

Youtao Zhang

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Computer Science Department
University of Pittsburgh
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RESEARCH INTERESTS

- Compilers and program analysis: update-conscious compilation; program slicing; program profiling; code optimization
- Computer architecture: architectural support for secure computer systems; chip multiprocessors; cache management; onchip interconnection

EDUCATION

- Ph.D., Department of Computer Science, University of Arizona, Tucson, AZ, August 2002, Thesis: “The Design and Implementation of Compression Techniques for Profile Guided Compilation”, Advisor: Professor Rajiv Gupta
- M.Eng., Department of Computer Science and Technology, Nanjing University, China, June 1996,
- B.S., Department of Computer Science and Technology, Nanjing University, China, June 1993

EMPLOYMENT

- Assistant Professor, University of Pittsburgh, Pittsburgh, PA, January 2006 –
- Assistant Professor, University of Texas at Dallas, Richardson, TX, November 2002 – December 2005
- Summer Intern, Hewlett-Packard Company, Boise, ID, May 1998 – August 1998
- Software Engineer, Pacific City Inc. Nanjing, China, August 1996 – May 1997

AWARDS

- NSF CAREER Award, January 2005
- Distinguished Paper Award, IEEE/ACM International Conference on Software Engineering, May 2003
- Most Original Paper Award, International Conference on Parallel Processing, October 2003

I. RESEARCH

PUBLICATIONS

JOURNAL PUBLICATIONS

- [1] TACO Weijia Li, Youtao Zhang, Jun Yang, and Jiang Zheng, “Towards Update-Conscious Compilation for Energy-Efficient Code Dissemination in WSNs,” *ACM Transactions on Architecture and Code Optimization*, accepted.
- [2] TPDS Xiuyi Zhou, Jun Yang, Yi Xu, Youtao Zhang, Jianhua Zhao, “Thermal Management for 3D Processors via Task Scheduling,” *IEEE Transactions on Parallel and Distributed Systems*, accepted.
- [3] WINET Youtao Zhang, Jun Yang, Hai T. Vu, and Yizhi Wu, “The Design and Evaluation of Interleaved Authentication for Filtering False Reports in Multipath Routing WSNs,” *Wireless Networks*, Springer, accepted.
- [4] JPDC Jun Yang, Lan Gao, Youtao Zhang, Marek Chrobak, and Hsien-Hsin S Lee, “A Low-cost Memory Remapping Scheme for Address Bus Protection,” *Journal of Parallel and Distributed Computing*, accepted.

- [5] IEEE Micro Benjamin C. Lee, Ping Zhou, Doug Burger, Engin Ipek, Onur Mutlu, Jun Yang, Youtao Zhang, and Bo Zhao, "Phase Change Technology and the Future of Main Memory (tentative title)," *IEEE Micro, Special Issue: Micro's Top Picks from 2009 Computer Architecture Conferences (MICRO TOP PICKS)*, Vol. 30, No. 1, January/February 2010.
- [6] JNCA Youtao Zhang, Jun Yang, Weijia Li, Linzhang Wang, and Lingling Jin, "An Authentication Scheme for Locating Compromised Sensor Nodes in WSNs," *Journal of Network and Computer Applications*, Elsevier, vol 33(1):50-62, 2010.
- [7] JCEE Youtao Zhang, Jun Yang, and Lan Gao, "Supporting Flexible Streaming Media Protection through Privacy-aware Secure Processors," a special issue on Circuits and Systems for Real-Time Security and Copyright Protection of Multimedia, *Journal of Computers and Electrical Engineering*, Elsevier, Vol 35(2), pages 286-299, 2009.
- [8] JSS Yongjing Lin, Youtao Zhang, and Rajiv Gupta, "The Design and Evaluation of Path Matching Schemes on Compressed Control Flow Traces", *Journal of Systems and Software*, Elsevier, Vol 80(3), pages 396-409, 2007.
- [9] SP&E Youtao Zhang and Rajiv Gupta, "Compressing Heap Data for Improved Memory Performance," *Software Practice & Experience*, Vol 36(10) pages 1081-1111, 2006.
- [10] TC Jun Yang, Lan Gao, and Youtao Zhang, "Improving Memory Encryption Performance in Secure Processors," *IEEE Transactions on Computers*, Vol 54(5), pages 630-640, 2005.
- [11] JSA Jun Yang, Jia Yu, and Youtao Zhang, "A Low Energy Cache Design for Multimedia Applications Exploiting Set Access Locality," *Journal of Systems Architecture*, Elsevier, Vol 51(10-11), pages 653-664, 2005.
- [12] TOPLAS Xiangyu Zhang, Rajiv Gupta, and Youtao Zhang, "Cost and Precision Tradeoffs of Dynamic Slicing Algorithms," *ACM Transactions on Programming Languages and Systems*, Vol 27(4), pages 631-661, 2005.
- [13] JEC Youtao Zhang and Jun Yang, "Reducing I-cache Energy of Multimedia Applications through LowCost Tag Comparison Elimination," *Journal of Embedded Computing*, IOS Press, Vol 1(4), pages 461-470, 2005.
- [14] IJHPCN Zili Shao, Qingfeng Zhuge, Youtao Zhang, Edwin H.-M. Sha, "Algorithms and Analysis of Scheduling for Low-Power High-Performance DSP on VLIW Processors," *International Journal of High Performance Computing and Networking*, Vol 1, pages 3-16, 2004.

