

Jaehong Kim

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Research Interest

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

Education

KAIST (Korea Advanced Institute of Science and Technology)

PH.D. IN ELECTRICAL ENGINEERING

[Daejeon, S.Korea](#)

Feb. 2020 - Aug. 2024 (Expected)

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

KAIST (Korea Advanced Institute of Science and Technology)

M.S. IN ELECTRICAL ENGINEERING

[Daejeon, S.Korea](#)

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)

B.S. IN ELECTRICAL ENGINEERING (CUM LAUDE)

[Daejeon, S.Korea](#)

Mar. 2014 - Aug. 2018

University of Maryland

EXCHANGE STUDENT PROGRAM

[College Park, MD, USA](#)

Jan. 2016 - May. 2016

Publications / Preprints

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

TOPICS

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

Volumetric Video

Jaehong Kim, Junha Kim, and Dongsu Han

Under Review

[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

[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

[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

Feb. 2023 **29th Samsung Humantech Paper Award**

[Samsung Electronics](#)

Silver Prize (2nd place), Communication & Network

Dec. 2022 **Google Conference Scholarship**

[Google LLC](#)

Travel grants for students giving oral presentations at top-tier CS conferences.

Dec. 2022 **ACM CoNEXT'22 Best Paper Award Nomination & ACM Student Grant**

[NSF & ACM](#)

Received the highest review score with five "4 Accept" ratings.

Feb. 2022 **28th Samsung Humantech Paper Award**

[Samsung Electronics](#)

Gold Prize (1st place), Communication & Network

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|------|--|--------|
| 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)

| | | |
|---------------------------|---|-----------------------------|
| KR10-2338986-0000 | Method for enhancing live video delivery at ingest point utilizing content-aware neural network | 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

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 offers **89.6%** better compression efficiency. Demonstrated real-time performance using **Azure Kinect** Camera attached to the Jetson device.

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

Conference talk at CoNEXT'22

Presented OutRAN: Co-optimizing for Flow Completion Time in Radio Access Network.  Demo

Rome, Italy

Dec. 2022

Conference talk at SIGCOMM'20

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

Virtual

Aug. 2020

 20-min talk ,  10-min talk

Demo & Poster session at OSDI'18

Presented demo of Neural Adaptive Content-aware Internet Video Delivery.  Demo

Carlsbad, CA, USA

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

Dongsu Han (Advisor)

Professor
School of Electrical Engineering
Korea Advanced Institute of Science and Technology
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Song Min Kim

Associate Professor
School of Electrical Engineering
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