

# JAERIN LEE

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## Contact

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GitHub: <https://github.com/ironjr>  
Google Scholar: <https://scholar.google.com/citations?user=LMMwadAAAAAJ&hl=en>

## Research Interest

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My goal as a researcher is to contribute to our understanding of the intricacies and dynamics of this world around us. I believe that the key lies in the representation learning. I started my research career in low-level vision where I have gained valuable insights into complex structural priors within images. Now I am lifting my sight from 2D to 3D, and from 3D to 4D, where our reality lies. I want to answer how we can perceive and act upon this four dimensional universe, and I wish to have the answers for them soon enough through my journey as an AI researcher.

## Education

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Sep 2019 - Present **Seoul National University**, Seoul, Korea  
The Integrated MA/Ph.D. Course in Electrical and Computer Engineering  
GPA: 4.14/4.30 (45 credits in Ph.D. Course of Electrical and Computer Engineering)  
Advisor: Prof. Kyoung Mu Lee  
*Leave of absence for military service*: Jan 2021 - Jul 2022 (18 months)

Mar 2015 - Aug 2019 **Seoul National University**, Seoul, Korea  
B.Sc. in Electrical and Computer Engineering  
*Summa cum laude*, GPA: 3.98/4.30 (161 credits in Electrical and Computer Engineering)  
Thesis: Progressively Growing Neural Networks for Image Recognition  
Advisor: Prof. Kyoung Mu Lee

Mar 2013 - Feb 2015 **Yonsei University**, Seoul, Korea  
Pre-Dentistry Major  
GPA: 3.99/4.30 (34 credits in Pre-Dentistry)  
*Withdrawn in pursue of a new career.*

Mar 2011 - Feb 2013 **Sejong Science High School**, Seoul, Korea  
Science Department  
*One year early graduation*

## Publications

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### PREPRINT

- Jaeyoung Chung, Suyoung Lee, Hyeongjin Nam, **Jaerin Lee**, Kyoung Mu Lee, “LucidDreamer: Domain-free Generation of 3D Gaussian Splatting Scenes,” *arXiv preprint*, arXiv:2311.13384, 2023. [[PDF](#)] [[PROJECT](#)]

### INTERNATIONAL CONFERENCE

- **Jaerin Lee**, JoonKyu Park, Sungyong Baik, and Kyoung Mu Lee, “Rethinking RGB Color Representation for Image Restoration Models,” submitted to International Conference on Learning Representations (ICLR), 2024, *Review in progress*. [[PDF](#)]
- Seungjun Nah, Sanghyun Son, **Jaerin Lee**, and Kyoung Mu Lee, “Clean Images are Hard to Reblur: Exploiting the Ill-Posed Inverse Task for Dynamic Scene Deblurring,” International Conference on Learning Representations (ICLR), 2022. [[PDF](#)]

- **Jaerin Lee** and Kyoung Mu Lee, “Structure-Resonant Discriminator for Image Super-Resolution,” IEEE International Conference on Multimedia and Expo (ICME), 2021, **Oral**. [PDF]
- Sanghyun Son, **Jaerin Lee**, Seungjun Nah, Radu Timofe and Kyoung Mu Lee *et al.*, “AIM 2020 Challenge on Video Temporal Super-Resolution,” 2nd AIM in ECCV Workshop, 2020. [PDF]

#### DOMESTIC CONFERENCE

- Deokhyeon Kim, Mingyu Park, and **Jaerin Lee**, “Development and Demonstration of Hanging Pendulum Type Low Thrust Measurement System,” In Proceedings of Spring Conference of the Korean Society for Aeronautical & Space Sciences, 2019.

## Professional Activities

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- Reviewer for International Conference: CVPR 2024, ECCV 2020 Workshop.
- Workshop co-organizer for International Conference: AIM 2020 Workshop for ECCV 2020.

