JOO CHAN LEE

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I am a Ph.D. candidate in the Department of Artificial Intelligence at SungKyunKwan University, advised by Prof. Jong Hwan Ko and Prof. Eunbyung Park. My research spans **computer vision, graphics, and machine learning**, with a focus on efficient neural representation architectures from neural fields to recent advances in 3D Gaussian Splatting. In my recent work, I have concentrated on **efficient neural rendering for both static and dynamic scenes**, with **a strong interest in extending these methods to real-world applications** such as immersive AR/VR experiences, digital human modeling, autonomous robotics, and embodied AI systems.

EDUCATION

Current | *2020* **Ph.D. in Artificial Intelligence**
SungKyunKwan University (SKKU), Suwon, Korea
Advised by Prof. Jong Hwan Ko & Prof. Eunbyung Park
GPA: 4.42/4.5

2020 | *2016* **B.S. in Information & Communication Engineering**
Inha University, Incheon, Korea
GPA: 3.97/4.5 (Top 7 %)

RESEARCH EXPERIENCE

Current | *2020* **Graduate Researcher**
IRIS Lab, SungKyunKwan University (SKKU)
(Alternative military service, Mar. 2023 – Mar. 2026)

Research focuses on efficient machine learning across domains:

- **Neural Rendering**
  3D Gaussian Splatting [C7,C9,C11,C13,J4], Neural Radiance Field [C4,C6]
- **Neural Field Architecture**
  General neural field [C6], Video representation [C5]
- **Vision Applications**
  Object detection [C1], Image compression [C12,J1], Anomaly detection [C8]
- **System-Aware Neural Networks**
  Flexible-precision weight neural networks [C10], Edge-cloud collaborative neural networks [C2,J2]

SELECTED PUBLICATIONS

C11 **Optimized Minimal 3D Gaussian Splatting**
Joo Chan Lee, Jong Hwan Ko, Eunbyung Park
NeurIPS, 2025 [Page][Paper][Code]

C8 **Continuous Memory Representation for Anomaly Detection**
Joo Chan Lee*, Taejune Kim*, Eunbyung Park, Simon S. Woo, Jong Hwan Ko
ECCV, 2024 [Page][Paper][Code]

J4 **Compact 3D Gaussian Splatting for Static and Dynamic Radiance Fields**
Joo Chan Lee, Daniel Rho, Xiangyu Sun, Jong Hwan Ko, Eunbyung Park
Preprint (In major revision for TPAMI), 2024 [Page][Paper][Code]

C7 **Compact 3D Gaussian Representation for Radiance Field**
Joo Chan Lee, Daniel Rho, Xiangyu Sun, Jong Hwan Ko, Eunbyung Park
CVPR, 2024 (Highlight) [Page][Paper][Code]

C6 **Coordinate-Aware Modulation for Neural Fields**
Joo Chan Lee, Daniel Rho, Seungtae Nam, Jong Hwan Ko, Eunbyung Park
ICLR, 2024 (Spotlight) [Page][Paper][Code]

C5 **FFNeRV: Flow-Guided Frame-Wise Neural Representations for Videos**
Joo Chan Lee, Daniel Rho, Jong Hwan Ko, Eunbyung Park
ACM MM, 2023 [Page][Paper][Code]

C4 **Masked Wavelet Representation for Compact Neural Radiance Fields**
Daniel Rho*, Byeonghyeon Lee*, Seungtae Nam, **Joo Chan Lee**, Jong Hwan Ko, Eunbyung Park
CVPR, 2023 [Page][Paper][Code]

HONORS & AWARDS

2025 **Doctoral Colloquium –** *Korean Conference on Computer Vision (KCCV)*
Selected among the outstanding 8 Ph.D. researchers in Computer Vision in Korea

2024 **President's Award –** *Korea Institute of Energy Technology Evaluation and Planning (KETEP)*

2022 **Scholarship for Outstanding PhD Candidates –** *Dept. of Artificial Intelligence, SungKyunKwan University*

2022 **Outstanding Research Award –** *Dept. of Artificial Intelligence, SungKyunKwan University*

2020 **2nd Place Winner of Artificial Intelligence Grand Challenge –** *Institute of Information & Communications Technology Planning & Evaluation, Korea*

2020 **1st Place Winner of the Object Detection Track –** *VisDrone (ECCV 2020 Workshop) Challenge*

