

Minyoung Kim

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RESEARCH INTERESTS

Cross-layer System Tuning for Mobile Real-time Embedded Systems
Formal Methods
HW/SW Co-design
Multimedia Compression/Communication

EDUCATION

2003.9 **Ph.D. candidate**
-2008.8 expected Architectures and Compilers for Embedded Systems Lab., (<http://www.ics.uci.edu/~aces>)
Center for Embedded Computer Systems, (<http://www.cecs.uci.edu>)
University of California, Irvine (UCI), CA, USA
Advisors: Prof. Nikil Dutt, Prof. Nalini Venkatasubramanian
Thesis topic: Online verifiable cross-layer adaptation for distributed real-time embedded systems

1999.3-2001.2 **M.S. in Electrical Engineering and Computer Science**
Co-design and Parallel Processing Lab., (<http://peace.snu.ac.kr>)
Seoul National University (SNU), South Korea
Advisor: Prof. Soonhoi Ha

1995.3-1999.2 **B.S. in Computer Engineering**, Graduated (Cum Laude)
Seoul National University (SNU), South Korea

HONORS/AWARDS

Best Paper Award

- Best Overall Idea Award, IEEE RTSS '07 Ph.D. Forum. (Dec. 2007)
- Best System Architecture Award, IEEE RTSS '07 Ph.D. Forum. (Dec. 2007)

Fellowship

- Regents fellowship, Donald Bren School of Information and Computer Science, UC Irvine. (2003)
- Scholarship, Korean Institute of Information Technology Assessment. (2003)
- Scholarship, KFAQ (Korean Foundation for Advanced Studies). (1999)
- Merit-based scholarship, Seoul National University. (1996, 1997, 1998)
- Scholarship, Yeongju Hwangso Cultural Foundation. (1995)

Travel Grant Award

- NSF ADVANCE Program, Faculty Horizons. (Jul. 2008)
- IEEE Cyber Physical Systems Week '08. (Apr. 2008)
- IEEE/ACM DATE '08. (Mar. 2008)
- NSF CRA Academic Career Workshop. (Feb. 2008)
- IEEE ASP-DAC '08. (Jan. 2008)

INDUSTRY EXPERIENCE

2007/2006 Summer **Student research associate**
SRI (Stanford Research Institute) International, Menlo Park, CA, USA. (<http://www.sri.com>)
Supervisors: Dr. Carolyn Talcott, Dr. Mark-Oliver Stehr

2001.3-2002.4 **Research engineer**
LG Electronics Institute of Technology, Seoul, South Korea.

PROJECT EXPERIENCE

- 2006.6-present **xTune: Online Verifiable Cross-Layer Adaptation for Distributed Real-Time Embedded Systems (NSF CNS-0615438, 0615436)**
- Exploiting formal modeling, specification and reasoning about cross-layer timing properties.
 - Designing policies/mechanisms for addressing energy/QoS(Quality of Service)/reliability tradeoffs based on the cross-layer timing analysis.
 - Related publications: [J3, C5-10, C11, P2], <http://xtune.ics.uci.edu>
- 2003.10-2006.5 **FORGE: A Framework for Optimization of Distributed Embedded Systems Software (NSF ACI-0204028)**
- FORGE targets cross-layer integration for delivery of real-time multimedia application on handheld platforms, and exploration of strategies for synergistic management of power and performance with respect to Quality of Service for these applications.
 - Developed a power-aware error-resilient distributed video conferencing system in handheld mobile environment.
 - Related publications: [J2, C3-4, C12, P1], <http://forge.ics.uci.edu>
- 2002.10-2003.9 **Multi-mode Multimedia Terminal**
- Developed a multimedia application including mp3 player, videophone, and DivX player as a case study of system level specification and software synthesis.
 - The system (PeaCE: Ptolemy Extension As Codesign Environment) was demonstrated at Design Automation Conference (DAC'2003).
 - Related publication: [C2], <http://peace.snu.ac.kr/research/peace>
- 2001.3-2002.4 **IrisAccess3000: A Biometrics Security System Based on the Iris Recognition Technology**
- Worked as a research engineer at LG Electronics, Seoul, South Korea.
 - Developed camera control software and device driver for image capture board.
 - Became an expert in Linux thread programming and device driver using Embedix SDK.
- 2000.10-2001.2 **System Level Low Power Design (master's thesis)**
- Presented a new system level run-time power management technique (hybrid of DPM and DVFS) for real-time embedded system with voltage scalable processor.
 - Related publications: [J1, C1]
- 1999.12-2000.9 **Electronic Book**
- Participated in developing an electronic book system composed of Cirrus Logic EP-7212 processor, LCD, touch screen, mp3 decoder, USB, flash memory, smart media card, etc.
 - Implemented device drivers and serial communication protocols on Linux-based system.
- 1999.3-1999.11 **Arm-processor Based Co-design Prototyping Board**
- Participated in developing a prototyping board as a test vehicle of the PeaCE HW/SW co-design environment for rapid development of heterogeneous digital system.
 - Ported Linux operating system using ARM Developer Kit.
- 1997.9-1998.12 **RenderCAP**
- RenderCAP is a project on building the prototyping board for the PC-based 3D graphics accelerator focusing on cost-effective add-on cards.
 - Participated in the library design and implementation for graphics hardware.
 - Became familiar with EDA (Electronic Design Automation) tools such as MAX+PLUS II and Behavior Compiler.

