Junhee Cho

Graduate Researcher in Quantum Computing and Semiconductor Devices

Yeonil-eup, Nam-gu, Pohang-si, Gyeongsangbuk-do, 37655, Republic of Korea

(+82) 10-4706-7446 | junheecho@postech.ac.kr | 0009-0001-0318-4971

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 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 to Spice model by BSIM4 library
- Integrated HEMT model with clamp circuit in LTspice to achieve normally-off operation and optimized switching speed
- Achieved high power conversion efficiency in a 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, <u>Junhee Cho</u>, 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*

<u>Junhee Cho</u>, Myunghun Kim, Sehyeon Gwon, Keumhyun Kim, Hyegoo Lee, Sangsoo Han and Moonjoo Lee *Feb. 2024*

31st Korean conference on semiconductors (KCS), Poster presentation

A segmented-blade trap with biasing rods *Hannover, Germany*

Myunghun Kim, <u>Junhee Cho</u>, Keumhyun Kim, Hyegoo Lee, Jungsoo Hong and Moonjoo Lee *Sep. 2023*

7th European conference on trapped-ion(ECTI), Poster presentation

Enhancement-mode GaN MOS-HFET with Integrated Clamp Circuit *Jeongseon, Korea*

<u>Junhee Cho</u>, Seungheon Shin and Ho-Young Cha *Feb. 2023*

30th Korean conference on semiconductors (KCS), Poster presentation

Honors & Awards

Domestic Awards

Feb. 2023 **On-site Poster Award**, The 30th Korean Conference on Semiconductors *Jeongseon, Korea*

Feb. 2024 **On-site Poster Award**, The 31st 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
	HFSS (Ansys Electronics)
Vacuum System Construction	Rotary pump, turbo pump, ion pump and NEG pump, Ti sublimation and Ion gauge operation
	Cryostation operation
Laser / Fiber Optics	SM-fiber delivery, double-pass AOM modulation, PID power and frequency lock system
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