

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering

Approved by the Regents

May 14, 2009

Todd M. Austin, associate professor of electrical engineering and computer science, with tenure, Department of Electrical Engineering and Computer Science, College of Engineering, is recommended for promotion to professor of electrical engineering and computer science, with tenure, Department of Electrical Engineering and Computer Science, College of Engineering.

Academic Degrees:

Ph.D. 1996 University of Wisconsin, Madison, Computer Science, Madison, WI
M.S. 1990 Rochester Institute of Technology, Computer Engineering, Henrietta, NY
B.S. 1987 University of Wisconsin, Madison, Electrical Engineering, Madison, WI
B.S. 1987 University of Wisconsin, Madison, Computer Science, Madison, WI

Professional Record:

2003-present Associate Professor, (with tenure), Department of Electrical Engineering and Computer Science, University of Michigan
1999-2003 Assistant Professor, Department of Electrical Engineering and Computer Science, University of Michigan
1997-1999 Adjunct Assistant Professor, Computer Science and Engineering Department, Oregon Graduate Institute, Portland, OR
1996-1999 Senior Computer Architect, Intel Corporation, Portland, OR
1992-1996 Research Assistant, Computer Science Department, University of Wisconsin, Madison, WI

Summary of Evaluation

Teaching: Professor Austin has accumulated a strong record of teaching at all levels from introductory sophomore level courses to advanced graduate seminars. He has been recognized with several teaching awards including the Henry Russel Award (2004), the College of Engineering (CoE) Education Excellence Award (2004), and the Ruth and Joel Spira Outstanding Teacher Award (2002). He has taught large undergraduate courses, which also involve coordinating and supervising graduate student instructors and graders. His teaching scores have been consistently strong with his Q1 and Q2 scores averaging 4.4 and 4.7, respectively. Students remark on his ability to stimulate discussion in the classroom, his open and engaging style, and the practice of including real life examples in lectures. Professor Austin has also contributed to curriculum development. In particular, he participated in a much-needed retooling of EECS 470 (Computer Architecture), a capstone computer engineering course. In addition, he introduced EECS 598, the graduate level seminar course human-inspired computing. Professor Austin has maintained an active research group since coming to the University of Michigan. He has graduated four Ph.D. students, with a fifth expected early in 2009. Three of his students have found jobs in academia. In addition, he has supervised an extensive set of masters students. He provides his students with good direction and encouragement and fosters their own creativity with enthusiasm.

Research: Professor Austin is one the leading researchers of his cohort in the field of computer architecture. His main contributions to research have been in the area of dynamic verification, in which processors are verified for correctness while they execute. Professor Austin is credited as being one of the pioneers of this approach. His main two research projects in this area have been DIVA and Razor. Reviewers credit Professor Austin with having developed the new research area of dynamic verification. DIVA supplements a processor core with a simple yet high-performance checker. This work has received the best paper award at the 1999 IEEE/ACM Symposium on Microarchitecture and has since been cited

over 300 times by other researchers. Razor, a collaborative research effort with another CoE faculty member, allows a microprocessor to run at lower voltages and higher frequencies through dynamic verification. Professor Austin is the recipient of the 2007 ACM Maurice Wilkes Award, the top mid-career award in his field, for innovative contributions in computer architecture including the SimpleScalar Toolkit and the DIVA and Razor architectures. Professor Austin has established a stellar reputation in the computer architecture research community. He is an inventor or co-inventor of 11 patents. The quality of his research is further evidenced by his impressive publication record in archival journals and highly selective conferences in computer architecture.

Recent and Significant Publications:

