

CHIHYO AHN (MARK)

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Website: <https://chihyoa.github.io>

Research Interests: Computer Architecture, Front-end Compiler, MLSys

EDUCATION

Georgia Institute of Technology

Ph.D. Student

Sep. 2021 – Present

Atlanta, GA

- Ph.D. student in Electrical and Computer Engineering
- Kwanjung Overseas Scholarship

University of Michigan Ann Arbor | GPA 4.0/4.0

Master Student

Sep. 2018 – Aug. 2020

Ann Arbor, MI

- Master of Science in Electrical and Computer Engineering

Sungkyunkwan University | GPA 4.47/4.5

Undergraduate Student

Mar. 2011 – Aug. 2018

Seoul, Korea

- Bachelor of Science in Electronic and Electrical Engineering / Business Administration **(Valedictorian)**

Queen's University Belfast

Exchange Student

Jan. 2015 – Feb. 2016

Belfast, United Kingdom

- Continued studying in Electrical Engineering / Business Administration (took 7 courses)

RESEARCH EXPERIENCES

HPArch Lab: Georgia Institute of Technology

Graduate Research Assistant (Adviser: Professor Hyesoon Kim)

Nov. 2021 – Present

Atlanta, GA

- Efficient Deep Neural Network Framework for object detection:
 - Quantized training for hardware-limited scenarios.
 - Schemes for choosing most suitable pre-trained models with different dataset and target agents.
- Expanding CUDA:
 - Auto tuning and expanding the RISC-V GPGPU configuration for different applications.
 - Translator for CUDA execution in configurable RISC-V GPGPU (Host/Device LLVM IR translator).

Solid State Electronics Lab: University of Michigan

Research Intern (Adviser: Professor Robert Dick)

May. 2020 – Apr. 2021

Ann Arbor, MI

- Worked on project addressing memory-hard problems with unpredictable communications between processing elements and memory.
- Wrote codes using Pymeeep FDTD Simulation tool for Free space structure demux with superimposed Bragg gratings.
- Designed Multi-channel demultiplexer using FDFD/FDTD inverse design to achieve fabricable Free space structure demultiplexer for use in global communication network architecture (can be used in network interface controllers and PCIe switches to control bus access required in the interconnection between CPUs and GPUs).
- SiP structure design for future foundry manufacturing processes.

Quantum Science Theory Lab: University of Michigan

Graduate Student Research Assistant (Adviser: Professor Mackillo Kira)

Sep. 2018 – Apr. 2020

Ann Arbor, MI

- Wrote programs using Fortran computing Semiconductor Bloch Equations (SBEs) to calculate dynamics of microscopic quantities of materials and other optical properties.
- Studied full doublet contribution (scattering matrix) and excitation induced dephasing models in SBEs to efficiently describe realistic quantum systems.

Nanofabrication Lab: University of Michigan

Sep. 2018 - Apr. 2020

Graduate Student Research Assistant (Adviser: Professor Zetian Mi)

Ann Arbor, MI

- Optimized crystalline structure (Nanowire / Epilayer) growth using Molecular Beam Epitaxy (MBE) for optoelectronic devices.
- Characterized optoelectronic properties of spontaneous nanowires with embedded GaN monolayer for deep-UV LEDs grown in MBE system.
- Studied selective area growth for LEDs and laser devices with higher efficiency and selectivity using E-Beam lithography and MBE.

Display Devices and Materials Lab: SungKyunKwan University

Sep. 2016 - Aug. 2018

Research Intern (Adviser: Professor Jangkun Song)

Suwon, Korea

- Conducted experiments including measuring Kerr effect in projects on 2D materials with high Kerr coefficient for optical applications.
- Characterized optical properties of α -ZrP by synthesizing, exfoliating, measuring at different conditions for future birefringence type displays.

PUBLICATIONS

C. Ahn, S. Jeong, L. P. Cooper, N. Parnenzini, H. Kim, “Comparative Analysis of Executing GPU Applications on FPGA: HLS vs. Soft GPU Approaches”, *IPDPS Workshop 2024(CGRA4HPC)* (2024).