CONFERENCE PUBLICATIONS

- [1] DATE Lin Li, Youtao Zhang, Jun Yang, and Jianhua Zhao, "Proactive NBTI Mitigation for Busy Functional Units in Out-of-Order Microprocessors," *The IEEE conference on Design, Automation and Test in Europe*, accepted, Dresden, Germany, March 8-12, 2010. (acceptance rate = n/a).
- [2] HPCA Yi Xu, Bo Zhao, Youtao Zhang, and Jun Yang, "Simple Virtual Channel Allocation for High Throughput and High Frequency On-Chip Routers," *IEEE the 16th International Symposium on High-Performance Computer Architecture*, accepted, Bangalore, India, January 2010. (acceptance rate = n/a).
- [3] MICRO Bo Zhao, Yu Du, Youtao Zhang, and Jun Yang, "Variation-Tolerant Non-Uniform 3D Cache Management in Die Stacked Multicore Processor," *The 42nd Annual IEEE/ACM International Symposium on Microarchitecture*, accepted, New York, December 2009. (acceptance rate = n/a).
- [4] ICCAD Pin Zhou, Bo Zhao, Jun Yang, and Youtao Zhang, "Energy Reduction for STT-RAM Using Early Write Termination," *IEEE/ACM International Conference on Computer-Aided Design*, accepted, San Jose, CA, November 2009. acceptance rate = $115/438 = 26\%$).
- [5] ISCA Ping Zhou, Bo Zhao, Jun Yang, and Youtao Zhang, "A Durable and Energy Efficient Main Memory Using Phase Change Memory Technology," *The 36th International Symposium on Computer Architecture*, Austin, Texas, June 2009. (acceptance rate = $43/210 = 20\%$)
- [6] RTCSA Yang Zhao, Youtao Zhang, Zhiguang Qin, and Taieb Znati, "SDC: Secure Data Collection for Time Based Queries in Tiered Wireless Sensor Networks," *The 15th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications*, Beijing, China, August 2009. (acceptance rate: $39/124=31\%$)