## Press Coverage

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- **National Defence TV, Defence Media Agency**, Korea (Government media) December 30, 2021
  - Program: “Dreaming of the Army with Advanced Science and Technology, Military Science and Technology Researcher in Korea Military Academy, Part 2,” *I Am a Republic of Korea Soldier*, episode 176. [YOUTUBE]
  - Summary: A half hour-long documentary TV show on the state broadcaster dedicated to my job as a Military Science and Technology Researcher, a new specialty in the ROK Army, and *my contributions on supporting the cadet education with teaching assistance and technology demonstrations on artificial intelligence in the Korea Military Academy*.
  - Role: I am the main cast of the documentary show.
- **National Defence TV, Defence Media Agency**, Korea (Government media) December 23, 2021
  - Program: “Dreaming of the Army with Advanced Science and Technology, Military Science and Technology Researcher in Korea Military Academy, Part 1,” *I Am a Republic of Korea Soldier*, episode 175. [YOUTUBE]
  - Summary: A half hour-long documentary TV show on the state broadcaster dedicated to my job as a Military Science and Technology Researcher, a new specialty in the ROK Army, and *my contributions on the first field application of artificial intelligence in the ROK Army, the project I have planned and executed*.
  - Role: I am the main cast of the documentary show.

## Invited Talks

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- **Korea Military Academy**, Seoul, Korea May 18, 2022
  - Event: The 1<sup>st</sup> Korea Military Academy Artificial Intelligence Seminar
  - Subject: High Performance Computing for Artificial Intelligence
  - Contribution: Delivered a full one-and-a-half-hour lecture for the 40 *faculty members* in the Korea Military Academy as the sole speaker of the seminar.

## Experiences

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- **Military Science and Technology Researcher** of Republic of Korea Army Feb 2021 - Jul 2022
  - Location: Republic of Korea Army AI R&D Center, Korea Military Academy, Seoul, Korea
  - PI: Prof. COL Changhee Han
  - Role: An enlisted soldier (final rank: Sergeant) with research speciality in AI for the compulsory military service.
  - Contribution: Project manager and lead developer of the automated surveillance system in the Korea Military Academy, the first real-world military application of deep learning & computer vision in the ROK Army.
  - Awards: Corps Commander’s Commendation Ribbon (\*\*\*), Division Commander’s Commendation Ribbon (\*\*), Certificate of Appreciation from the ROK Army AI R&D Center.
- **Undergraduate Researcher** at Computer Vision Lab Jan 2019 - Aug 2019
  - Location: Seoul National University, Seoul, Korea

- Advisor: Prof. Kyoung Mu Lee
- Contribution: Research in image restoration and object detection.
- **Undergraduate Researcher** under SNU Undergraduate Research Program May 2018 - Nov 2018
  - Location: Seoul National University, Seoul, Korea
  - Advisor: Prof. Youdan Kim
  - Contribution: Designed and implemented a cold gas reaction control system for orientation control of a rocket and the measurement devices.
  - Awards: Funded by the SNU Undergraduate Research Program, Received the Excellence Award from the SNU Undergraduate Research Award.
- **Undergraduate Researcher** at Applied Superconductivity Lab Jun 2018 - Oct 2018
  - Location: Seoul National University, Seoul, Korea
  - Advisor: Prof. Seungyong Hahn
  - Contribution: Developer of an accelerated computer simulator for high-temperature superconductor (HTS) magnets, research participation in preliminary design of an MRI and NMR systems using HTS magnets.
- **Undergraduate Researcher** at Virtual Machine and Optimization Lab Feb 2018 - Jun 2018
  - Location: Seoul National University, Seoul, Korea
  - Advisor: Prof. Soo-Mook Moon
  - Contribution: Researcher and developer of a blockchain network simulator for study in network security and scalability of the commercial blockchain consensus mechanisms, developer of an edge computer-based blockchain.
  - Awards: The 1st Place in the 2018 Hdac HACKATHON (Prize: ₩50M  $\simeq$  \$45,000) for the blockchain development.
- **Undergraduate Researcher** at Nano/Micro Systems & Controls Lab Feb 2017 - Jun 2017
  - Location: Seoul National University, Seoul, Korea & SK telecom, Seoungnam, Korea
  - Advisor: Prof. Dong-il “Dan” Cho & Prof. Taehyun Kim
  - Contribution: Co-developer of an ion-trap controller of a quantum computer and communications system using a digital-to-analog converter (DAC) and FPGA.
- **Internship** at Collain Healthcare Jan 2016 - Feb 2016
  - Location: Georgetown, Texas, USA
  - Contribution: Market research on electronic health record (EHR) system providers for nursing homes in the US under the CSO of Collain Healthcare.