INTELLECTUAL PROPERTIES

PROJECTS

Now | *2023* **Lightweighting Dynamic Neural Radiance Fields**
Electronics and Telecommunications Research Institute (ETRI)
- Deployed compact neural radiance fields for dynamic scenes. J4

Now | *2023* **High-Performance Industrial Anomaly Detection**
SEMES
- Deployed high-performance anomaly detection model for industrial images. C8

2022 | *2020* **Object Detection System for UAVs**
Korea Aerospace Research Institute (KARI)
- Deployed edge-cloud neural network system for high-performance object detection in aerial imagery. C1

PATENTS

P8 **Joo Chan Lee**, Daniel Rho, Jong Hwan Ko, and Eunbyung Park, KR Patent **Registration No. 10-2803669**, Method and Apparatus for Representing Frame of Video Using Deep Learning Model, Apr. 2025.

P7 Xiangyu Sun, **Joo Chan Lee**, Jong Hwan Ko, and Eunbyung Park, KR Patent Application No.10-2024-0177514, Method of Processing Coordinates and Attributes of Point and Apparatus Thereof, Dec. 2024.

P6 **Joo Chan Lee**, Taejune Kim, Eunbyung Park, Simon S. Woo, and Jong Hwan Ko, PCT International Application No. PCT/KR2024/017582, Anomaly Detection Method and Apparatus, and Learning Method Thereof, Nov. 2024.

P5 **Joo Chan Lee**, Daniel Rho, Xiangyu Sun, Jun Young Jeong, Gwangsoon Lee, Jong Hwan Ko, and Eunbyung Park, KR Patent Application No.10-2024-0167744, Method and Computing Device for Compressed 3D Gaussian Splatting, and Computer-Readable Recording Medium Thereof, Nov. 2024.

P3 Johnny Rhe, Kang Eun Jeon, **Joo Chan Lee**, Seongmoon Jeong, and Jong Hwan Ko, PCT International Application No.PCT/KR2024/016234, Method and apparatus for convolution operation utilizing kernel shape control, Oct. 2024.

P4 Daniel Rho, Byeonghyeon Lee, Seungtae Nam, **Joo Chan Lee**, Jong Hwan Ko, and Eunbyung Park, KR Patent Application No.10-2023-0183124, Method and Apparatus for 2D Image Generation Based on Neural Radiance Fields Model, Dec. 2023.

P2 **Joo Chan Lee** and Jong Hwan Ko, US Patent Application No.18/203,695 **(Allowed)**, Deep Neural Network-Based Real-Time Inference Method, and Cloud Device and Edge Device Performing Deep Neural Network-Based Real-Time Inference Method, May. 2023.

P1 **Joo Chan Lee** and Jong Hwan Ko, US Patent Application No.18/197,891, Deep Neural Network-Based Object Detection Method, and Cloud Server and Edge Device Performing Deep Neural Network-Based Object Detection Method, May. 2023.

FULL PUBLICATIONS

CONFERENCE

C13 **Optimized Minimal 4D Gaussian Splatting**
Minseo Lee, Byeonghyeon Lee, Lucas Yunkyu Lee, Eunsoo Lee, Sangmin Kim, Seunghyeon Song, **Joo Chan Lee**, Jong Hwan Ko, Jaesik Park, Eunbyung Park
Preprint, 2025 [Page][Paper][Code]

C12 **Single-step Diffusion for Image Compression at Ultra-Low Bitrates**
Chanung Park, **Joo Chan Lee**, Jong Hwan Ko
Preprint, 2025 [Paper]

C11 **Optimized Minimal 3D Gaussian Splatting**

Joo Chan Lee, Jong Hwan Ko, Eunbyung Park
NeurIPS, 2025 [Page][Paper][Code]

C10 **TruncQuant: Truncation-Ready Quantization for DNNs with Flexible Weight Bit Precision**
Jin Hee Kim, Seoyeon Yoon, Taeho Lee, **Joo Chan Lee**, Kang Eun Jeon, Jong Hwan Ko
ISLPED, 2025 [Paper][Code]

C9 **F-3DGS: Factorized Coordinates and Representations for 3D Gaussian Splatting**
Xiangyu Sun, **Joo Chan Lee**, Daniel Rho, Jong Hwan Ko, Usman Ali, Eunbyung Park
ACM MM, 2024 [Page][Paper][Code]