- [7] DCOSS Weijia Li, Youtao Zhang, and Bruce Childers, "MCP: an Energy-Efficient Code Distribution Protocol for Multi-Application WSNs," *The 5th IEEE International Conference on Distributed Computing in Sensor Systems*, LNCS 5516, Springer-Verlag, pages 259-272, Marina Del Rey, California, June 2009. (acceptance rate = $26/116 = 22\%$)
- [8] HPCA Yi Xu, Yu Du, Bo Zhao, Xiuyi Zhou, Youtao Zhang, and Jun Yang, "A Low-Radix and Low-Diameter 3D Interconnection Network Design," *IEEE the 15th International Symposium on High-Performance Computer Architecture*, pages 30–41, Raleigh, North Carolina, 2009. **Nominated for best paper award.** (acceptance rate = $35/184 = 19\%$)
- [9] ASPDAC Ping Zhou, Bo Zhao, Yi Xu, Yu Du, Youtao Zhang, Jun Yang, Li Zhao, "Frequent Value Compression in Packet-based NoC Architecture," *The 14th Asia and South Pacific Design Automation Conference*, Yokohama, Japan, January 2009. (acceptance rate = $116/355 = 33\%$)
- [10] EUC Weijia Li, Yu Du, Youtao Zhang, Bruce Childers, Ping Zhou, Jun Yang, "Adaptive Buffer Management for Efficient Code Dissemination in Multi-Application Wireless Sensor Networks," *International Conference on Embedded and Ubiquitous Computing*, Shanghai, China, 2008. (acceptance rate = $70/233 = 30\%$)
- [11] ICPP Xiuyi Zhou, Yi Xu, Yu Du, Youtao Zhang and Jun Yang, "Thermal Management for 3D Processors via Task Scheduling," *International Conference on Parallel Processing*, Portland, Oregon, September 2008. (acceptance rate = $81/263 = 30\%$)
- [12] ISPASS Jun Yang, Xiuyi Zhou, Marek Chrobak, Youtao Zhang, Lingling Jin, "Dynamic Thermal Management through Task Scheduling," *International Symposium on Performance Analysis of Systems and Software*, April 2008. (acceptance rate = $22/63 = 35\%$)
- [13] PLDI Weijia Li, Youtao Zhang, Jun Yang, and Jiang Zheng, "UCC: Update-conscious Compilation for Energy Efficiency in Wireless Sensor Networks," *ACM SIGPLAN Conference on Programming Language Design and Implementation*, San Diego, California, 2007. (acceptance rate = $45/178 = 25\%$)
- [14] MASS Weijia Li, Youtao Zhang, and Jun Yang, "Dynamic Authentication-Key Re-assignment for Reliable Report Delivery," *The 3rd IEEE International Conference on Mobile Ad-hoc and Sensor Systems*, Vancouver, Canada, October 2006. (acceptance rate = $49/197 = 25\%$)
- [15] ICCD Lingling Jin, Wei Wu, Jun Yang, Chuanjun Zhang, and Youtao Zhang, "Reduce Register Files Leakage Through Discharging Cells," *International Conference on Computer Design*, California, October 2006. (acceptance rate = $45/178 = 25\%$)
- [16] PACT Lan Gao, Jun Yang, Marek Chrobak, Youtao Zhang, San Nguyen, Hsien-Hsin Lee, "A Low-cost Memory Remapping Scheme for Address Bus Protection," *The 15th International Conference on Parallel Architectures and Compilation Techniques*, Seattle, Washington, September 2006. (acceptance rate = $30/117 = 26\%$)
- [17] DCOSS Youtao Zhang, Jun Yang, Lingling Jin, and Weijia Li, "Locating Compromised Sensor Nodes through Incremental Hashing Authentication," *IEEE International Conference on Distributed Computing in Sensor Systems*, San Francisco, June 2006. (acceptance rate = $33/87 = 38\%$)
- [18] IPDPS Youtao Zhang, Jun Yang, and Hai T Vu, "The Interleaved Authentication for Filtering False Reports in Multipath Routing based Sensor Networks," *IEEE 20th International Parallel and Distributed Processing Symposium*, Rhodes Island, Greece, April 2006. (acceptance rate = $125/531 = 24\%$)
- [19] HPCA Weidong Shi, Joshua B. Fryman, Guofei Gu, Hsien-Hsin S. Lee, Youtao Zhang, and Jun Yang, "InfoShield: A Security Architecture for Protecting Information Usage in Memory," *IEEE 12th International Symposium on High-Performance Computer Architecture*, Austin, TX, February 2006. (acceptance rate = $26/172 = 15\%$)
- [20] HPCA Youtao Zhang, Lan Gao, Jun Yang, Xiangyu Zhang, and Rajiv Gupta, "SENS: Security Enhancement to Symmetric Shared Memory Multiprocessors," *IEEE 11th International Symposium on High Performance Computer Architecture*, San Francisco, California, February 2005. (acceptance rate = $28/181 = 15\%$)
- [21] SAC Yongjing Lin, Youtao Zhang, Quanzhong Li, and Jun Yang, "Supporting Efficient Query Processing on Compressed XML Files," *ACM The 20th Annual Symposium on Applied Computing*, Santa Fe, New Mexico, March, 2005. (acceptance rate = $278/764 = 36\%$)