PUBLICATIONS

Available from <http://www.ics.uci.edu/~minyounk/pub.html>

Journal Articles

[J3] **Minyoung Kim**, Sudarshan Banerjee, Nikil Dutt, Nalini Venkatasubramanian, "Energy-aware Cosynthesis of Real-time Multimedia Applications on MPSoCs Using Heterogeneous Scheduling Policies", *ACM Trans. on Embedded Computing Sys. (TECS)*. 7(2):Article 9, 2008.

[J2] **Minyoung Kim**, Hyunok Oh, Nikil Dutt, Alex Nicolau, Nalini Venkatasubramanian, "PBPAIR: An Energy-efficient Error-resilient Encoding Using Probability Based Power Aware Intra Refresh", *ACM SIGMOBILE Mob. Comput. Commun. Rev.* 10(3): 58-69, 2006.

[J1] **Minyoung Kim** and Soonhoi Ha, "Hybrid Run-time Power Management Technique for Real-time Embedded System with Voltage Scalable Processor", *ACM SIGPLAN Notice*. 36(8): 11-19, 2001.

Peer-reviewed Archival Conference/Workshop Papers

[C12] Kyoungwoo Lee, **Minyoung Kim**, Nikil Dutt, Nalini Venkatasubramanian, "Error-Exploiting Video Encoder to Extend Energy/QoS Tradeoffs for Mobile Embedded Systems", to appear in *IFIP Working Conference on Distributed and Parallel Embedded Systems (DIPES'08)*, Sep. 2008, Milano, Italy.

[C11] **Minyoung Kim**, Daniel Massaguer, Nikil Dutt, Sharad Mehrotra, Shangping Ren, Mark-Oliver Stehr, Carolyn Talcott, Nalini Venkatasubramanian, "A Semantic Framework for Reconfiguration of Instrumented Cyber Physical Spaces", to appear in *Second Workshop on Event-based Semantics (WEBS'08) in conjunction with IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS'08)*, Apr. 2008, St. Louis, MO, USA.

[C10] **Minyoung Kim**, Mark-Oliver Stehr, Carolyn Talcott, Nikil Dutt, Nalini Venkatasubramanian, "Constraint Refinement for Online Verifiable Cross-Layer System Adaptation", *IEEE/ACM Design Automation and Test in Europe (DATE '08)*, Mar. 2008, Munich, Germany.

[C9] **Minyoung Kim**, Nikil Dutt, Nalini Venkatasubramanian, Carolyn Talcott, "xTune: Online Verifiable Cross-Layer Adaptation for Distributed Real-Time Embedded Systems", *IEEE International Real-Time Systems Symposium (RTSS'07) Ph.D. Forum*, Dec. 2007, Tucson, AZ, USA., also published as *SIGBED Review*, Volume 5, Number 1, January 2008 Special Issue on the RTSS Forum on Deeply Embedded Real-Time Computing **(Best Overall Idea & Best System Architecture Award)**

[C8] **Minyoung Kim**, Mark-Oliver Stehr, Carolyn Talcott, Nikil Dutt, Nalini Venkatasubramanian, "Combining Formal Verification with Observed System Execution Behavior to Tune System Parameters", *International Conference on Formal Modelling and Analysis of Timed Systems (FORMATS'07), Guest Conference of ESWEEK*, Oct. 2007, Salzburg, Austria., LNCS 4763 (pp. 257 - 273)

[C7] **Minyoung Kim**, Mark-Oliver Stehr, Carolyn Talcott, Nikil Dutt, Nalini Venkatasubramanian, "A Probabilistic Formal Approach to Cross-layer Optimization in Distributed Embedded Systems", *IFIP Conference on Formal Methods for Open Object-Based Distributed Systems (FMODS'07)*, Jun. 2007, Paphos, Cyprus., LNCS 4468, pp285-300.

