Se-Min Lim

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Education

Sep 2020 – Current
Doctor of Philosophy, *University of California Irvine*, CA, US.
GPA - 4.00/4.00 | Major: Computer Science

Mar 2017 – Feb 2019
Master's Degree, *Korea University*, S. Korea.
GPA - 4.38/4.50 | Major: Electronics Engineering

Mar 2011 – Feb 2017
Bachelor's Degree, *Korea University*, S. Korea.
GPA - 3.50/4.50 | Major: Electronics Engineering

Research Interest

Artificial Intelligence

○ Neural networks, machine & deep learning, computational neuroscience, signal & image processing

○ Wearable sensors technology, skill assessment, human visual perception, computer vision

Computer Architecture

○ FPGA-based accelerators for neural networks, low power design

○ Energy-aware computing, embedded systems, system-on-chip

Applications

○ Human activity recognition, motion similarity evaluation, neural networks-based coaching assistant system

Professional Experience

Sep 2020 – Current
PhD Student Researcher, *ARDA Research Group*, UC Irvine, CA, US.

1) FPGA-based CNN Accelerator with ZFP

○ Developing a CNN Accelerator on FPGA with compression methods to achieve very low-cost and noticeable speed-up

Nov 2019 – Aug 2020
Researcher, *Parallel Computation & VLSI Architecture Lab*, Korea University, S. Korea.

1) CRNN-based Human Posture Recognition in Video Data

○ Designed an AI system that recognizes specific human posture in video data using an end-to-end CRNN

2) GRU-based Activity Recognition from Early-stage Motion

○ Implemented a customized GRU for posture correction and coaching in sports using a small number of sensor data acquired at early-stage motion

Apr 2019 – Oct 2019	**Researcher**, *Korea University Research & Business Foundation*, S. Korea.

1) Low-cost Method for Recognizing Table Tennis Activity
   ○ Implemented an upgraded FPGA hardware accelerator with high energy efficiency and processing based on cosine similarity for recognizing table tennis activity
2) Activity Recognition from Early-stage Motion
   ○ Designed LSTM RNN based neural networks for inference of table tennis posture using few time-series data acquired at early-stage of motion

Mar 2017 – Feb 2019	**Research Assistant**, *Parallel Computation & VLSI Architecture Lab*, Korea University, S. Korea.

1) LSTM-guided Coaching Assistant for Table Tennis Practice
   ○ Constituted a deep space state model derived from LSTM and compared two players' low-dimensional latent trajectories through probabilistic inference
2) Low-cost Assistive System for Table Tennis Practice
   ○ Developed two FPGA hardware accelerators each based on two separate systems-LSTM RNN and cosine similarity-and compared their functionality and efficiency
3) Pipelined Squarer for Unsigned Integers of up to 16 Bits
   ○ Applied the pipelining technique, CSA (Carry-Save Adder) tree and ripple-carry method to design a squarer
4) Deep Learning-based Assistive System for Table Tennis Practice
   ○ Designed two-stacked unidirectional, bidirectional, and residual LSTM RNNs by adding specific embedding layer for inference of table tennis posture

Mar 2015 – Feb 2017	**Undergraduate Student Researcher**, *Parallel Computation & VLSI Architecture Lab*, Korea University, S. Korea.

1) Deep Learning-based Real-time People and Objects Recognition System for Blind People
   ○ Designed real-time human and objects recognition system based on YOLO CNN by using NVIDIA TX 1
2) Kinect Camera-based Forward Head Posture Correction Device
   ○ Developed a portable embedded device that detects forward head posture and gives proper advice for correction by linking with Android application
3) Raspberry Pi 2 Model B-based CAN Bus Driver
   ○ Implemented a Raspbian based CAN(Controller Area Network) bus protocol driver

Sep 2020	**Teaching Assistant**, *UC Irvine*, CA, US.

   ○ Principles of Operating System

Mar 2017 – Dec 2018	**Teaching Assistant**, *Korea University*, S. Korea.

