Taeyoung Kim

Ph.D
Software Engineer at Intel Corporation
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Areas of interest

VLSI System Design and Reliability: VLSI modeling, simulation, and optimization. System design flow and methods, VLSI Schematic and Layout, Sign off for Reliability and Signal Integrity

Embedded Systems and Reliability: Real-time systems and reliability analysis, HW/SW co-design for embedded systems

High performance computing systems and Reliability: Energy- and thermal-aware dark silicon system-level modeling and optimization

Heterogeneous Computing: HW/SW partitioning and Acceleration techniques including GPGPU, FPGA and specialized ASIC's

Experience

Software Engineer, Signal & Power Integrity, System Modeling Group, Product Development Solution (PDS), Intel Corporation, Hillsboro, OR, USA Jun, 2017-Present

Software Intern Graduate Level, Signal & Power Integrity, System Modeling Group, Design Technology Solutions (DTS), Intel Corporation, Hillsboro, OR, USA Jun-Sep, 2016

Researcher, Full-time Research Staff, Embedded Systems, Department of Electrical and Computer Engineering, University of Virginia, Charlottesville, VA, USA, Jun.2012–Feb.2013

Lecturer, Full-time Instructor, Programming Language and Computer Security Classes, Kyungmin College, Uijeongbu, Korea, Aug.2007–May.2008

Software Engineering, Assistant Manager, System Software Engineering, Netpia, Inc., Seoul, Korea, Nov.2001–Apr.2004

Software Engineering, Staff, System Software Engineering, eStop, Inc., Seoul, Korea, Aug.1999–Apr.2000

Education

Ph.D. Computer Science, University of California, Riverside, CA, USA
Advisor: Dr. Sheldon X.-D. Tan
Sep.2013–Jun.2017
GPA: 3.87/4.0

M.S. Electrical Engineering, University of Virginia, Charlottesville, VA, USA
Aug.2009–May.2012

M.Eng. Electronics and Computer Engineering, Korea University, Seoul, Korea
Mar.2005–Feb.2007

B.S. Electronic Engineering, Konkuk University, Seoul, Korea
Mar.1997–Feb.2005

Honors and Awards

Dissertation Year Program (DYP) Fellowship Award, University of California, Riverside, 2016-2017

Finalist at ACM student Research Competition (SRC), ICCAD, Nov. 2016

Travel Grant Award at ACM Student Research Competition (SRC), ICCAD, Nov. 2016

Travel Grant Award at ACM Student Research Competition (SRC), ICCAD, Nov. 2015

Travel Grant Award at ACM Student Research Competition (SRC), ICCAD, Nov. 2014

Travel Grant Award at Young Faculty Workshop, Design Automation Conference (DAC), Jun, 2016

Best Poster Research Award at ACM PhD Forum, Design Automation Conference (DAC), Jun, 2015

Travel Grant Award at ACM PhD Forum, Design Automation Conference (DAC), Jun, 2015

Richard Newton Fellowship Award, DAC, Jun. 2014

Dean's Distinguished Fellowship Award, University of California, Riverside, 2013-2015

In Recognition of Exceptional Presentation (2nd place), KSEA Virginia Regional Conference, 2013

Outstanding Academic Performance Award, Korea University, 2007

Publications

Theses

T. Kim, *System-Level Electromigration-Induced Dynamic Reliability Management,* Ph.D. thesis University of California, Riverside, June, 2017

T. Kim, *Detection and Prevention of Forward Head Posture with Body Sensor Networks,* M.S. thesis University of Virginia, Charlottesville, May, 2012

T. Kim, *A Large Scale Indoor Localization System Based on Wireless Sensor Networks,* M.Eng. thesis, Korea University, Seoul, Feb, 2007

Journal Articles

T. Kim, S. X.-D. Tan, C. Cook, and Z. Sun, "Detection of Counterfeited ICs Via On-Chip Sensor and Post-Fabrication Authentication Policy", *Integration, the VLSI Journal*, vol. 63, pp. 31-40, Sep. 2018.

T. Kim, Z. Liu, and S. X.-D. Tan, "Dynamic reliability management based on resource-based EM modeling for multi-core microprocessors," *Microelectronics Journal*, vol. 74, pp. 106-115, Apr. 2018.

