

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering
Department of Electrical Engineering and Computer Science

Approved by the
Regents
May 21, 2015

Zhengya Zhang, assistant professor of electrical engineering and computer science, Department of Electrical Engineering and Computer Science, College of Engineering, is recommended for promotion to associate professor of electrical engineering and computer science, with tenure, Department of Electrical Engineering and Computer Science, College of Engineering.

Academic Degrees:

Ph.D. 2009 University of California, Electrical Engineering, Berkeley, CA
M.S. 2005 University of California, Electrical Engineering, Berkeley, CA
B.A.Sc. 2003 University of Waterloo, Computer Engineering, Waterloo, Canada

Professional Record:

2009 – present Assistant Professor, Department of Electrical Engineering and Computer Science, University of Michigan

Summary of Evaluation:

Teaching: Professor Zhang is an outstanding teacher who has taught undergraduate courses (300 and 400), and a graduate course that he developed on VLSI for digital signal processing. His average Q1/Q2 scores are extremely high (4.76/4.89) and his courses are well enrolled, further demonstrating that students respect and benefit from his instruction. Letters from students uniformly pointed to his propensity to stay after class and lead conversations among students that one called “a forum that includes anyone within earshot.” His clarity and approachability were highlighted frequently. In terms of graduate student mentoring, Professor Zhang has excelled. He has already established a large research group (eight Ph.D. students) and has graduated two Ph.D. students to date. His Ph.D. students praise him for the personal attention he gives them as well as his ability to raise funds to support the students’ research.

Research: Professor Zhang’s research is in the area of hardware implementations of signal processing and communication algorithms, particular in integrated circuits (ICs). He has a focus on low-density parity codes (LDPC), which are widely used in high-speed communication and data storage products. Professor Zhang and his research group have developed the most energy- and area-efficient LDPC decoders ever reported. He deftly combines circuit-level innovations with architectural and algorithmic novelties to demonstrate such record performance levels on a consistent basis. This area is ripe for collaboration, and Professor Zhang has worked successfully with other circuit researchers as well as signal processing and communication algorithm researchers. His research has expanded during his time in rank to include error-resilient computing as well as neuromorphic signal processing systems. On the former, Professor Zhang has developed radiation-hardened systems for flight and space-borne electronics as well as new coding techniques targeting optical and satellite communication and storage devices. On neuromorphic design, his group has developed biologically-inspired neural network

chips for vision processing applications, and worked with a nanotechnologist to enable stochastic computing with memristors for energy efficient signal processing applications.

Professor Zhang has published 15 journal articles (including one in press) and 30 conference papers (in his field of work, top conferences are highly competitive and considered equivalent in prestige to journals) in total with a very high proportion of these papers published in top-tier venues, highlighting Professor Zhang's emphasis on quality in research. He regularly gives talks on his work at top industry research labs and other universities. His funding base is excellent, having received ~\$2.8M in total funding during his five years at Michigan. His funding sources include a wide range of government sources (NASA, DARPA, NSF) as well as industry (including a major consortium), the latter indicating the high regard with which companies in his field hold him.

Recent and Significant Publications:

- Y. S. Park, D. Blaauw, D. Sylvester, and Z. Zhang, "Low-power high-throughput LDPC decoder using non-refresh embedded DRAM," *IEEE Journal of Solid-State Circuits*, vol. 49, no. 3, pp. 783-794, March 2014.
- P. Knag, W. Lu, and Z. Zhang, "A native stochastic computing architecture enabled by memristors," *IEEE Transactions on Nanotechnology*, vol. 13, no. 2, pp. 283-293, March 2014.
- T.-C. Ou, Z. Zhang, and M. C. Papaefthymiou, "An 821MHz 7.9Gb/s 7.3pJ/b/iteration charge-recovery LDPC decoder," in *IEEE International Solid-State Circuits Conference (ISSCC)*, San Francisco, CA, February 2014, pp. 462-463.
- Y. S. Park, Y. Tao, and Z. Zhang, "A 1.15Gb/s fully parallel nonbinary LDPC decoder with fine-grained dynamic clock gating," in *IEEE International Solid-State Circuits Conference (ISSCC)*, San Francisco, CA, February 2013, pp. 422-423.
- J. K. Kim, J. A. Fessler, and Z. Zhang, "Forward-projection architecture for fast iterative image reconstruction in X-ray CT," in *IEEE Transactions on Signal Processing*, vol. 60, no. 10, pp. 5508-5518, October 2012.

Service: Professor Zhang has an impressive record in both internal and external service. He has participated in several departmental committees, has been faculty advisor for the student honor society in Electrical and Computer Engineering, has served as the advisor for computer engineering majors for four years, and served on 25 Ph.D. dissertation committees. Externally, he has served as an associate editor for two IEEE journals and on three IEEE conference program committees. We also emphasize Professor Zhang's contributions to climate and diversity, which include mentoring 10 underrepresented minority and female students (both undergraduate and graduate) in research.

External Reviewers:

Reviewer A: "He is a visible and impressive representative of EECS at your institution...I cannot think of another of his contemporaries at other universities who have accomplished such impressive feats so early."

Reviewer B: "His research is innovative, creative, and deals with futuristic topics on the most leading-edge of electronic designs."

Reviewer C: “Zhengya is one of the top researchers worldwide in the area of VLSI signal processing with applications to communication systems...”

Reviewer D: “I consider Zhengya to be one of the brightest minds in VLSI signal processing...”

Reviewer E: “As a [junior] faculty member, Dr. Zhang has exceeded all expectations in all three areas: teaching, research and service.”

Reviewer F: “I particularly find his work towards stochastic computing with two-terminal digital memristive devices to potentially have high-impact in the area of energy efficient computing...”

Summary of Recommendation: Professor Zhang is a widely recognized researcher in the design of integrated circuits for signal processing and communication applications. He is a collaborative researcher and excellent colleague and an outstanding teacher and mentor to his graduate students. It is with the support of the College of Engineering Executive Committee that I recommend Zhengya Zhang for promotion to associate 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 2015