Michael O Lam

Curriculum Vitae

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Affiliation: Assistant Professor
Department of Computer Science
James Madison University
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Education

2014 Ph.D. Computer Science, University of Maryland
Thesis title: "Automated Floating-Point Precision Analysis"
2010 M.S. Computer Science, University of Maryland
GPA: 4.0
2007 B.S. Computer Science, James Madison University
Minor in Mathematics and 15 credit hours in Technical Communication
GPA: 4.0

Research Interests

- High-Performance Computing
- Compilers and Program Analysis
- Software Engineering
- Scientific Visualization

Technical Skills

- Areas: Binary instrumentation, runtime analysis, floating-point arithmetic, system tools, auto-tuning, software engineering, scientific visualization
- Operating Systems: Linux (RHEL/CentOS, Ubuntu), Mac OS X, Microsoft Windows
- Languages: C, C++, C#, Java, Ruby, OCaml, Haskell, x86/x86_64 Assembly
- Systems: Dyninst, GNU Make, LaTeX/BibTex, .NET, Swing

Organizations

- Association for Computing Machinery
- Upsilon Pi Epsilon
- Pi Mu Epsilon
- Phi Kappa Phi

Research Experience

I have published peer-reviewed research on floating-point program analysis in the context of high-performance computing, as well as on software engineering for medical imaging. I have presented these research results in a wide variety of settings.

- Aug '14 - present: Assistant Professor at James Madison University. Ongoing work for a variety of projects with other faculty members (both CS and Math) and undergraduate students.
- Summer '15: Advised three students on two projects in collaboration with other CS and Math faculty members. These projects were presented at various local research gatherings, and one of them will be submitted as a journal paper by the end of the year.
- Spring '08 - June '14: Graduate Research Assistant and Postdoctoral Researcher at the University of Maryland, College Park. Worked with Dr. Jeff Hollingsworth on a system for automated floating-point precision level recommendations using binary instrumentation and runtime analysis. Also developed a tool for detecting and reporting floating-point cancellation.

  Website: `http://blog.freearrow.com/software/craft`
- Summer '11: Research Internship at Laurence Livermore National Lab in Livermore, CA. Worked with Dr. Bronis de Supinski and others to develop tools for floating-point arithmetic analysis in the context of high-performance computing.
- Fall '06 - Spring '07: Student research assistant with Dr. David Bernstein (JMU) on an open source object-oriented framework for OpenGL programming in C++, with a focus on robust design patterns and support for large-scale multiple-monitor visualization.

  Website: `http://code.google.com/p/xor/`
- Summer '06: Student research assistant on an open source framework for medical image retrieval in C# with Dr. Daniela Raicu (DePaul). Topics included content-based image retrieval, co-occurrence image features, and Gabor image filters.

  Website: `http://brisc.sourceforge.net/`

Teaching Experience

- CMSC330 - Survey of Programming Languages (Summer '08 and Summer '12, UMD)
- CS240 - Data Structures and Algorithms (Fall '14, Fall '15, JMU)
- CS430 - Programming Languages (Spring '25, JMU)
- CS480 - Special Topics: Compilers (Fall '15, JMU)
- CS480 - Special Topics: Large-scale Visualization (Spring '15, JMU)
- CS630 - Compilers: Theory and Implementation (Spring '15, JMU)

Service Experience

- Fall '15 - present: PAC executive committee member.
- Spring '15 - present: Coordinating the purchase and installation of a 12-node high performance computing cluster that will be used for research and teaching.

- Fall ’14 - present: Systems track curriculum re-design committee. Helped significantly with the development of a new senior-level parallel and distributed systems class.
- Fall ’14 - present: CS department lab committee member.
- Fall ’10 - Spring ’13: Representative, Graduate Student Government, University of Maryland. Attended regular campus-wide assembly meetings and voted on matters related to graduate student life. Served one year on the Student Affairs committee and one year on the Budget and Finance committee.
- Spring ’13: Member, Graduate Admissions Committee, Department of Computer Science, University of Maryland. Reviewed over thirty applications and submitted written evaluations.
- Spring ’12: Member, Departmental Review Committee, Department of Computer Science, James Madison University. Reviewed numerous aspects of the department and co-authored a report for the university administration.