   ○ Electronic Circuits II, Signals and Systems I, Electric Circuits II, Pre-Calculus, Calculus
   ○ Introduction to Applied Mathematics, Digital System Laboratory, Discrete Mathematics, Computer Architecture

Publication

[J1] **<u>Se-Min Lim</u>**, Jooyoung Park, and Hyeong-Cheol Oh, "Low-cost Method for Recognizing Table Tennis Activity", *IEICE Trans. on Information and Systems*, Vol.E102-D, No.10, pp.2051-2054, Oct. 2019.

[J2] **<u>Se-Min Lim</u>**, Hyeong-Cheol Oh, Jaein Kim, Juwon Lee, and Jooyoung Park, "LSTM-Guided Coaching Assistant for Table Tennis Practice", *MDPI Sensors*, 2018, 18(12), 4112-4126, DOI: 10.3390/s18124112.

[C1] **<u>Se-Min Lim</u>**, Byeong-Cheol Chae, Soo-Bin Lim, Jooyoung Park, and Hyeong-Cheol Oh, "CRNN-based Human Posture Recognition in Video Data", *KCC 2020: Korea Computer Congress 2020*, KIISE, Online, Korea (July 02–04, 2020).

[C2] Keon-Woo Kim, Gyu-Sam Jang, **<u>Se-Min Lim</u>**, In-Kyeong Ann, Jooyoung Park and Hyeong-Cheol Oh, "GRU-based Activity Recognition from Early-stage Motion", *Summer Annual Conference of IEIE*, IEIE, Jeju, Korea (Aug 19–21, 2020).

[C3] Keon-Woo Kim, **<u>Se-Min Lim</u>**, Jooyoung Park, In-Kyeong Ann and Hyeong-Cheol Oh, "Activity Recognition from Early-stage Motion", *KCC 2019: Korea Computer Congress 2019*, KIISE, Jeju, Korea (June 26–28, 2019).

[C4] **<u>Se-Min Lim</u>**, Keon-Woo Kim, Jong-Wun Yang, Jooyoung Park, and Hyeong-Cheol Oh, "Low-Cost Assistive System for Table Tennis Practice", *KCC 2018: Korea Computer Congress 2018*, KIISE, Jeju, Korea (June 20–22, 2018).

[C5] **<u>Se-Min Lim</u>**, Jong-Wun Yang, Jooyoung Park, and Hyeong-Cheol Oh, "Deep Learning based Assistive System for Table Tennis Practice", *KSC 2017: Korea Software Congress 2017*, KIISE, Busan, Korea (December 20–22, 2017).

[T1] **<u>Se-Min Lim</u>**, "AI-Based Coaching Assistant System for Sports Practice", *Master Thesis*, Korea University, Feb. 2019.

Patents

[1] **<u>Se-Min Lim</u>**, Seongjin Choi, and Hyeong-Cheol Oh, "Pipelined Squarer for Unsigned Integers of up to 16 Bits", KR101974779, filed Apr. 25, 2019.

Service

Reviewer
○ IEEE System Journal

Awards and Fellowships

Awards

Jul 2018   **Best Poster Award**, *Korea Computer Congress 2018*.
Korean Institute of Information Scientists and Engineers

Sep 2016   **Best Research of Undergraduate Student Award**, *Department of Electronics Engineering Congress 2016*.
Korea University

Fellowships

Sep 2020 – Current **Fellowships of Graduate Student Researcher & Teaching Assistant**, *UC Irvine*.

Mar 2017 – Feb 2019 **Fellowships of Research & Teaching Assistant**, *Korea University*.

Jun 2015 – Dec 2016 **National Grant**, *Korea Student Aid Foundation*.

Sep 2016 **Scholarship for Undergraduate Student Researcher**, *Korea University*.

Dec 2015 **Scholarship of Korea University Alumni Association**, *Korea University*.

Skills

Computer Language Skills

- C/C++, Window/Linux Programming, Python, Verilog, VHDL, Bluespec, MATLAB, HTML

Software Skills

- Visual Studio, PyCharm, iPython Notebook, Jupyter, Spider, Quartus Prime, Vivado, ISE WebPack, Multisim, Microsoft Office