Junhee **Cho**

Graduate Researcher in Quantum Computing & Semiconductor Devices

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Education

POSTECH(Pohang University of Science and Technology)

Pohang, Korea

M.S. in Electrical Engineering

Mar. 2023 - Present

- GPA: 4.11 / 4.3
- Supervisor: Prof. Moonjoo Lee
- Thesis: Construction of a Cryogenic Ion-Trap Quantum Computing System and Investigation of Light-Induced Charging Effects from Electrode Patches

Hongik University

Seoul, Korea

B.S. in Electronic and Electrical Engineering

Mar. 2016 - Feb. 2023

- GPA: 3.96 / 4.5
- Supervisor: Prof. Ho-Young Cha

Research Experiences

Master's candidate

Pohang, Korea

POSTECH Quantum Computing and Quantum Networks Lab.

Mar. 2023 - Present

Outline: Construction of cryogenic ion trap system for quantum computing

- Investigated the nonlinear Duffing oscillator dynamics of a single $^{174}Yb^{+}$ ion
- Designed and fabricated a multi-layer ion trap chip for scalable quantum-computing experiments
- Constructed an ultra-high vacuum (UHV), electrical delivery, $^{40}Ca^{+}$ ion fluorescence imaging system within a 4 K cryogenic station
- Designed and built a stable laser system and optical path for trapped-ion manipulation
- Developed a PyQt-based user interface(UI) to automate the experimental setup
- Trapped two $^{40}Ca^{+}$ ion qubits and compensated micro-motion by narrowing the Lorentzian linewidth in 397 nm spectroscopy
- Characterized light-induced charging effects on trap electrodes and their impact on the ion-trapping potential
- Developing a real-time ion-detection program based on a Faster R-CNN model to automatically infer ion number and positions from EMCCD images

Undergraduate student

Seoul, Korea

Hongik Univ. Advanced Semiconductor Technology Lab.

Aug. 2021 - Dec. 2022

Outline: Enhancement-mode operation of depletion-mode GaN HEMT by integrating with clamp circuit

- Modeled and analyzed AlGaN/GaN HEMT using TCAD(Silvaco Atlas)
- Converted TCAD model into Spice model by BSIM4 library
- Integrated the HEMT model with a clamp circuit in LTspice to achieve normally-off operation and optimized switching speed
- Achieved high power conversion efficiency in a GaN-based DC-DC boost converter

Publications

- Seongchan Bae, Myunghun Kim, **Junhee Cho**, Moonjoo Lee, Jae-Yoon Sim, "A 600-V Peak-to-Peak 65-dBc RF Signal Source for Trapped-Ion Quantum Computing", *IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS II*, (2024)

Patents

Deep learning inference device for ion qubit detection, ion qubit detection system, and ion qubit detection method

Moonjoo Lee, Junhee Cho, Yongha Shin, Keumhyun Kim, Hyegoo Lee

Nov. 2025

• Korean Patent Application No. 10-20250165113

A single-ion nano engine

Moonjoo Lee, Myunghun Kim, Junhee Cho

Oct. 2023

• Korean Patent Application No. 10-2023-0139870

• U.S. Patent Application No. 18/744,460 (2025)

Selected Conferences

A Segmented-blade Trap and Oscillatory Motion of Trapped Ions — *Okinawa, Japan*
Myunghun Kim, **Junhee Cho**, Sangsoo Han, Sehyeon Gwon, Hyegoo Lee, Keumhyun Kim and Moonjoo Lee — *Sep. 2024*
Advanced Quantum Technologies for Trapped Ions (AQTTI), Poster presentation

Constructing Ytterbium Ion Trap System for Quantum Computing using Cryostat — *Gyeongju, Korea*
Junhee Cho, Myunghun Kim, Sehyeon Gwon, Keumhyun Kim, Hyegoo Lee, Sangsoo Han and Moonjoo Lee — *Feb. 2024*
31^{st} Korean conference on semiconductors (KCS), Poster presentation

A segmented-blade trap with biasing rods — *Hannover, Germany*
Myunghun Kim, **Junhee Cho**, Keumhyun Kim, Hyegoo Lee, Jungsoo Hong and Moonjoo Lee — *Sep. 2023*
7^{th} European conference on trapped-ion(ECTI), Poster presentation

Enhancement-mode GaN MOS-HFET with Integrated Clamp Circuit — *Jeongseon, Korea*
Junhee Cho, Seungheon Shin and Ho-Young Cha — *Feb. 2023*
30^{th} Korean conference on semiconductors (KCS), Poster presentation

Honors & Awards

Domestic Awards

Feb. 2023 **On-site Poster Award**, The 30^{th} Korean Conference on Semiconductors — *Jeongseon, Korea*
Feb. 2024 **On-site Poster Award**, The 31^{st} Korean Conference on Semiconductors — *Gyeongju, Korea*
Nov. 2024 **POSTECH Presidential Award**, POSTECH Startup Competition — *Pohang, Korea*

Skills

Data Analysis & Deep Learning	Python, C, Matlab, QuTiP, Qiskit, PyTorch
Device Design and Simulation	TCAD (Silvaco Atlas & Athena), SPICE (BSIM4, LTspice, Pspice), MATLAB, Microwind3, Ansys Maxwell 3D
Vacuum & Cryogenic Systems	Operation of rotary, turbo, ion and NEG pumps; Ti-sublimation pumps; and 4 K cryostations
Optics & Laser Control	Fiber delivery, double-pass AOM setups, PID-based laser power and frequency stabilization
Material Analysis and Imaging	SEM & EDS, 3D Profiler
Control & Embedded Systems	PyQt (Experimental GUI), FPGA, High-resolution DAC, Arduino, Raspberry Pi
3D modeling	Autodesk Inventor, Rhino 8