

# 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] BlenDR: Enabling 3D Live Streaming over the Internet

Volumetric Video

Jaehong Kim, Junha Kim, and Dongsu Han

Under Review, 🏠 preprint, 📺 Demo

### [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, 🏠 DASH.js code

### [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

Mar. 2025	<b>NSF Workshop on Networking and Systems Challenges in Immersive Computing — Travel Grant</b>	NSF
	Position paper accepted for the NSF Workshop with travel grant support.	
Jan. 2025	<b>NSF NeTS Early Career Workshop with Travel Grant</b>	NSF
	Selected to attend the NeTS Early Career Workshop 2025 at NSF Headquarters.	
Sep. 2024	<b>NRF Postdoctoral Fellowship Program</b>	NRF
	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.	
Feb. 2023	<b>29th Samsung Humantech Paper Award</b>	Samsung Electronics
	Silver Prize (2nd place), Communication & Network	
Dec. 2022	<b>Google Conference Scholarship</b>	Google LLC
	Travel grants for students giving oral presentations at top-tier CS conferences.	
Dec. 2022	<b>ACM CoNEXT'22 Best Paper Award Nomination &amp; ACM Student Grant</b>	NSF & ACM
	Received the highest review score with five “4 Accept” ratings.	
Feb. 2022	<b>28th Samsung Humantech Paper Award</b>	Samsung Electronics
	Gold Prize (1st place), Communication & Network	
2021	<b>KAIST Breakthrough of the Year</b>	KAIST
	For the top 15 most significant research achievements.	
2020	<b>Donghwa Industry Moon Daewon AI Research Scholarship</b>	KAIST
	Awarded to a graduate student for outstanding AI research and collaborative spirit.	
2018	<b>USENIX OSDI Student Grant</b>	USENIX

## Patents

### INTERNATIONAL

US17265680	<b>Live video ingest system and method</b>	KAIST
US11463750B2	<b>Method and apparatus for transmitting adaptive video in real time using content-aware neural network</b>	KAIST

### DOMESTIC (SOUTH KOREA)

KR10-2338986	<b>Method for enhancing live video delivery at ingest point utilizing content-aware neural network</b>	KAIST
KR10-2129115	<b>Method and apparatus for transmitting adaptive video in real time using content-aware neural network</b>	KAIST
KR10-2024-0170218	<b>Method of encoding and decoding video including depth data</b>	KAIST
(Filed)	<b>AI-native Media Processing Technology based on Neural Network Representation</b>	KAIST
KR10-2023-0164365 (Filed)	<b>Unified Compression Method for RGB and Depth Video in Live 3D Video Streaming</b>	KAIST
KR10-2022-0091760 (Filed)	<b>Acceleration method for encoding selective super-resolved video</b>	KAIST
KR10-2022-0091726 (Filed)	<b>Acceleration and scheduling method for video super-resolution based on codec-level information</b>	KAIST
KR10-2022-0138553 (Filed)	<b>Practical flow scheduling algorithm designed for 4G/5G radio access network base stations for low-latency applications</b>	Samsung Electronics & KAIST
KR10-2022-0077669 (Filed)	<b>Method of scheduling flow and electronic device performing the method</b>	Samsung Electronics & KAIST
KR10-2023-0181034 (Filed)	<b>Cloud storage system for cold video with content-aware super-resolution</b>	KAIST

## Research Experience

<b>3D Gaussian Splat Compression and Delivery</b>	Sep. 2024 - Aug. 2025
Exploring efficient compression and Internet delivery of 3D Gaussian Splats for Immersive experience.	
<b>AI-augmented Video Delivery for Immersive Media (NRF, PI)</b>	Sep. 2024 - Aug. 2025
Funded by the National Research Foundation of Korea (NRF) with ₩60,000,000 for one year as a postdoctoral researcher and PI.	

### Live Volumetric Video Streaming [P-2]

Nov. 2022 - Feb. 2024

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 reduces bandwidth usage for streaming live volumetric video by **25.3×**, while delivering **108×** denser (i.e., higher resolution) volumetric video.

### 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 & Research

- Seyeon Lee (M.S. KAIST / Jun. 2024 - Present): Mentored research on Neural Video Pipeline [W-1].
- 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

### Demo & Poster session at NSF Immercom'25 Workshop

Arlington, VA, USA

Enabling 3D Live Streaming over the Internet

April. 2025

### Research talk at Qualcomm Immersive Video Research Team

Vitruval, USA

Enabling High-quality 2D and 3D Live Streaming over the Internet

Feb. 2025

### 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

2025 **ACM Multimedia**, Role: Reviewer

2025 **USENIX Annual Technical Conference**, Role: External Review Committee (ERC)

2023, 2024, 2025 **IEEE/ACM Transactions on Networking**, Role: Reviewer

## Skills

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

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

**AI Frameworks** TensorFlow, PyTorch, TensorRT

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

## References

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Available upon request.