- [22] DCC Yongjing Lin, and Youtao Zhang, "Performance Comparison of Path Matching Algorithms over Compressed Control Flow Traces," *IEEE Data Compression Conference*, Snowbird, Utah, March 2005. (acceptance rate = n/a)
- [23] ICESS Lingling Jin, Wei Wu, Jun Yang, Chuanjun Zhang, and Youtao Zhang, "Dynamic Co-allocation of Level One Caches," *The Second International Conference on Embedded Software and Systems*, pages 373-385, Xi'an, China 2005. (acceptance rate = 68/361 = 19%)
- [24] ICSE Xiangyu Zhang, Rajiv Gupta, and Youtao Zhang, "Efficient Forward Computation of Dynamic Slices Using Reduced Ordered Binary Decision Diagrams," *IEEE/ACM International Conference on Software Engineering*, Edinburgh, UK, May 2004. (acceptance rate = 58/436 = 13%)
- [25] ICPADS Guodong Li, Youtao Zhang, Yongjing Lin, Yaochun Huang, "Scalable Duplication Strategy with Bounded Availability of Processors," *IEEE The Tenth International Conference on Parallel and Distributed Systems*, Newport Beach, California, July 2004. (acceptance rate = 65/292 = 22%)
- [26] MICRO Jun Yang, Youtao Zhang and Lan Gao, "Fast Secure Processor for Inhibiting Software Piracy and Tampering," *IEEE/ACM 36th International Symposium on Microarchitecture*, pages 351-360, San Diego, December 2003. (acceptance rate = 35/134 = 26%)
- [27] ICPP Youtao Zhang and Rajiv Gupta, "Enabling Partial Cache Line Prefetching Through Data Compression," *International Conference on Parallel Processing*, pages 277-285, Kaohsiung, Taiwan, October 2003. **ICPP 2003 Most Original Paper Award.** (acceptance rate = 69/192 = 36%)
- [28] ICPP Youtao Zhang and Jun Yang, "Procedural Level Address Offset Assignment of DSP Applications with Loops," *International Conference on Parallel Processing*, pages 21-28, Kaohsiung, Taiwan, October 2003. (acceptance rate = 69/192 = 36%)
- [29] ICSE Xiangyu Zhang, Rajiv Gupta, and Youtao Zhang, "Precise Dynamic Slicing Algorithms," *IEEE/ACM International Conference on Software Engineering*, pages 319-329, Portland, Oregon, May 2003. **ICSE 2003 Distinguished Paper Award.** (acceptance rate = 42/324 = 13%)
- [30] ISLPED Youtao Zhang and Jun Yang, "Low Cost Instruction Cache Designs for Tag Comparison Elimination," *ACM/IEEE International Symposium on Low Power Electronics and Design*, pages 266-269, Seoul, Korea, August 2003. (acceptance rate = 90/221 = 41%)
- [31] ISLPED Jun Yang, Jia Yu, and Youtao Zhang, "Lightweight Set Buffer: Low Power Data Cache for Multimedia Applications," *ACM/IEEE International Symposium on Low Power Electronics and Design*, pages 270-273, Seoul, Korea, August 2003. (acceptance rate = 90/221 = 41%)
- [32] CC Youtao Zhang and Rajiv Gupta, "Data Compression Transformations for Dynamically Allocated Data Structures," *International Conference on Compiler Construction*, LNCS 2304, Springer Verlag, pages 14-28, Grenoble, France, April 2002. (acceptance rate = 18/44 = 41%)
- [33] CC Rajiv Gupta, Eduard Mehofer, and Youtao Zhang, "A Representation for Bit Section based Analysis and Optimization," *International Conference on Compiler Construction*, LNCS 2304, Springer Verlag, pages 62-77, France, April 2002. (acceptance rate = 18/44 = 41%)
- [34] DCC Youtao Zhang and Rajiv Gupta, "Path Matching in Compressed Control Flow Traces," *IEEE Data Compression Conference*, pages 132-141, Snowbird, Utah, April 2002. (acceptance rate = n/a)
- [35] PLDI Youtao Zhang and Rajiv Gupta, "Timestamped Whole Program Path Representation and its Applications," *ACM SIGPLAN Conference on Programming Language Design and Implementation*, pages 180-190, Snowbird, Utah, June 2001. (acceptance rate = 30/144 = 21%)
- [36] MICRO Jun Yang, Youtao Zhang, and Rajiv Gupta, "Frequent Value Compression in Data Caches," *IEEE/ACM 33rd International Symposium on Microarchitecture*, pages 258-265, Monterey, CA, December 2000. (acceptance rate = 31/110 = 28%)
- [37] ASPLOS Youtao Zhang, Jun Yang, and Rajiv Gupta, "Frequent Value Locality and Value-Centric Data Cache Design," *ACM 9th International Conference on Architectural Support for Programming Languages and Operating Systems*, pages 150-159, Cambridge, MA, November 2000. (acceptance rate = 24/114 = 21%)

