

# 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* (Advisor: Professor Hyesoon Kim)

Nov. 2021 – Present

Atlanta, GA

- Efficient Deep Neural Network Framework for object detection:
  - Designed quantized training methods optimized for hardware-limited scenarios.
  - Designed schemes to select the most suitable pre-trained models for various datasets and target agents.
- Expanding CUDA:
  - Auto-tuned and expanded the RISC-V GPGPU configuration for diverse applications using analytical models.
  - Worked on a Host/Device LLVM IR translator for CUDA execution in configurable RISC-V GPGPU systems.
  - Improved performance using CUDA Graph to enhance computational efficiency.

### Solid State Electronics Lab: University of Michigan

*Research Intern* (Advisor: Professor Robert Dick)

May. 2020 – Apr. 2021

Ann Arbor, MI

- Addressed memory-hard problems involving unpredictable communication between processing elements and memory.
- Utilized Pymeep FDTD simulations to design free-space demultiplexers with superimposed Bragg gratings.
- Designed a multi-channel demultiplexer using FDFD/FDTD inverse design techniques, creating a fabricable free-space structure demultiplexer for use in global communication network architectures.

## Quantum Science Theory Lab: University of Michigan

Sep. 2018 - Apr. 2020

Graduate Student Research Assistant (Advisor: Professor Mackillo Kira)

Ann Arbor, MI

- Worked on Fortran-based programs to compute the dynamics of microscopic material quantities using Semiconductor Bloch Equations (SBEs).
- Investigated 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 (Advisor: Professor Zetian Mi)

Ann Arbor, MI

- Optimized nanowire and epilayer growth using Molecular Beam Epitaxy (MBE) for optoelectronic devices.
- Characterized optoelectronic properties of spontaneous nanowires embedded with GaN monolayers for deep-UV LEDs grown in MBE systems.
- 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 (Advisor: Professor Jangkun Song)

Suwon, Korea

- Conducted experiments measuring the Kerr effect in 2D materials with high Kerr coefficients for optical applications.
- Characterized optical properties of  $\alpha$ -ZrP by synthesizing, exfoliating, and measuring under various conditions for future birefringence-based 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)*. [pdf]

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  $\alpha$ -ZrP”, *International Meeting on Information Display 2017*, (2017), Busan, Korea.

## WORK EXPERIENCES

**Lawrence Livermore National Lab: Center for Applied Scientific Computing**  
*Computing Graduate Student Intern*

May. 2024 - Aug. 2024  
Livermore, CA

- Sparse / Quantization of object detection models for edge devices.

**Samsung Austin Research Center: Compiler Team**  
*Research and Development Intern*

May. 2023 - Aug. 2023  
Austin, TX

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

## 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)

## 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:** 2<sup>nd</sup> 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

## EXTRACURRICULAR ACTIVITIES

### **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.

## 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.