S. Wang, T. Kim, Z. Sun, S. X.-D. Tan, and M. B. Tahoori, "Recovery-aware Proactive TSV Repair for Electromigration Lifetime Enhancement in 3D ICs" *IEEE Transaction on Very Large Scale Integration Systems (TVLSI)* vol. PP, no. 99, pp. 1-13. doi: 10.1109/TVLSI.2017.2775586

S. Peng, H. Zhou, T. Kim, H. Chen, S. X.-D. Tan, "Physics-based Compact TDDB Models for Low-k BEOL Copper Interconnects with Time-Varying Voltage Stressing," *IEEE Transaction on Very Large Scale Integration (VLSI) Systems (TVLSI)* vol. PP, no. 99, pp. 1-10. doi: 10.1109/TVLSI.2017.2764880

S. X.-D. Tan, H. Amrouch, T. Kim, Z. Sun, C. Cook, and J. Henkel, "Recent Advances in EM and BTI induced Reliability Modeling, Analysis and Optimization," *Integration, the VLSI Journal* Volume 60, 2018, Pages 132-152, ISSN 0167-9260.

H. Chen, S. X.-D. Tan, T. Kim, and J. Chen, "Analytical Modeling of Electromigration Failure for VLSI Interconnect Tree Considering Temperature and Segment Length Effects," *IEEE Transactions on Device and Materials Reliability (TDMR)*, vol. 17, no. 4, pp. 653-666, Dec. 2017.

X. Huang, V. Sukharev, T. Kim, and S. X.-D. Tan, "Dynamic electromigration modeling for transient stress evolution and recovery under time-dependent current and temperature stressing," *Integration, the VLSI Journal*, Volume 58, 2017, Pages 518-527, ISSN 0167-9260

T. Kim, Z. Sun, H. Chen, H. Wang, and S. X.-D. Tan, "Energy and Lifetime Optimizations for Dark Silicon Manycore Microprocessor Considering both Hard and Soft Errors", *IEEE Trans Very Large Scale Integration (VLSI) Systems (TVLSI)*, vol. 25, no. 9, pp. 2561-2574, 2017.

H. B. Chen, S. X.-D. Tan, X. Huang, T. Kim and V. Sukharev, "Analytical Modeling and Characterization of Electromigration Effects for Multibranch Interconnect Trees," *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, vol. 35, no. 11, pp. 1811-1824, Nov. 2016.

X. Huang, V. Sukharev, J.-H. Choy, M. Chew, T. Kim, S. X.-D. Tan, "Electromigration assessment for power grid networks considering temperature and thermal stress effects," *Integration, the VLSI Journal*, Volume 55, Sep. 2016, Pages 307-315

Z. Yue, T. Kim, H. Shin, S. X.-D. Tan, X. Li, H. Chen and H. Wang, "Statistical Rare Event Analysis and Parameter Guidance by Elite Learning Sample Selection", *ACM Transaction on Design Automation of Electronic Systems (TODAES)*, vol. 21, no. 4, p. 56, Sep. 2016.

S. Chen, J. S. Brantley, T. Kim, S. A. Ridenour, and J. Lach, "Characterising and minimising sources of error in inertial body sensor networks," *Int. J. Auton. Adapt. Commun. Syst. (IJAACS)*, vol. 6, no. 3, pp. 253-271, 2013.

W. Y. Lee, K. Hur, T. Kim, D. S. Eom, and J. O. Kim, "Large scale indoor localization system based on wireless sensor networks for ubiquitous computing," *Wireless Personal*, vol. 63, no. 1, pp. 241-260, 2012.

D Eom, T. Kim, H. Jee, H. Lee and J. Han, "A Multi-Player Arcade Video Game Platform with A Wireless Tangible User Interface", *IEEE Transaction on Consumer Electronics*, 2008.10

Conference Proceedings

Y. Ye, T. Kim, S. X.-D. Tan, H. Chen and H. Wang, "Comprehensive Detection of Counterfeit ICs Via On-Chip Sensor and Post-Fabrication Authentication Policy," *International Conference on Synthesis, Modeling Analysis and Simulation Methods and Applications to Circuit Design (SMACD2017)*, Taormina, Italy, June 2017.