BOOK CHAPTERS

- [1] JW&S Youtao Zhang, Rajiv Gupta, “Enabling Partial Cache Line Prefetching Through Data Compression,” *High-Performance Computing: Paradigm and Infrastructure*, pages 183-200, John Wiley & Sons, Inc., October 2005.
- [2] CRC Rajiv Gupta, Eduard Mehofer and Youtao Zhang, “Profile Guided Code Optimizations,” *The Compiler Design Handbook: Optimizations and Machine Code Generation, Chapter 4*, CRC Press, September 2002.

WORKSHOP/POSTER PUBLICATIONS

- [1] NSFNGS Youtao Zhang, Jun Yang and Weijia Li, “Towards Energy-Efficient Code Dissemination in Wireless Sensor Networks,” *The Next Generation Software Workshop*, collocated with IPDPS, Florida, April 2008.
- [2] ASAP Youtao Zhang, Jun Yang, and Lan Gao, “Efficient Group Key Management with Tamper-resistant ISA Extensions,” *IEEE 17th International Conference on Application-specific Systems, Architectures and Processors*, (Poster), Steamboat Springs, Colorado, September 2006.
- [3] WASSA Youtao Zhang, Jun Yang, Yongjing Lin, and Lan Gao, “Architectural Support for Protecting User Privacy on Trusted Processors,” *The Workshop on Architectural Support for Security and Anti-Virus*, In conjunction with the 11th ASPLOS, Boston, MA, October 2004.
- [4] LCPC Bengu Li, Youtao Zhang and Rajiv Gupta, “Speculative Subword Register Allocation in Embedded Processors,” *The 17th International Workshop on Languages and Compilers for Parallel Computing*, West Lafayette, Indiana, September 2004.

Invited Presentations

- “The Emerging Secure Processor Designs”, the Sixth Annual Emerging Information Technology Conference (EITC), August 2006, Dallas
- “Interleaved Authentication for Filtering False Reports in Multipath Routing based Sensor Networks”, School of Information Sciences, University of Pittsburgh, 2006, Pittsburgh

GRANTS

- NSF, co-PI, \$120,000, “CSR-CSI: An Update-conscious Compilation Framework for Energy-Efficient Code Dissemination in Wireless Sensor Networks”, 09/2007-09/2009
- NSF CAREER Award, PI, \$400,000, “A Compilation Framework for the Development of High Performance Secure Applications on Trusted Processors”, 01/2005-12/2009
- Emmitt Project, PI, \$45,000, University of Texas at Dallas, ”Architectural support for enhancing security”, 6/2005-8/2006
- NSF, PI, \$26,000, “Architectural Support for Security and Privacy Protection on Uni- and Multi-Processors”, 11/2004-10/2005

