
EDUCATION

- Georgia Institute of Technology**
Doctor of Philosophy in Computer Science; GPA: 4.0

Atlanta, GA
Aug. 2019 – Present
- Ajou University**
Bachelor of Science in Computer Engineering; Summa Cum Laude (1/213)

Suwon, South Korea
Mar. 2016 – Aug. 2018
- National Institute for Lifelong Education**
Associate of Science in Computer Engineering

Seoul, South Korea
Mar. 2015 – Feb. 2016
- ChungKang College of Cultural Industries**
Attended for Freshmen in Video Game Development

Icheon, South Korea
Mar. 2011 – Dec. 2011

PUBLICATIONS

- [1] **Heo, Jin**, Ketan Bhardwaj, and Ada Gavrilovska. Flexr: A system enabling flexibly distributed extended reality. In *Proceedings of the 14th Conference on ACM Multimedia Systems*, pages 1–13, 2023.
- [2] **Heo, Jin**, Ketan Bhardwaj, and Ada Gavrilovska. Poster: Enabling flexible edge-assisted xr. In *2021 IEEE/ACM Symposium on Edge Computing (SEC)*, pages 465–467. IEEE, 2021.
- [3] **Heo, Jin**, Christopher Phillips, and Ada Gavrilovska. Flicr: A fast and lightweight lidar point cloud compression based on lossy ri. In *2022 IEEE/ACM 7th Symposium on Edge Computing (SEC)*, pages 54–67. IEEE, 2022.
- [4] **Heo, Jin**, Gregoire Phillips, Per-Erik Brodin, and Ada Gavrilovska. Poster: Making edge-assisted lidar perceptions robust to lossy point cloud compression. In *2022 IEEE/ACM 7th Symposium on Edge Computing (SEC)*, pages 293–295. IEEE, 2022.
- [5] Sajjad Taheri, **Heo, Jin**, Payman Behnam, Jeffrey Chen, Alexander Veidenbaum, and Alexandru Nicolau. Acceleration framework for fpga implementation of openvx graph pipelines. In *2018 IEEE 26th Annual International Symposium on Field-Programmable Custom Computing Machines (FCCM)*, pages 227–227. IEEE, 2018.

EXPERIENCES & PROJECTS

- Kernel Lab, Georgia Tech**
Graduate Research Assistant

Atlanta, GA, USA
Aug. 2019 - Present

 - **Adaptive rendering optimization for scalable cloud gaming:** Stimpack is a system that enables adaptive rendering optimization for cloud gaming service. By fully utilizing the characteristics of cloud gaming, Stimpack effectively improves the number of users served by each server node.
 * *Git, Docker, Python, Scikit-learn, Unreal Engine, FFmpeg*
 - **Enabling flexibly distributed eXtended Reality (XR):** FleXR [1, 2] is a system that enables flexibly distributed XR. Based on the concept of stream processing, FleXR provides a framework that makes its pipeline kernels deployable for different distributed environments without any code changes. With FleXR, XR pipelines in various distributed topologies can be flexibly created at runtime, enabling an efficient edge assistance in various distributed environments.
 * *Git, Docker, C++, Boost, CMake, OpenCV, OpenGL, Unreal Engine, Unity 3D, FFmpeg, NVIDIA Video Codec SDK, GStreamer, ROS, Network Libraries (ZMQ, uvgRTP), Doxygen*
- AT&T Labs**
Graduate Intern

Austin, TX, USA
Jun. 2023 - Aug. 2023

- **A digital-twin platform for wireless network simulation:** This work is to develop a scalable digital-twin platform for the AT&T Lab’s next generation wireless network simulator, WiNGS. The digital-twin platform enables WiNGS to simulate cellular network with real-world contexts such as buildings and user mobility that can affect the network performance based on the 3GPP wireless network model. The developed platform uses the satellite images for building and road segmentation, and the 3D scene is reconstructed as a Unity scene by using the semantic information. Thus, the game-engine-based virtual world is enabled, and the framework supports the industrial standard, USD, to exchange the digital-twin information with other 3D software and simulation pipelines.

* *Git, C#, Unity, Universal Scene Description (USD), Python, PyTorch, MS Map SDK*

• Ericsson Research

Santa Clara, CA, USA

Graduate Intern (Remote)

Mar. 2021 - Dec. 2022

- **Lightweight and low-latency LiDAR point cloud compression:** FLiCR [3] is a fast and lightweight LiDAR point cloud compression method. By using the range image as an intermediate representation of LiDAR point clouds, FLiCR aggressively utilizes down-sampling and quantization together to improve the compression ratio of the downstream compression algorithm, and to reduce the latency and energy usage. It is lightweight to run on commodity mobile devices and fast to reduce the discrepancies between the perception results and real-world objects, caused by the end-to-end latency of the offloaded LiDAR perception.
- **Making remote LiDAR perceptions robust to lossy compression:** This work develops the method to improve the LiDAR perception performance on the encoded-decoded point clouds with lossy compression. By interpolating points at the intermediate representation of LiDAR point clouds, the perception performance degradation caused by the lossy compression is mitigated [4].

* *Git, Point Cloud Library (PCL), OpenCV, C++, OpenMP, CMake, FFmpeg, Python, PyTorch, Performance Profiling*

• Parallel Architectures and Systems Lab, UC Irvine

Irvine, CA, USA

Undergraduate Research Assistant (UROP)

Jul. 2017 - Jan. 2018

- **FPGA acceleration for OpenVX graph pipeline:** This work is to develop a framework of FPGA acceleration for pipelined operations [5]. The proposed framework splits and re-organizes the dataflow graph of an OpenVX pipeline for optimizing its execution. Our framework is implemented on the Intel high-level synthesis (HLS) tool with Arria 10 FPGA.

* *Git, C++, Intel HLS Compiler, OpenCV*

• Computer Communication Lab, Ajou University

Suwon, South Korea

Undergraduate Research Assistant (UROP)

Mar. 2017 - Jul. 2017

- **Network protocol investigation for continuous mobile communication:** For enabling continuous session-based communication of mobile users at the application level, the network protocol stack is investigated. Based on Host Identity Protocol (HIP) and Mobile IPv6, the network protocol stack is proposed.

• Commonwealth Scientific and Industrial Research Organisation

Brisbane, Australia

Undergraduate Research Assistant (UROP)

Sep. 2016 - Feb. 2017

- **A radio communication method for wireless sensor networks (WSN):** This work is to develop an efficient communication method among commodity sensor devices of limited batteries. The proposed communication method is implemented on TI SensorTag and Contiki OS by using a network flooding algorithm that synchronizes the radio transmissions across WSN.

TECHNICAL SKILLS & OPEN-SOURCE CONTRIBUTIONS

- **Programming Language:** C/C++, C#, Java, Python, and Shell Script
- **Software Platforms and Tools:** OpenGL, OpenCV, OpenVX, Pytorch, Tensorflow, Docker, gRPC, ZMQ, GStreamer, RaftLib, FFmpeg, Makefile, CMake, Meson, Unity3D, Unreal Engine
- **Project Management and Documentation:** Git, Agile Method, Test-Driven Development, Doxygen, Markdown
- **RaftLib:** Contributed to resolving the issue of the pipeline scheduler for resource efficiency
- **uvgRTP:** Contributed to improving the build system for Linux installation with pkg-config