T. Kim, Z. Sun, C. Cook, J. Gaddipati, H. Wang, H. Chen, S. X.-D. Tan, "Dynamic Reliability Management for Near-Threshold Dark Silicon Processors", *Proc. IEEE/ACM International Conference on Computer-Aided Design (ICCAD2016)*, Austin, TX, Nov. 2016.

Z. Sun, E. Demircan, M. D. Shroff, T. Kim, X. Huang and S. X.-D. Tan, "Voltage-Based Electromigration Immortality Check for General Multi-Branch Interconnects", *Proc. IEEE/ACM International Conference on Computer-Aided Design (ICCAD2016)*, Austin, TX, Nov. 2016.

C. Cook, Z. Sun, T. Kim and S. X.-D. Tan, "Finite Difference Method for Electromigration Analysis of Multi-Branch Interconnects," *International Conference on Synthesis, Modeling Analysis and Simulation Methods and Applications to Circuit Design (SMACD2016)*, Lisbon, Portugal, Jun. 2016.

T. Kim, Z. Sun, C. Cook, H. Zhao, R. Li, D. Wong, S. X.-D. Tan, "Cross-layer modeling and optimization for electromigration induced reliability", *Proc. IEEE/ACM Design Automation Conference (DAC2016)*, Austin, TX, June, 2016.

X. Huang, V. Sukharev, Z. Qi, T. Kim, H. Chen, S. X.-D. Tan, "Physics-Based Full-Chip TDDB Assessment for BEOL Interconnects", *Proc. IEEE/ACM Design Automation Conference (DAC2016)*, Austin, TX, June, 2016.

T. Kim, X. Huang, H. Chen, V. Sukharev, S. X.-D. Tan, "Learning-based Dynamic Reliability Management for Dark Silicon Processor Considering EM Effects", *Proc. Design, Automation and Test in Europe (DATE2016)*, Dresden, Germany, March 2016 (Acceptance rate = 24%).

X. Huang, V. Sukharev, T. Kim, H. Chen, S. X.-D. Tan, "Electromigration Recovery Modeling and Analysis under Time-Dependent Current and Temperature Stressing", *Proc. Asia South Pacific Design Automation Conference (ASP-DAC2016)*, Macao, China, Jan. 2016.

T. Kim, X. Huang, V. Sukharev and S. X.-D. Tan, "Learning-Based Reliability Management for Dark Silicon Systems", *Sixth IEEE International Workshop on Testing Three-Dimensional Stacked Integrated Circuits (3D-TEST2015)*, Anaheim, CA, Oct, 2015.

T. Kim, X. Huang, V. Sukharev, X. X.-D. Tan, "A Dynamic Reliability Management Framework for Dark Silicon", *TECHCON*, Austin, Sep, 2015.

H. Chen, X. Huang, V. Sukharev, S. X.-D. Tan, T. Kim, " Interconnect reliability modeling and analysis for multi-branch interconnect trees," *Proc. IEEE/ACM Design Automation Conference (DAC2015)*, San Francisco, June, 2015.

T. Kim, B. Zheng, H. Chen, Q. Zhu, V. Sukharev and S. X.-D. Tan, "Lifetime optimization for real-time embedded systems considering electromigration effects," *Proc. IEEE/ACM International Conference on Computer-Aided Design (ICCAD2014)*, San Jose, CA, Nov. 2014

T. Wei, T. Kim, S. Park, Q. Zhu, S. X.-D. Tan, N. Chang, S. Ula, M. Maasoumy, "Battery management and application for energy-efficient buildings," *Proc. IEEE/ACM Design Automation Conference (DAC2014)*, San Francisco, June, 2014

T. Kim, S. Chen, J. Lach, "Detecting and Preventing Forward Head Posture with Wireless Inertial Body Sensor Networks," *International Conference on Body Sensor Networks (BSN2011)*, PP. 125-126, 2011.5

A.T. Barth, B.C. Bennett, B. Boudaoud, J.S. Brantley, S. Chen, C.L. Cunningham, T. Kim, H.C. Powell, Jr., S.A. Ridenour, J. Lach, "Longitudinal High-Fidelity Gait Analysis with Wireless Inertial Body Sensors," *IEEE Wireless Health Conference*, 192-3, 2010

S. Chen, J. S. Brantley, T. Kim, and J. Lach, "Characterizing and Minimizing Synchronization and Calibration Errors in Inertial Body Sensor Networks," in *Proceedings of the Fifth International Conference on Body Area Networks (BodyNet2010)*, Corfu, Greece, 2010, pp. 138-144.