- Joseph L. Greathouse, Ilya Wagner, David A. Ramos, Gautam Bhatnagar, Todd Austin, Valeria Bertacco and Seth Pettie, "Testudo: Heavyweight Security Analysis via Statistical Sampling," in the 41st Annual International Symposium on Microarchitecture (MICRO-41), November 2008.
- T. Austin, V. Bertacco, S. Mahlke, and K. Cao, "Reliable Systems on Unreliable Fabrics," *IEEE Design and Test of Computers*, Vol. 25, No. 4, July 2008.
- Kypros Constantinides, Smitha Shyam, Sujay Phadke, Valeria Bertacco and Todd Austin, "Ultra Low-Cost Defect Protection for Microprocessor Pipelines," International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), October 2006.
- Shubhendu S. Mukherjee, Christopher T. Weaver, Joel Emer, Steven K. Reinhardt, and Todd Austin, "Measuring Architectural Vulnerability Factors", *IEEE MICRO* special issue on Top Picks From Microarchitecture Conferences of 2003, Vol. 23, No. 6, December 2003.
- Dan Ernst, Nam Sung Kim, Shidhartha Das, Sanjay Pant, Toan Pham, Rajeev Rao, Conrad Ziesler, David Blaauw, Todd Austin, Trevor Mudge, and Krisztián Flautner, "Razor: A Low-Power Pipeline Based on Circuit-Level Timing Speculation," in the 36th Annual International Symposium on Microarchitecture (MICRO-36), December 2003. (Best Paper Award.)
- Dan Ernst and Todd Austin, "Efficient Dynamic Scheduling Through Tag Elimination," ACM/IEEE 29th International Symposium on Computer Architecture (ISCA-2002), May 2002.
- Todd Austin, Eric Larson, and Dan Ernst, "SimpleScalar: An Infrastructure for Computer System Modeling," *IEEE Computer*, February 2002.
- Todd Austin, "DIVA: A Reliable Substrate for Deep Submicron Microarchitecture Design," ACM/IEEE 32nd Annual Symposium on Microarchitecture (MICRO-32), November 1999. (Best Paper Award.)

Service: Professor Austin has made significant contributions to the University and the external professional community through his service. He has served on several major committees within the Department of Electrical Engineering and Computer Science (EECS) and in the College of Engineering. Over the last decade, he has served as a member of the Computer Science and Engineering (CSE) Graduate Admission Committee, as financial aid chair for CSE, and as CUGS program advisor and CE program advisor. Professor Austin was a significant contributor to the EECS Internal Review Committee in Fall 2004 and the Graduate Education Task Force in Winter 2008. His external service record is significant and of high quality, having served on program committees of major conferences and notable workshops, and several NSF and DARPA panels. He has served as an associate editor and guest editor for venues including the *ACM Transactions on Architecture and Code Optimization*, *IEEE Computers*, and *IEEE Micro*.

External Reviewers:

Reviewer A: "...Prof. Austin is perhaps the most gifted computer architect of his generation, with contributions to simulation, fault-tolerance, performance, and power. ... [He] led the call for *dynamic verification* of processor cores and provided a foundational answer with *DIVA*."

Reviewer B: “He starts whole new areas of research. ... [and] is more likely to ask a very different question, and come up with a very different answer. ... [His insight] essentially launched the research area of creating low-cost hardware checkers.”

Reviewer C: “He has clearly established himself as a leader in the area of semiconductor reliability.”

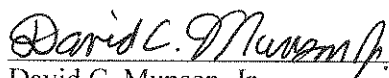
Reviewer D: “Todd is well known for ... his pioneering research in dynamic verification with the DIVA and Razor microarchitectures. ... It is safe to say without SimpleScalar many ideas in processor design may not have been subjected to rigorous quantitative evaluation. ... He picks important problems and his research ideas have a high degree of novelty.”

Reviewer E: “...he is one of the most innovative and creative computer architects in the world in his age group, if not any age group. ... he is a leader and a gifted communicator. I always look forward to hear [sic] one of his presentations. He manages to take a complex topic apart and present the concepts in a crystal clear format.”

Reviewer F: “*SimpleScalar* is ... the single most important piece of modeling infrastructure in the architecture world over the last decade. ... Todd’s work is consistently characterized by a level of creativity and elegance that is truly rare.”

Reviewer G: “Regarding his position among his contemporaries, I would place Professor Austin’s work at the very top level, not in quantity but at least in the quality of the work, and the potential impact of his contributions.”

Summary of Recommendation: Professor Todd Austin’s research has established him as one of the top computer architects of his cohort and has strengthened Computer Science and Engineering at the University of Michigan. He is credited by his peers as one of the pioneers in the important new area of dynamic verification. He is recognized as an effective teacher and a respected scholar at the University of Michigan and has taken on the substantial service role expected of faculty at the rank of professor. It is with the support of the College of Engineering Executive Committee that I recommend Todd Austin for promotion to professor of electrical engineering and computer science, with tenure, Department of Electrical Engineering and Computer Science, College of Engineering.



David C. Munson, Jr.

Robert J. Vlasic Dean of Engineering

College of Engineering

May 2009