Y. Wu, D. A. Laleyan, Z. Deng, **C. Ahn**, A. F. Aiello, A. Pandey, X. Liu, P. Wang, K. Sun, E. Ahmadi, Y. Sun, M. Kira, P. K. Bhattacharya, E. Kioupakis, Z. Mi, “Controlling defect formation of nanoscale AlN: Toward efficient current conduction of ultrawide-bandgap semiconductors”, *Adv. Electron. Mater.* 6, 2000337 (2020). [pdf]

Y. Wu, X. Liu, P. Wang, D. A. Laleyan, K. Sun, Y. Sun, **C. Ahn**, M. Kira, E. Kioupakis, Z. Mi, “Monolayer GaN excitonic deep ultraviolet light emitting diodes”, *Appl. Phys. Lett.* 116, 013101 (2020). [pdf]

C. H. Ahn, A. R. Masud, S. H. Hong, T. Z. Shen, J. K. Song, “Particle size dependence of electro-optical switching in ZrP nano colloid”, *Liquid Crystals*, 46:2, 159-165 (2018). [pdf]

A. R. Masud, S. H. Hong, T. Z. Shen, **C. H. Ahn**, J. K. Song, “Electrical switching of birefringence in zirconium phosphate colloids with various solvents”, *Opt. Express* 26(1), 173–178 (2018). [pdf]

PRESENTATIONS

B. Tine, J. Young, L. Cooper, **C. H. Ahn**, S. Jeong, H. Kim, “Open-source RISC-V Based GPGPU (Vortex) and their usage cases”, *Workshop, MICRO23*, (2023), Toronto, ON, Canada.

C. H. Ahn, Z. Mi, M. Kira, “Excitation-induced effects in semiconductors”, *oral presentation, Bluesky Workshop*, (2019), Ann Arbor, MI, USA.

C. H. Ahn, K. Lee, J. Jian, W. Wu, Q. Wen, W. Jiang, R.A.Muniz, M. Kira, “Dynamic Cluster Expansion”, *poster presentation, Quantum Science and Technology Workshop*, (2019), Ann Arbor, MI, USA.

C. H. Ahn, A. R. Masud, J. K. Song, “Electro-Optical Switching of α -ZrP”, *International Meeting on Information Display 2017*, (2017), Busan, Korea.

SKILLS

Relevant Courses

- High Performance Computer Architecture, Interconnection Networks, Adv Programming Techniques
- Machine Learning, Computer Vision

Technical Skills

- **Computer Programming:** Fortran, Python, PyTorch, PyMeep, C++, LLVM, MATLAB, LaTeX, Excel VBA
- **Device Characterization:** Scanning electron microscopy (SEM), Energy dispersive spectrometer (EDS), E-beam Lithography (EBL), Temperature dependent Photoluminescence (PL)
- **Thin Film Epitaxy:** Molecular Beam Epitaxy (MBE)

EXTRACURRICULAR ACTIVITIES

Samsung Austin Research Center: Compiler Team

May. 2023 - Aug. 2023

Research and Development Intern

Austin, TX

- Developed checker for invalid control flow during derivative calculation in GPU.
- Designed an optimizer for redundant thread mask update instructions.

Gaya Global: Trade Company

Jun. 2015 - Aug. 2015

Research and Development Intern

Seoul, Korea

- Developed prototypes for calculating total revenue and expenses.
- Designed automated system for documenting invoice and packing list.
- Dealt with technical and communication issues.

Republic of Korea Army: 131 Engineering Battalion

May 2012 - Jan. 2014

Radio Operator

Yeoncheon, Korea

- Served 21 months, honorably discharged as a sergeant.
- Engaged in landmine detection removal operations at Demilitarized Zone, Korea.

Sullivan Center for the Blind

Nov. 2014 - Jan. 2016

Volunteer

Seoul, Korea

- Converted books into braille for the blind.

HONORS AND AWARDS

Kwanjung Overseas External Scholarship: \$20,000/year towards Ph.D. Degree

- Kwanjung Educational Foundation

4 years

University of Michigan Program Entry Award: Full Academic Graduate Scholarship

- University of Michigan Ann Arbor

2 years

National Scholarship for Science and Engineering: Full Academic Undergraduate Scholarship

- The Korea Student Aid Foundation

8 terms

Prize in Graduation Thesis Competition: 2nd place

- Sungkyunkwan University

2018

Graduation Awards: graduated first in class

- Sungkyunkwan University

2018

Dean's list

- Sungkyunkwan University

5 terms

Academic Excellence Prize: first ranked student in engineering department (\$1000)

- Sungkyunkwan University

2012

Internship Program Scholarships (\$500)

- Leaders in Industry-University Cooperation Sungkyunkwan University

2015

TEACHING EXPERIENCES

ECE 2031: Digital Design Laboratory FA21 (TA, GATech)

Aug. 2021 - Dec. 2021

- Assisted students in understanding the implementation of digital during lab sessions and office hours.

EECS 215: Introduction to Electronic Circuits WN20 (TA, Umich)

Jan. 2020 - Apr. 2020

- Assisted students in understanding circuit properties and conducting experiments during lab sessions and office hours.

Sungkyunkwan University International Summer Semester (TA)

Jun. - Jul. 2016 / Jun. - Jul. 2018

- Assisted with two business courses covering: daily classes, office hours, course plan build-up.
- Aided foreign exchange students with adjusting to campus life and Korean culture through various activities including welcoming orientation and field trips.