Other Relevant Experience

- Spring ’12: CMSC 818P (Exascale Computing) with Dr. Jeff Hollingsworth (UMD). Topics included a petascale retrospective as well as various issues related to the exascale effort, such as codesign, workloads, reliability, programming models, variable precision, power management, and checkpointing.
- Fall ’07: CMSC 631 (Program Analysis) with Dr. Michael Hicks (UMD). Topics included lambda calculus, operational semantics, data flow analysis, and type systems. Grade: A
- Summer ’05: Worked at a technology startup company on .NET software development. Wrote code for network communication, data object marshalling, and distributed system management.

Publications

Journal articles

1. Lam, Michael O. and Jeffrey K. Hollingsworth. Fine-Grained Floating-Point Precision Analysis (in submission). *International Journal of High Performance Computing Applications* (2015).
2. Lam, Michael O., Jeffrey K. Hollingsworth, and G. W. Stewart. Dynamic floating-point cancellation detection. *Parallel Computing* **39**(3) (Mar. 2013), 146–155.
3. Lam, Michael O, Tim Disney, Daniela S Raicu, Jacob Furst, and David S Channin. BRISC - An Open Source Pulmonary Nodule Image Retrieval Framework. *Journal of Digital Imaging* **20**(Suppl 1) (2007), 63–71.

Conference papers

1. Lam, Michael O., Jeffrey K. Hollingsworth, Bronis R. de Supinski, and Matthew P. Legendre. Automatically adapting programs for mixed-precision floating-point computation. In: *Proceedings of the 27th International ACM Conference on Supercomputing - ICS '13*. New York, New York, USA: ACM Press, June 2013, pp.369.
2. Lam, Michael O, Jeffrey K Hollingsworth, and G W Stewart. Dynamic Floating-Point Cancellation Detection. In: *Proceedings of the First International Workshop on High-performance Infrastructure for Scalable Tools (WHIST'11)*. 2011.
3. Disney, Tim, Michael O Lam, Daniela S Raicu, Jacob Furst, and David S Channin. A Lookup and Reference Tool for Pulmonary Computed Tomography Nodules. In: *Proceedings of the 2007 Annual Meeting of the Society for Imaging Informatics in Medicine (SIIM'07)*. Providence, Rhode Island, 2007.
4. Lam, Michael, Tim Disney, Mailan Pham, Daniela Raicu, Jacob Furst, and Ruchaneewan Susomboon. Content-Based Image Retrieval for Pulmonary Computed Tomography Nodule Images. In: *Proceedings of the 2007 SPIE Medical Imaging Conference (SPIE'07)*. Vol. 6516. San Diego, CA: Spie, 2007.

Conference posters

1. Lam, Michael O and Jeffrey K Hollingsworth. Fine-Grained Floating-Point Precision Analysis (Poster). In: *Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis (SC'15)*. 2015.
2. Lam, Michael O, Jeffrey K Hollingsworth, Bronis R de Supinski, and Matthew P Legendre. Automatically Adapting Programs for Mixed-Precision Floating-Point Computation (Poster). In: *Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis (SC'12)*. 2012.

Unpublished technical reports

1. Lam, Michael O. *Automatic Floating-Point Precision Analysis (Ph.D Proposal)*. Tech. rep. Department of Computer Science, University of Maryland, Oct. 2011.
2. — *Dynamic Floating-Point Cancellation Detection (Master's Degree Scholarly Paper)*. Tech. rep. Department of Computer Science, University of Maryland, 2010.

Selected presentations

- "Automated Floating-Point Program Analysis." Invited colloquium talk for the Department of Mathematics, James Madison University. 9 Feb 2015.
- "Automated Mixed-Precision Floating Point Analysis." Invited talk. Workshop on Algorithmic and Application Error Resilience 2013. Eugene, OR. 11 June 2013.
- "Office Space and Salami: Analyzing Rounding Error in Computer Programs." Presentation. 1st Place in "Smart Computers and Computer Science" category. UMD Graduate Research Interaction Day. 23 April 2013.
- "Optimization of Floating-point Precision using Binary Modification." Presentation. Center for Scalable Application Development Software (CScADS). Performance Tools for Extreme-scale Computing Workshop 2012. Snowbird, UT. July 2012.