

Amir Hossein Hormati

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RESEARCH INTEREST My research interests lie in the area of compilers and computer architecture. Designing applications to efficiently utilize the future multi-core/many-core systems requires careful investigation and re-engineering of the different layers of computing from the input languages to the underlying hardware. The focus of my work is to find innovative ways to program heterogeneous/homogeneous multi-core systems and also compilation techniques to efficiently target these systems. Currently, I am working on streaming languages as the input language and compilation techniques for programs implemented based on streaming paradigm. I am also seeking new ways to improve the architecture of both distributed and shared memory processors to facilitate the execution of streaming programs.

EDUCATION **University of Michigan**
• Ph.D. candidate in Computer Science and Engineering *June 2007 to present*
• M.Sc., Computer Science and Engineering (GPA: 8.88, A=8 A+=9) *Sept. 2005 to June 2007*
Sharif University of Technology *Sept. 2001 to June 2005*
• B.Sc., Computer Engineering(GPA 18.35/20)

AWARDS AND HONORS • **University of Michigan Rackham Predoctoral Fellowship** *2009 to 2010*
The Rackham Predoctoral Fellowships support outstanding doctoral students who have achieved candidacy and are actively working on dissertation research and writing. Approximately 72 fellowships will be awarded campus-wide every year.
• **Rackham International Students Graduate Fellowship** *Winter 2007*
The Rackham international student fellowship assists outstanding international students. Every year this award is given to 25 students at University of Michigan with a strong academic record that demonstrate outstanding academic and professional promise.
• **Graduate Fellowship from EECS Department at University of Michigan** *Fall 2005, Winter 2006*
Graduate fellowship is awarded to first year graduate students who have outstanding resume and grades.
• **Ranked 1st among CSE students at Sharif University of Technology** *2001-2005*
• **Ranked 16th in the national university entrance exam** *2000*
(more than 300,000 participants)

PUBLICATIONS **Flextream: Adaptive Compilation of Streaming Applications for Heterogeneous Architectures**
Amir Hormati, Yoonseo Choi, Manjunath Kudlur, Rodric Rabbah, Trevor Mudge and Scott Mahlke
Proc. 18th Intl. Conference on Parallel Architectures and Compilation Techniques (PACT)

Optimus: Efficient Realization of Streaming Applications on FPGAs

Amir Hormati, Manjunath Kudlur, Scott Mahlke, and Rodric Rabbah

2008 International Conference on Compilers, Architecture, and Synthesis for Embedded Systems (CASES 2008)

VEAL: Virtualized Execution Accelerator for Loops

Nathan Clark, Amir Hormati, and Scott Mahlke

2008 International Symposium on Computer Architecture (ISCA 2008)

Liquid Metal: Object-Oriented Programming Across the Hardware/Software Boundary

Shan Shan Huang, Amir Hormati, David Bacon, and Rodric Rabbah

22nd European Conference on Object-Oriented Programming (ECOOP 2008)

Exploiting Narrow Accelerators with Data-Centric Subgraph Mapping

Amir Hormati, Nathan Clark, and Scott Mahlke

2007 International Symposium on Code Generation and Optimization (CGO 2007)

Liquid SIMD: Abstracting SIMD Hardware using Lightweight Dynamic Mapping

Nathan Clark, Amir Hormati, Scott Mahlke, Sami Yehia, and Krisztian Flautner

2007 International Symposium on High-Performance Computer Arch. (HPCA-13)

Scalable Subgraph Mapping for Acyclic Computation Accelerators

Nathan Clark, Amir Hormati, Scott Mahlke, and Sami Yehia

2006 International Conference on Compilers, Architecture, and Synthesis for Embedded Systems (CASES 2006)

PATENTS

Translation of SIMD Instructions in a Data Processing System, Patent #11905160, Sami Yehiam, Krisztian Flautner, Nathan Clark, Amir Hormati, Scott Mahlke *June 2008*

PRESENTATIONS

Talk at **International Conference on Parallel Architectures and Compilation Techniques, Raleigh, NC** on "Flexstream: Adaptive Compilation of Streaming Applications for Heterogeneous Architectures" *Sept. 2009*

Talk at **2008 International Conference on Compilers, Architecture, and Synthesis for Embedded Systems, Atlanta, GA** on "Optimus: Efficient Realization of Streaming Applications on FPGAs" *Sept. 2008*

Talk at **IBM T.J. Watson Research Center, Hawthorne, NY** on "How to Schedule High-Level Streaming Applications for FPGAs" *August 2008*

Talk at **IBM T.J. Watson Research Center, Hawthorne, NY** on "Efficient Synthesis of Object Oriented Application to FPGAs" *August 2007*

Talk at **2007 International Symposium on Code Generation and Optimization, San Jose, CA** on "Exploiting Narrow Accelerators with Data-Centric Subgraph Mapping" *April 2007*

EXPERIENCE

University of Michigan

Research Assistant

Investigating parallel languages, compilers and architectures. Focused on compiling high-level streaming languages to future multi-core/many-core systems.

Ann Arbor, MI

June 2007 to present

Graduate Teaching Instructor

Winter 2007

Teaching assistant for undergraduate computer architecture course. Responsibilities included teaching recitation sections, holding office hours, and developing homeworks/exams.

IBM T.J. Watson Research Center

Research Intern, Dynamic Optimization Group

Summer 2007, 2008

Worked on LiquidMetal project developing a new language and runtime compiler for executing streaming applications on heterogeneous systems.

Sharif University of Technology

Teacher Assistant

Winter 2002, Fall 2003

Teaching assistant for undergraduate courses, Introduction to Microprocessors and Introduction to Java Programming. Responsibilities included teaching recitation sections developing projects.

ObjectJ Co.

Project Manager

June 2002 to June 2003

Worked as a project manager on several enterprise projects such as Nexus(A web based learning management system), Sonata(A web based course authoring tool), and Quest(A web based assessment tool).

REPRESENTATIVE
PROJECTS

MacroSS

Summer 2009

MacroSS is a compiler for streaming applications based on MIT's StreamIt compiler. MacroSS enables vectorization of streaming application at actor level.

Optimus

Summer 2008

Optimus is a compiler with an extensive set of optimizations to map streaming applications to reconfigurable architectures, such as FPGAs. Optimus is based on Trimaran and currently generate verilog code.

Fault-tolerant Cache Coherent Protocol

Fall 2006

In this project, the MOESI bus based cache coherence protocol was modified to enable multiple cores in a CMP system cooperate and perform fault detection and recovery. Detection and recovery were implemented using Finger-printing and SafetyNet in M5 simulator.

Advanced Out-of-Order Processor

Fall 2005

In this work, a synthesizable out-of-order processor with speculative instruction execution, early branch resolution, speculative load/store queue with store-to-load forwarding, and non-blocking dual-port data cache was designed in Verilog.

High-speed PCI Digital I/O Card

Winter 2005

The hardware(PCB) and software(Linux drivers) for a 2Mbps digital PCI I/O card with 32 input and 8 outputs were designed and implemented. In this project, AMCC S5920 was used as the PCI controller and XC95144XL CPLD was used as the on-board ram controller.

RELEVANT
GRADUATE
COURSES

EECS 470, Advanced Computer Architecture (A+)
EECS 478, Logic Circuit Synthesis and Optimization (A+)
EECS 492, Artificial Intelligence (A+)
EECS 583, Advanced Compilers (A+)
EECS 570, Parallel Computer Architecture (A+)
EECS 573, Microarchitecture (A+)
IOE 510, Linear Programming (A)

REFERENCES

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Rodric Rabbah, Researcher

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Manjunath Kudlur, Researcher

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