[C6] **Minyoung Kim**, Sudarshan Banerjee, Nikil Dutt, Nalini Venkatasubramanian, "Design Space Exploration of Real-time Multi-media MPSoCs with Heterogeneous Scheduling Policies", *IEEE/ACM/IFIP Conference on Hardware/Software Codesign and System Synthesis (CODES-ISSS'06)*, Oct. 2006, Seoul, South Korea.

[C5] **Minyoung Kim**, Nikil Dutt, Nalini Venkatasubramanian, "Policy Construction and Validation for Energy Minimization in Cross Layered Systems: A Formal Method Approach", *IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS'06) Work-in-Progress Session* Apr. 2006, San Jose, CA, USA.

[C4] **Minyoung Kim**, Hyunok Oh, Nikil Dutt, Alex Nicolau, Nalini Venkatasubramanian, "Probability Based Power Aware Error Resilient Coding", *International Workshop on Services and Infrastructures for the Ubiquitous and Mobile Internet (SIUMI'05) in conjunction with ICDCS'05* Jun. 2005, Columbus, Ohio, USA.

[C3] Shivajit Mohapatra, Radu Cornea, Hyunok Oh, Kyoungwoo Lee, **Minyoung Kim**, Nikil Dutt, Rajesh Gupta, Alex Nicolau, Sandeep Shukla, Nalini Venkatasubramanian, "A Cross-Layer Approach for Power-Performance Optimization in Distributed Mobile Systems", *NSF Next Generation Software Program (NGS'05) in conjunction with IPDPS'05* Apr. 2005, Denver, Colorado, USA

[C2] Dohyung Kim, **Minyoung Kim**, and Soonhoi Ha, "A Case Study of System Level Specification and Software Synthesis of Multi-mode Multimedia Terminal", *International Workshop on Embedded Systems for Real-time Multimedia (ESTIMedia'03) in conjunction with CODES-ISSS'03* Oct. 2003, Newport Beach, CA, USA

[C1] **Minyoung Kim** and Soonhoi Ha, "Hybrid Run-time Power Management Technique for Real-time Embedded System with Voltage Scalable Processor", *ACM SIGPLAN/SIGBED Conference on Languages, Compilers, and Tools for Embedded Systems (LCTES'01)*, Jun. 2001, Snowbird, Utah, USA

Posters

[P2] **Minyoung Kim**, Mark-Oliver Stehr, Carolyn Talcott, Nikil Dutt, Nalini Venkatasubramanian, "xTune: Online Verifiable Cross-Layer Adaptation for Distributed Real-Time Embedded Systems", *IEEE Asia and South Pacific Design Automation Conference (ASP-DAC'08) Ph.D. Forum*, Jan. 2008, Seoul, South Korea.

[P1] Radu Cornea, **Minyoung Kim**, Kyoungwoo Lee, Gabor Madl, Shivajit Mohapatra, Hyunok Oh, Nikil Dutt, Alex Nicolau, Nalini Venkatasubramanian, "FORGE: Power-aware Cross-layer Adaptation for Mobile Applications", *New Initiatives Workshop*, Nov. 2005, Tempe, AZ, USA.

TEACHING EXPERIENCE

- Teaching assistant, "Computer Systems Architecture", UC-Irvine. (Spring'06, Winter'06, Spring'05, Fall'04)
- Teaching assistant, "Digital Logic Design", UC-Irvine. (Winter'05)
- Teaching assistant, "Introductory Computer Organization", UC-Irvine. (Fall'05)
- Teaching assistant, "Electric Circuit Theory", Seoul National University. (Spring'99)

PROFESSIONAL ACTIVITIES

- Journal reviewing: ACM TECS
- Conference reviewing: ISLPED, CODES-ISSS, CASES, RTSS, DATE, ASP-DAC, ESTIMedia, WoWMoM

REFERENCES

Prof. Nikil Dutt
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Prof. Nalini Venkatasubramanian
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