MINSOO **KIM**

San Diego, CA 92093 | mik226@ucsd.edu | minsookim.me

Summary

- I am a PhD student at UC San Diego, looking for a full-time position (starting in 2022) in the digital VLSI physical design and the Electronic Design Automation (EDA) area. I currently research at VLSI CAD Laboratory (ABKGroup) under the supervision of Prof. Andrew B. Kahng. Before joining UCSD, I worked in the Design Technology team at Samsung as a physical design engineer and developed physical design methodologies for advanced technology nodes (Samsung Foundry 7, 8, 10, 14 and 28nm technologies). My research interests lie in technology-aware physical design methodology, design-technology co-optimization (DTCO), open-source EDA and machine learning-based prediction/optimization for physical design.

Skills

Research Skills

- SoC physical design flows from RTL to GDS
- Develop an open-sourced academic physical design flow from RTL to GDS (OpenROAD)
- Technology-aware physical design optimization
- Design and Technology Co-Optimization (DTCO)
- Machine learning in physical design

Programming Language Skills

- Verilog HDL, **Tcl**, C/**C++**, **Python**, Perl, Matlab
- Version control S/W: Git, Perforce

Electronic Design Automation Tools

- Synthesis: Design Compiler, Genus
- Place and Route: IC compiler, IC compiler II, Innovus, and Nitro-SoC
- Static Timing Analysis: Primetime and Tempus
- Design Verification: Calibre and IC Validator
- Power Integrity Verification: Redhawk and Voltus

Experience

Graduate Student Researcher / VLSI CAD Laboratory **09/2017 to Current**
UC San Diego **La Jolla, CA, USA**

- Research for manufacturing-aware leakage optimization and placement methodology for advanced technologies
- Research for power delivery networks (power stapling) to mitigate IR-drop for advanced technologies
- Design-Technology Co-Optimization (DTCO) methodology development
- Open-sourcing research project (OpenROAD, Open-source RTL-to-GDS) (https://theopenroadproject.org) supported by DARPA
- Machine learning (ML)-based power delivery network (PDN) design and ML-based pathfinding at advanced nodes (sub-3nm)
- Work with industry collaborators at Qualcomm, Samsung, Intel, Arm, NXP and the C-DEN center (http://cden.ucsd.edu)
- Experienced with 7, 12, 14, 16, 28, 45, 65 and 130nm technologies from multiple academia/industry PDKs
- Teaching Assistant (TA) for VLSI Integrated Circuits and Systems Design (ECE260B/CSE241A) in Winter 2019

Software Intern / Digital and Signoff Group **06/2020 to 09/2020**
Cadence Design Systems **Austin, TX, USA**

- Developed buffering methodologies for detailed balancing of clock trees in clock tree synthesis stage (ccopt, Innovus)

Physical Design Engineer / Design Technology Team **02/2013 to 07/2017**
Samsung Electronics **Hwaseong-si, South Korea**

- Physical design methodology development for Samsung 7/8/10/14/28nm FinFET technology nodes
- Responsible for internal reference (golden) flow scripts and routing technology files of Synopsys IC Complier and IC Compiler II
- Complex design rule support in physical design (automatic place-and-route tools) for advanced technology nodes
- Technical support and technology files for Samsung foundry customers (Qualcomm, NVIDIA, AMD, ST Microelectronics, etc.)
- Collaboration with EDA companies (Cadence, Synopsys and Mentor Graphics) for tool development at advanced technology nodes
- Experienced multiple SoC projects for design verification (timing and physical signoff)
- Physical design and tapeout of multi-million instance designs for the world-first Samsung 10nm SoC project

Graduate Research Assistant / Smart Sensor Architecture Laboratory **02/2011 to 02/2013**
KAIST **Daejeon, South Korea**

- Thesis: An Efficient Energy Management for Solar-Powered Wireless Visual Sensor Networks
- Research for an energy management scheme for camera systems with solar-powered batteries and wireless visual sensor networks

Education and Training

Ph.D.: **Electrical and Computer Engineering** **Expected in 09/2022**
UC San Diego La Jolla, CA, USA
Advised by Prof. Andrew B. Kahng

M. S.: **Electrical Engineering** **02/2013**
KAIST Daejeon, South Korea
Advised by Prof. Chong-Min Kyung

B. S.: **Electrical Engineering** **02/2011**
Yonsei University Seoul, South Korea

Publications

(*All papers with Prof. Andrew B. Kahng, have authors listed in alphabetical order)**

Journal

- [J1] C.-K. Cheng, A. B. Kahng, H. Kim, **Minsoo Kim**, D. Lee, D. Park and M. Woo **"PROBE2.0: A Systematic Framework for Routability Assessment from Technology to Design in Advanced Nodes"**, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, 2021, in revision.