II. TEACHING

TEACHING EXPERIENCE

University of Pittsburgh

- CS2210 Compiler Construction (graduate level), Spring 2006, 2007, 2008, 2009
- CS3220 Compiler Techniques for Parallel Systems, Fall 2007
- CS1621 Structure of Programming Languages, Fall 2007, 2009
- CS1622 Introduction to Compiler Design, Fall 2008
- CS0441 Discrete Mathematics, Spring 2009

- CS0447 Computer Organization and Assembly Language Programming, Fall 2006

University of Texas at Dallas

- CS6353 Compiler Construction (graduate level), Spring 2003, 2004, 2005, Fall 2005
- CS4348 Operating System Concepts (undergraduate level), Spring 2003, 2005
- CS5348 Operating System Concepts (graduate level), Fall 2003, 2004, Spring 2005

STUDENTS

As the degree committee chair

- Weijia Li, PhD student, University of Pittsburgh
 - in progress, passed comprehensive exam
 - 7 publications, to graduate in Spring 2010
 - recipient of 2008-2009 Andrew Mellon Fellowship
- Yu Du, PhD student, University of Pittsburgh
 - in progress, passed comprehensive exam
 - 4 publications, to graduate in Summer 2011
- Mohammed Mohammed, MS student, University of Pittsburgh
 - in progress
- Hai T Vu, MS student (graduated), University of Texas at Dallas, Dec. 2005

On the degree committee

- Hui Ling, PhD student, University of Pittsburgh
- Peter Djalaliev, PhD student, University of Pittsburgh
- Jonathan Misurda, PhD student, University of Pittsburgh

III. SERVICE

PROFESSIONAL ACTIVITIES

Guest Editor

- Journal of Embedded Computing (JEC), Special issue on Embedded System Optimization, Volume 3, Issue 1, 2009

General Chair

- Co-chair, the 28th IEEE International Performance Computing and Communication Conference (IPCCC), December 2009

Program Chair

- The 27th IEEE International Performance Computing and Communication Conference (IPCCC), December 2008
- The 13th Workshop on Interaction between Compilers and Computer Architectures (Interact-13), February 2009

Publication Chair

- The International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2010

TPC Member

- ACM SIGPLAN Conference on Languages, Compilers and Tools for Embedded Systems(LCTES), 2004, 2010
- IEEE International Conference on Information Reuse and Integration (IRI), 2006, 2007, 2008, 2009
- The International Conference on Embedded Software and System (ICESS), 2004, 2005, 2009
- IEEE the International Symposium on Embedded Computing (SEC), 2007, 2008
- IASTED International Conference on Parallel and Distributed Computing and Networks (PDCN), 2005, 2006, 2007, 2008, 2009, 2010
- International Symposium on Data, Privacy, and E-Commerce (ISDPE), 2007, 2010
- International Conference on Embedded and Multimedia Computing (EM-COM), 2009
- IEEE International Conference on Computer Communications and Networks (ICCCN), 2007
- IFIP International Conference on Embedded And Ubiquitous Computing (EUC), 2005, 2006
- ACM/IEEE International Symposium on Code Generation and Optimization (CGO), 2005

Panelist and Reviewer

- NSF Panelist: SHF(March 2009), CRI(November 2008), CPA (March 2008), SoD(May 2006), CyberTrust(May 2005), ITR (May 2003)
- Reviewer for multiple journals and conferences

Membership

- ACM, IEEE, IEEE computer society

DEPARTMENT SERVICE

University of Pittsburgh

- Graduate Programs and Examinations Committee, Fall 2008 –
- Graduate admission and financial aid committee, Fall 2007 – Spring 2008
- Undergraduate advising committee, Fall 2006 – Spring 2007

University of Texas at Dallas

- Department Equipment Committee, Fall 2003 – Fall 2005
- Computer Engineering Graduate Admission Committee, Spring 2004 – Fall 2005