

Jaehong Kim

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Research Interest

AI for systems, AI for video streaming, Immersive video, Systems for large-scale AI, Networked system

Work Experience

Carnegie Mellon University

Pittsburgh, PA, USA

POSTDOCTORAL RESEARCHER IN COMPUTER SCIENCE DEPARTMENT

Sep. 2024 - Aug. 2025 (Expected)

- Postdoctoral Fellowship Program granted by NRF. (Advisor: Srinivasan Seshan and Anthony Rowe)

Education

KAIST (Korea Advanced Institute of Science and Technology)

Daejeon, S.Korea

PH.D. IN ELECTRICAL ENGINEERING

Feb. 2020 - Aug. 2024

- Thesis title: Enabling High-quality 2D and 3D Live Streaming at Ingest (Advisor: Prof. Dongsu Han)

KAIST (Korea Advanced Institute of Science and Technology)

Daejeon, S.Korea

M.S. IN ELECTRICAL ENGINEERING

Sep. 2018 - Feb. 2020

- Thesis title: Enhancing Live Video Quality at Ingest Using Online Trained DNNs (Advisor: Prof. Dongsu Han)

KAIST (Korea Advanced Institute of Science and Technology)

Daejeon, S.Korea

B.S. IN ELECTRICAL ENGINEERING (CUM LAUDE)

Mar. 2014 - Aug. 2018

University of Maryland

College Park, MD, USA

EXCHANGE STUDENT PROGRAM

Jan. 2016 - May. 2016

Publications / Preprints

CONFERENCE PROCEEDINGS (C), WORKSHOPS (W), PREPRINTS (P)

TOPICS

[P-2] Pushing the Limits of Live 3D Streaming with Blender

Volumetric Video

Jaehong Kim, Junha Kim, and Dongsu Han

Under Review, 🏠 preprint

[P-1] NerVast: Scaling Neural Video Representation with Enhanced Compression Efficiency

AI for Video

Yunheon Lee, Jaehong Kim, Juncheol Ye, and Dongsu Han

Under Review, 🏠 preprint

[C-5] FlexPass: A Case for Flexible Credit-based Transport for Datacenter Networks

Datacenter Networking

Hwijoon Lim, Jaehong Kim, Inho Cho, Keon Jang, Wei Bai, and Dongsu Han

ACM EuroSys 2023, 🏠 webpage

[C-4] OutRAN: Co-optimizing for Flow Completion Time in Radio Access Network

5G Networks

Jaehong Kim, Yunheon Lee, Hwijoon Lim, Youngmok Jung, Song Min Kim, and Dongsu Han

ACM CoNEXT 2022 (Best paper award nominee), 🏠 webpage

[C-3] NeuroScaler: Neural Video Enhancement at Scale

AI for Live Streaming

Hyunho Yeo, Hwijoon Lim, Jaehong Kim, Youngmok Jung, Juncheol Ye, and Dongsu Han

ACM SIGCOMM 2022, 🏠 webpage

[C-2] Neural-Enhanced Live Streaming: Improving Live Video Ingest via Online Learning

AI for Live Streaming

Jaehong Kim^{*}, Youngmok Jung^{*}, Hyunho Yeo, Juncheol Ye, and Dongsu Han

ACM SIGCOMM 2020, ^{*} Co-first authors, 🏠 webpage

[C-1] Neural Adaptive Content-aware Internet Video Delivery

AI for Video Streaming

Hyunho Yeo, Youngmok Jung, Jaehong Kim, Jinwoo Shin, and Dongsu Han

USENIX OSDI 2018, 🏠 webpage

[P(W)-2] Towards AI-Native Transformation of Media and its Processing Pipeline

AI for Video Systems

Seyeon Lee^{*}, Jaehong Kim^{*}, Yunheon Lee, and Dongsu Han

Under Review, ^{*} Co-first authors

[W-1] Neural Cloud Storage: Innovative Cloud Storage Solution for Cold Video

AI for Cloud Storage

Jinyeong Lim, Juncheol Ye, Jaehong Kim, Hwijoon Lim, Hyunho Yeo, and Dongsu Han

ACM HotStorage 2023, 🏠 webpage

Honors and Awards

Jan. 2025	NSF NeTS Early Career Workshop 2025 Selected to attend the NeTS Early Career Workshop 2025 at NSF Headquarters.	NSF
Sep. 2024	NRF Postdoctoral Fellowship Program Selected as a principal investigator of Postdoctoral Fellowship Program (Nurturing Next-generation Researchers) in 2024 granted by the National Research Foundation of Korea (NRF) with ₩60,000,000 grant for one year.	NRF
Feb. 2023	29th Samsung Humantech Paper Award Silver Prize (2nd place), Communication & Network	Samsung Electronics
Dec. 2022	Google Conference Scholarship Travel grants for students giving oral presentations at top-tier CS conferences.	Google LLC
Dec. 2022	ACM CoNEXT'22 Best Paper Award Nomination & ACM Student Grant Received the highest review score with five "4 Accept" ratings.	NSF & ACM
Feb. 2022	28th Samsung Humantech Paper Award Gold Prize (1st place), Communication & Network	Samsung Electronics
2021	KAIST Breakthrough of the Year For the top 15 most significant research achievements.	KAIST
2020	Donghwa Industry Moon Daewon AI Research Scholarship Awarded to a graduate student for outstanding AI research and collaborative spirit.	KAIST
2018	USENIX OSDI Student Grant	USENIX

Patents

INTERNATIONAL

US17265680	Live video ingest system and method	KAIST
US16612498	Method and apparatus for transmitting adaptive video in real time using content-aware neural network	KAIST

DOMESTIC (SOUTH KOREA)