C8 **Continuous Memory Representation for Anomaly Detection**
Joo Chan Lee*, Taejune Kim*, Eunbyung Park, Simon S. Woo, Jong Hwan Ko
ECCV, 2024 [Page][Paper][Code]

C7 **Compact 3D Gaussian Representation for Radiance Field**
Joo Chan Lee, Daniel Rho, Xiangyu Sun, Jong Hwan Ko, Eunbyung Park
CVPR, 2024 (Highlight) [Page][Paper][Code]

C6 **Coordinate-Aware Modulation for Neural Fields**
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ICLR, 2024 (Spotlight) [Page][Paper][Code]

C5 **FFNeRV: Flow-Guided Frame-Wise Neural Representations for Videos**
Joo Chan Lee, Daniel Rho, Jong Hwan Ko, Eunbyung Park
ACM MM, 2023 [Page][Paper][Code]

C4 **Masked Wavelet Representation for Compact Neural Radiance Fields**
Daniel Rho*, Byeonghyeon Lee*, Seungtae Nam, **Joo Chan Lee**, Jong Hwan Ko, Eunbyung Park
CVPR, 2023 [Page][Paper][Code]

C3 **Kernel Shape Control for Row-Efficient Convolution on Processing-In-Memory Arrays**
Johnny Rhe, Kang Eun Jeon, **Joo Chan Lee**, Seongmoon Jeong, Jong Hwan Ko
ICCAD, 2023 [Paper][Code]

C2 **A Splittable DNN-Based Object Detector for Edge-Cloud Collaborative Real-Time Video Inference**
Joo Chan Lee, Yongwoo Kim, SungTae Moon, Jong Hwan Ko
AVSS, 2021 [Paper]

C1 **VisDrone-DET2020: The Vision Meets Drone Object Detection in Image Challenge Results**
..., **Joo Chan Lee**, ... (Challenge Participants)
ECCV Workshops, 2020 [Paper][Certificate]

JOURNAL

J4 **Compact 3D Gaussian Splatting for Static and Dynamic Radiance Fields**
Joo Chan Lee, Daniel Rho, Xiangyu Sun, Jong Hwan Ko, Eunbyung Park
Preprint (In major revision for TPAMI), 2024 [Page][Paper][Code]

J3 **KERNTROL: Kernel Shape Control Toward Ultimate Memory Utilization for In-Memory Convolutional Weight Mapping**
Johnny Rhe, Kang Eun Jeon, **Joo Chan Lee**, Seongmoon Jeong, Jong Hwan Ko
IEEE TCAS-I, 2024 [Paper][Code]

J2 **A Reconfigurable Neural Architecture for Edge–Cloud Collaborative Real-Time Object Detection**
Joo Chan Lee, Yongwoo Kim, SungTae Moon, Jong Hwan Ko
IEEE Internet of Things Journal, 2022 [Paper]

J1 **Scalable Color Quantization for Task-Centric Image Compression**
Jae Hyun Park, Sang Hoon Kim, **Joo Chan Lee**, Jong Hwan Ko
ACM TOMM, 2022 [Paper]

PROFESSIONAL SERVICES

CONFERENCE PAPER REVIEWS

- Conference on Neural Information Processing Systems (NeurIPS)
- Conference on Computer Vision and Pattern Recognition (CVPR)
- International Conference on Computer Vision (ICCV)
- AAAI Conference on Artificial Intelligence (AAAI)
- Pacific Graphics (PG)
- British Machine Vision Conference (BMVC)
- IEEE International Conference on Advanced Visual and Signal-Based Systems (AVSS)
- Design Automation Conference (DAC)

JOURNAL PAPER REVIEWS

- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- Computer Vision and Image Understanding (CVIU)

STUDENT MENTORING

2025 – **Seunghyeon Song –** *Ph.D. Student at SungKyunKwan University*
- 3D Gaussian Splatting for dynamic scene representation

2024 – **Chanung Park –** *Ph.D. Student at SungKyunKwan University*
- Diffusion models for image compression at ultra low bitrate C12

2023 **Taejune Kim –** *M.S. Student at SungKyunKwan University, now at Robotics Lab, Hyundai Motor Company*
- Anomaly detection using neural representation C8

SKILLS

Programming Languages: Python, C/C++, Matlab

Learning Frameworks: Pytorch, Jax, Tensorflow

REFERENCES

Jong Hwan Ko *(Ph.D. advisor)*

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Dept. of Electrical and Computer Engineering
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Eunbyung Park *(Ph.D. advisor)*

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