Conference

- [C9] C. Chidambaram, A. B. Kahng, **Minsoo Kim**, G. Nallapati, S. C. Song and M. Woo, "**A Novel Framework for DTCO: Fast and Automatic Routability Assessment with Machine Learning for Sub-3nm Technology Options**", *Proc. IEEE Symposium on VLSI Technology*, 2021, pp. 1-2.
- [C8] H. Fatemi, A. B. Kahng, **Minsoo Kim** and J. Pineda de Gyvez **"Optimal Bounded-Skew Steiner Trees to Minimize Maximum k-Active Dynamic Power"**, Proc. *ACM/IEEE International Workshop on System-Level Interconnect Problems and Pathfinding*, 2020, pp. 1-8.

- [C7] A. Rovinski, T. Ajayi, **Minsoo Kim**, G. Wang and M. Saligane, **"Bridging Academic Open-Source EDA to Real-World Usability"**, *Proc. ACM/IEEE International Conference on Computer-Aided Design*, 2020, pp. 1-7.
- [C6] V. A. Chhabria, A. B. Kahng, **Minsoo Kim**, U. Mallappa, S. S. Sapatnekar, B. Xu, **"Template-based PDN Synthesis in Floorplan and Placement Using Classifier and CNN Techniques"**, *Proc. ACM/IEEE Asia and South Pacific Design Automation Conference*, 2020, pp. 44-49.
- [C5] T. Ajayi, V. A. Chhabria, M. Fogaça, S. Hashemi, A. Hosny, A. B. Kahng, **Minsoo Kim**, J. Lee, U. Mallappa, M. Neseem, G. Pradipta, S. Reda, M. Saligane, S. S. Sapatnekar, C. Sechen, M. Shalan, W. Swartz, L. Wang, Z. Wang, M. Woo and B. Xu, **"Toward an Open-Source Digital Flow: First Learnings from the OpenROAD Project"**, *Proc. ACM/IEEE Design Automation Conference*, 2019, pp. 76:1-76:4.
- [C4] T. Ajayi, D. Blaauw, T.-B. Chan, C.-K. Cheng, V. A. Chhabria, D. K. Choo, M. Coltella, S. Dobre, R. Dreslinski, M. Fogaça, S. Hashemi, A. Hosny, A. B. Kahng, **Minsoo Kim**, J. Li, Z. Liang, U. Mallappa, P. Penzes, G. Pradipta, S. Reda, A. Rovinski, K. Samadi, S. S. Sapatnekar, L. Saul, C. Sechen, V. Srinivas, W. Swartz, D. Sylvester, D. Urquhart, L. Wang, M. Woo and B. Xu, **"OpenROAD: Toward a Self- Driving, Open-Source Digital Layout Implementation Tool Chain"**, *Proc. Government Microcircuit Applications and Critical Technology Conference*, 2019, pp. 1105-1110.
- [C3] S. Heo, A. B. Kahng, **Minsoo Kim**, L. Wang and C. Yang **"Detailed Placement for IR Drop Mitigation by Power Staple Insertion in Sub-10nm"**, *Proc. ACM/IEEE Design, Automation and Test in Europe*, 2019, pp. 824-829.
- [C2] S. Heo, A. B. Kahng, **Minsoo Kim** and L. Wang, **"Diffusion Break-Aware Leakage Power Optimization and Detailed Placement in Sub-10nm VLSI"**, *Proc. ACM/IEEE Asia and South Pacific Design Automation Conference*, 2019, pp. 550-556. **(nominated for Best Paper award)**
- [C1] **Minsoo Kim**, C.-M. Kyung, K. Yi, **"An Energy Management Scheme for Solar-Powered Wireless Visual Sensor Networks Toward Uninterrupted Operations"**, *Proc. IEEE International SoC Design Conference*, 2013, pp. 23-26.