## Awards & Honors

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- **Certificate of Appreciation**, the Republic of Korea Army AI R&D Center Jul 2022
  - Received from the Principal Investigator of the Republic of Korea Army AI R&D Center, Colonel Changhee Han.
  - Honored for the 18 months of devotion and contribution to the advancement of the Army’s artificial intelligence capabilities with unwavering passion and fervent patriotism.
- **Division Commander’s Commendation Ribbon**, Superintendent of Korea Military Academy (MG) (★★) Jun 2022
  - For meritorious contributions to laying the groundwork for the intelligent military surveillance system by taking a leading role in the task “Development of AI Autonomous Surveillance System in Korea Military Academy Ammunition Storage Area.”
- **Corps Commander’s Commendation Ribbon**, Superintendent of Korea Military Academy (LTG) (★★★) Nov 2021
  - For meritorious contributions to laying the groundwork for the intelligent military surveillance system by taking a leading role in the task “Application of Artificial Intelligence on Intelligent Surveillance System of Korea Military Academy Command Control Center.”
- **Innovation Award**, 2021 5<sup>th</sup> Army Startup Competition, Republic of Korea Army Jun 2021
  - Awarded by the Commanding General of the Republic of Korea Army Personnel Command (MG) (★★).
  - Subject: Military Consultation Chatbot for the Army Mental Health Services Using Large Language Models.
  - Contribution: Ideation, design of the system, and the implementation of the demo.
- **Excellence Award**, SNU Undergraduate Research Award, Seoul National University Jan 2019
  - Subject: Development and Demonstration of 0.5-N Cold Gas Thruster for Reaction Control System in Sounding Rockets.

- Contribution: Team lead, design and development of the electronics of the testing apparatus, writing the main manuscript.
- **Gold Medal (the 1<sup>st</sup> Place)**, The 27<sup>th</sup> Rocket Engineering Competition Aug 2018
  - The National Universities' Rocket Association (NURA), Korea.
  - Contribution: Avionics team lead, executive of the team Hanaro.
- **The 2<sup>nd</sup> Place**, the 9<sup>th</sup> College of Engineering User Created Contents Contest, SNU Jul 2018
  - Subject: Passion Rocket Scientist; An yearly summary of the projects and activities conducted in the SNU Rocket Team Hanaro, awarded ₩1M ( $\simeq$  \$900) for the second place.
  - Contribution: Avionics team lead, executive of the team Hanaro, creator of the UCC.
- **The 1<sup>st</sup> Place**, 2018 Hdac HACKATHON -The ARENA-, Hdac Technology AG Jul 2018
  - Subject: Development of a Platform-as-a-Service on edge computing-based blockchain middleware.
  - Largest software development contest held in Korea, awarded ₩50M ( $\simeq$  \$45,000) for the first place.
- **Honors Student**, Yonsei University May 2015
  - Award given to student with high GPA of the previous semester.

## Scholarships

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- **Graduate Fellowship from Korea Foundation for Advanced Studies (KFAS)** Aug 2022 - Present  
Scholarship for full-tuition, health insurance, and living expenses, Korea Foundation for Advanced Studies.
- **National Scholarship for Science & Engineering** Mar 2015 - Feb 2018  
Full-tuition scholarship, Korea Student Aid Foundation.