H. Jee, D. Eom, T. Kim, H. Park, H. Lee, J. Han, "Multi-Player VR Game Built Upon Wireless Sensor Network," *The Second International Conference on Ubiquitous Information Management and Communication (ICUIMC)*, PP. 542-544, PP. 542-544, 2008.01

K. Hwang , T. Kim, D. Eom "Proactive Data Delivery Scheme with Optimal Path for Dynamic Sensor Networks", *Lecture Notes in Computer Science (LNCS)*, 412-421, 2007.8

D. Eom, J. Jang, T. Kim, J. Han, "A VR Game Platform Built upon Wireless Sensor Network," *Lecture Notes in Computer Science (LNCS)*, 146-155, 146-155, 2006.11

Teaching

Teaching Assistant, University of California, Riverside
Winter, 2017 EE260 Advanced VLSI
Fall, 2016 EE213 Computer-Aided Electronic Circuit Simulation
Winter, 2016 CS168 Introduction to VLSI
Fall, 2014 CS100 Software Construction

Teaching Assistant, University of Virginia
Fall, 2011 ECE3660 Electronics II

Full Time Lecturer, Kyungmin College,
Spring, 2008, Internet Programming
Fall, 2007, Internet and Computer Security

Teaching Assistant, Korea University,
Spring, 2007 KEEE474 Embedded Software
FALL, 2006 KEEE491 Capstone Project Lab

Student Project Advising

Hsin-Yu Fan Chiang (UCR, undergrad) - Project: Content Management System for Research Archive

Zhenning Jiang (UCR, undergrad) - Project: FPGA Debug Analyzer

Hui Li (UCR, undergrad) - Project: FPGA Debug Analyzer

He Dai (UCR, undergrad) - Project: FPGA Debug Analyzer

Shawn Kim (UVA, undergrad) - Project: Posture Detection System

Jeremy Kim (UVA, undergrad) - Project: Posture Detection System

Hana Lee (Korea Univ, undergrad) - Project: Motion Detection-based Virtual Game

Heejin No (Korea Univ, undergrad) - Project: Motion Detection-based Virtual Game

Graduate Classes

UCR-CS210-Scientific Computing: Grade A+

UCR-CS220-Synthesis of Digital System: Grade A+

UCR-CS229-Machine Learning: Grade A+

UCR-EE260-Embedded Real-time Systems: Grade A+

UCR-EE213-Computer Aided Electrical Circuit Simulation: Grade A

UCR-CS223-Reconfigurable Computing-FPGA Architecture: Grade A

UCR-CS201-Compiler Construction: Grade A

UCR-CS217-GPU Architecture Parallel Programming: Grade A

UCR-CS211-High Performance Computing: Grade A

UCR-CS203A-Computer Architecture

UCR-CS238-Algorithm Technique Computational Biology

UVA-ECE6332-VLSI

UVA-ECE5750-Digital Signal Processing

Professional Activities

2016-2020, Assistant Editor, Integration, the VLSI Journal, ELSEVIER

2017-2018, Program Committee, ACM Student Research Competition at International Conference On Computer Aided Design (ICCAD)

2018-Present, Reviewer, Microelectronics Journal, ELSEVIER

2018-Present, Reviewer, Microelectronics Reliability Journal, ELSEVIER

2018-Present, Reviewer, ACM Journal on Emerging Technologies in Computing Systems (JETC)

2017-Present, Reviewer, ACM Transactions on Embedded Computing Systems (TECS)

2016-Present, Reviewer, ACM Transactions on Design Automation of Electronic Systems (TODAES)

2015-Present, Reviewer, IEEE Transactions On Very Large Scale Integration (VLSI) Systems (TVLSI)

Professional Membership

2017-Present, Professional Member, Association for Computing Machinery (ACM)

2014-2017, Student Member, Association for Computing Machinery (ACM)

2017-Present, Professional Member, ACM Special Interest Group on Design Automation (SIGDA)

2014-2017, Student Member, ACM Special Interest Group on Design Automation (SIGDA)

2017-Present, Member, Institute of Electrical and Electronics Engineers (IEEE)

2010-2017, Student Member, Institute of Electrical and Electronics Engineers (IEEE)