

Sungwon Kim

AI Research Scientist

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Experience

July. 2020 – present : **AI Research Scientist, Intel path finding group.** Lead many AI/ML projects

-Graph Neural Network model in EDA design

Developed circuit design tools based on GNN. Present in 2021 Design Automation Conference

-Rotary Embedding Transformer based IP contents optimization

-Machine Learning based design technology co-optimization model

-Deep learning based computer vision/design-validation software development

Jan. 2012 – July. 2020 : **Modeling Engineer, Intel Advanced Design**

-Intel transistor compact model development

-Intel Dev Model/Calibration CAD software development (currently used in production line)

-Machine learning based device optimization tool development

-Machine learning based noise analysis and signal processing (owner of noise model)

Jan. 2005 – Dec. 2011 : **Research Scientist, Intel Design Technology Solution**

-Large scale CAD/Scientific software development

-Computational imaging/EM modeling and software development

-Computational geometry/Numerical optimization tool development

Research Interests

- Graph Neural Network based Circuit design (2021 DAC conference)
- Computer vision and machine learning.
- Machine learning based multi-scale optimization.

Education

Ph.D - Pennsylvania State University, PA

M.S - Korea Advanced Institute of Science and Technology, Korea

B.S - Yonsei University, Korea

Research Publications in Intel

1. Dual Feature Vector Hetero Graph Neural Network (DFV-GNN) based Post-Layout Parasitic Estimation, 2021 Design Automation Conference.

2. CMOS-based cryogenic control of silicon quantum circuits, *Nature* volume 593(2021), pp 205–210
3. A Scalable Cryo-CMOS Controller for the Wideband Frequency-Multiplexed Control of Spin-Qubits and Transmons, 2020 IEEE Journal of Solid State Circuits, Vol 55(2020), 11, pp 2930-2946
4. A Scalable Cryo-CMOS 2-to-20GHz Digitally Intensive Controller for 4×32 Frequency Multiplexed Spin Qubits/Transmons in 22nm FinFET Technology for Quantum Computers, 2020 IEEE International Solid-State Circuits Conference. Selected as the ISSCC 2020 Jan Van Vessel Award for Outstanding European Paper
5. Roy, Ananda; kim, Sungwon; Mudanai Siva; “An Improved Flicker Noise Model for Circuit Simulation”, IEEE Transactions on Electron Devices, Vol 64 (2017), No 4, pp. 1689-1694

Other Publications

- 1 Malkova, Sungwon Kim, and V. Gopalan “Symmetrical analysis of the defect level splitting in two-dimensional photonic crystals,” Journal of Physics: Condensed Matter as a Topical review, 15, 4535 (2003)
- 2 Kun-Wook Chung, Sungwon Kim, and Shizhuo Yin “Design of a highly nonlinear dispersion-shifted fiber with a small effective area by use of the beam propagation method with the Gaussian approximation method”, Optics Letter. 28, 2031 (2003)
- 3 D. Scrymgeour, N. Malkova, Sungwon Kim, and V. Gopalan “Electro-Optic control of Superprism in Photonic Crystal”, Appl. Phys. Lett, 82, 3176 (2003)
- 4 N. Malkova, Sungwon Kim, and V. Gopalan “Strain tunable light transmission through a 90° bend waveguide in a two-dimensional photonic crystal,” Appl. Phys. Lett, 83, 1509 (2003)
- 5 N. Malkova, Sungwon Kim, and V. Gopalan “Jahn-Teller Effect in Two-Dimensional Photonic Crystals,” Physical Review B, 68, 045105 (2003)
- 6 N. Malkova, Sungwon Kim, and V. Gopalan “Symmetrical Analysis of Complex Two Dimensional Hexagonal Photonic Crystals,” Physical Review B, 67, 125203 (2003)
- 7 Sungwon Kim and Venkatraman Gopalan “Strain-Tunable Photonic Bandgap Crystals,” Appl. Phys. Lett. 78, 3015 (2001)

Skill Set

NLP/RAG/LangChain/LlamaIndex/C++/C/Python/Pytorch/Tensorflow/Java/Unix/OpenCV/Go/MIPS
 Developing mathematical AI/ML software for solving complex multi scale real world problems

introduction for Sungwon Kim:

Meet Sungwon Kim, a dynamic individual thriving in the vibrant city of Portland, Oregon, where he shares his life with his beloved wife. Proud father to Eric, currently pursuing his passion for Computer Science at Columbia University, Sungwon himself is deeply entrenched in the realm of cutting-edge technology.

As an AI Research Scientist at Intel, Sungwon is at the forefront of innovation, spearheading the development of groundbreaking AI and ML solutions tailored for chip design. Renowned as a leading figure in Intel's AI landscape, his expertise spans across various facets of artificial intelligence, with a track record of involvement in numerous pioneering research endeavors.

Beyond his professional achievements, Sungwon finds solace in the serenity of nature, particularly on the ski slopes where his prowess as an expert skier shines through. A voracious reader, he indulges in the world of literature, constantly expanding his horizons.

Driven by a sense of wanderlust, Sungwon's travels often lead him to idyllic beach destinations, where he unwinds and rejuvenates. Fluent in both Korean and English, with a proficiency in reading Chinese characters, he effortlessly navigates linguistic landscapes.

Sungwon's impact extends beyond the confines of his technical prowess; his exceptional interpersonal skills and dedication to mentorship have empowered countless young engineers within Intel. In addition to his engineering acumen, Sungwon possesses a unique proficiency in large language model tuning and neural language translation.

Harnessing these skills, he has pioneered transformative projects, such as the development of a transformer architecture-based circuit modeling tool. Recently, Sungwon delved into the realm of RAG-based modeling to create a personalized Large Language Model app, showcasing his boundless curiosity and innovative spirit.

Based on Sungwon's technical leadership and integrity it would be a great opportunity to hire Sungwon as a leading engineer especially for AI/ML software development.