## Projects

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- **Development of AI Autonomous Surveillance System in Korea Military Academy Ammunition Storage Area** Jan 2022 - July 2022  
*Military Science and Technology Researcher (Enlisted Soldier)*
  - Participated in planning the project and led the development of a deep neural network-enabled unstaffed autonomous surveillance system for military operations.
  - Participated in *deployment* of the developed system at the Korea Military Academy Command Control Center; this is the first deployment of a machine learning application in the Republic of Korea Army.
  - Received a commendation ribbon from the Superintendent of Korea Military Academy (MG) (★ ★).
  - This project was commissioned by the Superintendent of Korea Military Academy (LTG) (★ ★ ★).
- **AI-Driven Real-Time Restoration of Command Control Center Surveillance Videos in Times of Inclement Weather** Jan 2022 - July 2022  
*Military Science and Technology Researcher (Enlisted Soldier)*
  - Planned and led the project of applying computer vision algorithms for image and video restoration on military surveillance videos exposed in inclement weather.
  - This project was commissioned by the Superintendent of Korea Military Academy (LTG) (★ ★ ★).
- **Application of Artificial Intelligence on Intelligent Surveillance System of Korea Military Academy Command Control Center** Apr 2021 - Nov 2021  
*Military Science and Technology Researcher (Enlisted Soldier)*
  - Planned and led the project of applying deep learning-based multi object tracking algorithm and re-identification database to the military surveillance assistant system.
  - Presented the result at the 21-2 semi-annual meeting of the Steering Committee of Korea Military Academy.
  - Featured on two thirty-minute-long episodes of a regular TV series in National Defence TV of Korea explaining the role of the Military Science and Technology Researcher, an enlisted specialized in research in science and technology, in the Republic of Korea Army and the result of this project.
  - Received a commendation ribbon from the Superintendent of Korea Military Academy (LTG) (★ ★ ★).

- This project was commissioned by the Superintendent of Korea Military Academy (LTG) (★ ★ ★).

### **Development of the Military Welfare Consultation Chatbot using LLM**

Mar 2021 - Jun 2021

*Enlisted service member of the Republic of Korea Army*

- Applied a GPT-based Korean language model fine-tuned to conversation logs from the Military Consultation Call Center of Republic of Korea Army.
- Submitted to the 2021 5<sup>th</sup> Army Startup Competition of the Republic of Korea Army.
- Received the Innovation Award from the Commanding General of the Republic of Korea Army Personnel Command (MG) (★ ★).

### **Research on Computer Vision Problems with Deep Learning**

Mar 2019 - Aug 2019

*Bachelor's Thesis*

- Advisor: Prof. Kyoung Mu Lee (Seoul National University).
- A novel approach to Network Architecture Search (NAS) by progressively growing a neural network based on the magnitudes of intermediate activations.
- Deep neural networks for image recognition implemented with PyTorch.
- Achieved better performance on image classification tasks compared to the concurrent NAS techniques.

### **Development of Electronic Systems for Sounding Rockets**

Nov 2017 - Aug 2019

*Avionics Team Lead, SNU Rocket Team HANARO*

- Advisor: Prof. Young Bin Yoon (Seoul National University).
- Developed flight computers, or avionics, responsible for tracking and recording rocket status in flight.
- Developed power and electronic systems for automatic rocket thrust measurement devices.
- Developed a trajectory recovery software with MATLAB for postprocessing retrieved data from rockets.
- The developed system had become a firm foundation for the rocket team's participation of Spaceport America Cup 2019, Las Cruces, NM, USA.

### **Development and Measurement of Cold Gas Reaction Control System (RCS) Thruster for Rocket Roll Axis Stabilization**

May 2018 - Nov 2018

*Undergraduate Researcher*

- Advisor: Prof. Youdan Kim (Seoul National University).
- Developed a cold gas reaction control system for orientation control of a sound rocket.
- Developed electronic and software systems for the thrust measuring devices with NI LabVIEW.
- This was a reward winning project for the SNU Undergraduate Research Award (Excellence Award).
- This was funded by the SNU Undergraduate Research Program through the Faculty of Liberal Education, Seoul National University (₩7M  $\simeq$  \$6,000).