KR10-2023-0164365	Method for enhancing live video delivery at ingest point utilizing content-aware neural network	KAIST
KR10-2024-0170218 (Filed)	Method of encoding and decoding video including depth data AI-native Media Processing Technology based on Neural Network Representation	KAIST
KR10-2023-0164365 (Filed)	Unified Compression Method for RGB and Depth Video in Live 3D Video Streaming	KAIST
KR10-2022-0091760 (Filed)	Acceleration method for encoding selective super-resolved video	KAIST
KR10-2022-0091726 (Filed)	Acceleration and scheduling method for video super-resolution based on codec-level information	KAIST
KR10-2022-0138553 (Filed)	Practical flow scheduling algorithm designed for 4G/5G radio access network base stations for low-latency applications	Samsung Electronics & KAIST
KR10-2022-0077669 (Filed)	Method of scheduling flow and electronic device performing the method	Samsung Electronics & KAIST
KR10-2023-0181034 (Filed)	Cloud storage system for cold video with content-aware super-resolution	KAIST

Research Experience

3D Gaussian Splat Compression and Delivery Exploring efficient compression and Internet delivery of 3D Gaussian Splats for Immersive experience.	Sep. 2024 - Aug. 2025
AI-augmented Video Delivery for Immersive Media (NRF, PI) Funded by the National Research Foundation of Korea (NRF) with ₩60,000,000 for one year as a postdoctoral researcher and PI.	Sep. 2024 - Aug. 2025
Live Volumetric Video Streaming [P-2] Designed a novel RGB-D representation and delivery scheme for live 3D video streaming. It reduces depth error by 8.7× (RMSE) and improves RGB quality by 3.18 dB (PSNR) given the same bandwidth. Compared to Google's Draco, it offers 89.6% better compression efficiency. Demonstrated real-time performance using Azure Kinect Camera attached to the Jetson device.	Nov. 2022 - Feb. 2024

Cross-layer Optimization for 5G Radio Access Networks [C-4]

Aug. 2020 - June. 2022

Developed a new transport-layer scheduling in 5G Networks that delivers better latency for latency-sensitive traffic without the QoS information. Implemented the design both on **NS-3** and on top of **srsRAN** gNodeB, which runs on **USRP** Software Defined Radios (**SDR**). Reduced the webpage load time up to **34%** outperforming legacy 4G/5G MAC schedulers. Funded by Samsung Electronics Modem S/W R&D Group.

Neural-enhanced Live Video Delivery [C-2, C-3]

Nov. 2018 - July. 2020

Designed a new live ingest framework that ensures high-quality live streaming to viewers by enhancing origin live video quality with online-trained super-resolution DNNs at ingest servers. Implemented the client and ingest server with **WebRTC**, **PyTorch**, and **ffmpeg**. Improved quality of experience for live stream viewers up to **69%** or saved streamer's bandwidth usage by 45.9%.

Neural-enhanced Adaptive Streaming [C-1]

Mar. 2017 - Oct. 2018

Contributed to the development of a neural adaptive content-aware video delivery system, a first application of neural enhancement in adaptive video streaming. Implemented an end-to-end system on top of **MPEG DASH (dash.js)** and **TensorFlow**. Improved the quality of user experience by **43.08%** or saved 17.13% of network bandwidth.

Mentoring Experience

Individual Study

- Junha Kim (B.S. KAIST / Jun. 2023 - Present): Mentored research on live 3D streaming [P-2]. Read his experience [🏠 here](#).
- Yunheon Lee (B.S. KAIST → Ph.D. Candidate KAIST / Jun. 2021 - Present): Mentoring research on 5G [C-4], and AI for video [P-1].
- Jinyeong Lim (M.S. KAIST): Mentored research on AI for cloud storage [W-1].
- Euijun Jeong (B.S. KAIST): Mentored research on an efficient cluster-wise training scheme for content-aware neural-enhancement.

Undergraduate Research Program (URP)

- Hyojin Choi (B.S. KAIST / Jan.2023 - Jun.2023): Mentored research on deep neural video compression.

Teaching Experience

Teaching Assistant

- Advanced Computer Networking and Cloud Computing (EE618) Spring 2021
- Network Programming (EE324) Fall 2020, Fall 2021
- SK Hynix ASK Program Aug. 2020
- Systems and Applications of Artificial Intelligence and Machine Learning (EE793) Spring 2020
- Programming Structures for Electrical Engineering (EE209) Spring & Fall 2019, Spring & Fall 2022

Presentation

Computer Science & Engineering Department Seminar/Interview at UNIST

Ulsan, S.Korea

Improving the Quality of Experience (QoE) of Internet Applications

Jun. 2024

Conference talk at CoNEXT'22

Rome, Italy

Presented OutRAN: Co-optimizing for Flow Completion Time in Radio Access Network. [▶ Demo](#)

Dec. 2022

Conference talk at SIGCOMM'20

Virtual

Presented Neural-Enhanced Live Streaming: Improving Live Video Ingest via Online Learning.

Aug. 2020

[▶ 20-min talk](#), [▶ 10-min talk](#)

Demo & Poster session at OSDI'18

Carlsbad, CA, USA

Presented demo of Neural Adaptive Content-aware Internet Video Delivery. [▶ Demo](#)

Oct. 2018

Academic Service

2023, 2024 **IEEE/ACM transactions on networking**, Role: Reviewer

Skills

Programming Python, C/C++, JavaScript, CUDA

AI Frameworks TensorFlow, PyTorch, TensorRT

Other Skills dash.js, ffmpeg, NS-3, srsRAN, Docker

Languages Korean (native), English (fluent, IBT TOEFL 106)

References

Available upon request.