### **MRI Magnet Design using No-Insulation High Temperature Superconductor (HTS) Solenoid Magnets**

Jun 2018 - Sep 2018

*Undergraduate Researcher*

- Advisor: Prof. Seungyong Hahn (Seoul National University).
- Developed an accelerated magnetic field calculator using parallel programming in C and achieved 78 $\times$  speedup compared to the nonparallel variant.
- Developed an optimal design software toolkit of large-scale solenoid magnets in consideration of the magnetic field, scale, and mechanical constraints in C based on the developed calculator.
- Developed an MRI solenoid magnet design toolkit with user interface with MATLAB.

### **Development of a Blockchain Network Simulator for Algorithmic Stability**

Feb 2018 - Jun 2018

*Undergraduate Researcher*

- Advisor: Prof. Soo-Mook Moon (Seoul National University).
- Developed a blockchain network simulator in Go programming language to simulate and conduct stress tests of various commercial blockchain consensus mechanisms on large-scale network topologies to test their security, robustness, and scalability.
- Conducted a broad survey of academic research on the developments and deployments of blockchains.

### **Implementation of FMT Performance Counter on GEM5 Simulator**

Sep 2017 - Dec 2017

*Undergraduate Researcher*

- Advisor: Prof. Jangwoo Kim (Seoul National University).
- Modeled and simulated CPU processors for computer systems in C++ and tested possible modifications.
- Implemented a front-end miss-event table performance measurement probe for a simulated CPU chip.

### **Game Development with Unity Game Engine**

Jan 2017 - Dec 2017

*Team Lead, Project Manager*

- Gathered a group of six undergraduates to build a game development team and took the lead.
- Organized the team into multiple subgroups and launched multiple game development projects in parallel.
- Participated in concept art, level design, and programming, also worked as the chief project manager.
- Developed two 2D pixel-art games using Unity Engine.

### **Development of Subsystem for Ion-Trap Quantum Computer**

Feb 2017 - Jun 2017

*Undergraduate Researcher*

- Advisor: Prof. Dong-il “Dan” Cho (Seoul National University).
- Participated in development of a qubit controller of ion-trap quantum computers using FPGA and Verilog.
- Ions are generated then polarized to be trapped in the electrical potential well imposed by carefully controlled voltages in a comb structure.
- The electric field in the ion-trap is generated by a DAC controlled by the developed FPGA controller that takes input commands from a PC.

### **Game Development with Unreal Engine 4 and Autodesk Maya**

Mar 2016 - Dec 2016

*Team Lead, Project Manager*

- Conduct a comprehensive market survey of video games with estimated revenue of indie game developers.
- Gathered a group of seven undergraduates to build a game development team and took the lead.
- Participated in level design and programming, and worked as the project manager.
- Developed a 3D vertical platformer game using Unreal Engine 4 and custom 3D models built with Maya.

## **Certificates**

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- **Engineer Information Communication**, National Technical Qualification Certificate  
Korea Communications Agency. Dec 2021
- **Engineer Information Processing**, National Technical Qualification Certificate  
Human Resources Development Service of Korea. May 2019
- **Amateur Radio Operator, The 1<sup>st</sup> Class**, Radio Operator’s License  
Korea Communications Agency. Oct 2018

## **Skill**

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### **Programming**

- Languages: C, C++, C#, Python (PyTorch, Tensorflow 1&2, JAX), MATLAB, Go, JavaScript, TypeScript, Java, Kotlin, MySQL, NI LabVIEW, Verilog, Ethereum smart contracts with Solidity.

- Game development experience with Unity Engine and Unreal Engine 4&5. Rich programming experience using OpenGL and OpenCL.
- Application development experience on Debian Linux, Microsoft Windows, iOS, and Android OS.

**Language**

- Korean (Native).
- English (Fluent): GRE (VR 157/170 QR 170/170 AW 4.5/6), TOEFL (112/120).