

SEUNGCHEOL (PAUL) OH

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EDUCATION

California State University Long Beach

Long Beach, CA, USA

Master of Science in Electrical Engineering - Advisor: Prof. Sean Kwon

May 2022

- Thesis: [Enhancement of Multiple Input Multiple Output \(MIMO\) Communication System with Polarization](#)
- Graduated with graduate [Dean's List of University Scholars and Artists](#)

Bachelor of Science in Electrical Engineering

Dec. 2019

- Graduated with Dean's Honour List and Magna Cum Laude

SKILLS

Areas of Knowledge: Machine Learning, Wireless Communication, Optimization, Signal Processing, Software Dev.

Specialty: LLM, NLP, GPT, Decision-Transformer, LSTM, GRU, Massive-MIMO, Phased Array Antenna, Polarization

Languages & Tools: Python (PyTorch, NumPy, Matplotlib, re), HuggingFace, MATLAB/Simulink, C/C++, HTML/CSS, Javascript, SQL, Kotlin, Swift, LabVIEW, CVX-Solver, Android Studio, Arduino, LTSpice, MongoDB

WORK EXPERIENCE

Visiting Researcher, WiSE Lab

June 2023 – Present

- Developing data driven, end-to-end machine learning based solutions to optimization problems in wireless communication systems by leveraging DNN, GRU, LSTM and Decision-Transformer (GPT) [1]

Graduate Student Researcher, University of Toronto

August 2022 - May 2023

- Produced a dataset to validate the neural network's capability to learn the channel statistics from accurately ray-traced reconfigurable intelligent surface (RIS) enabled wireless channels

Graduate & Undergraduate Student Researcher, WiSE Lab

Jan 2018 – Dec 2022

- Developed novel wireless communication systems that leverage polarization to enhance the systems with significant improvements in error rate or/and signal to noise ratio (co-op project with Prof. Andreas Molisch) [2, 3]

RESEARCH PROJECTS

Parameter Designs with Sequential Learning in PR-MIMO Communication System

Jan 2024 – Present

- Developing an RNN (LSTM) and decision-transformer (GPT) based sequential learning framework in polarized-MIMO communication system that abstracts essential temporal correlation in the channel to maximize system objective

Learning to Map Pilots to Optimal Polarization and Beamforming Vectors

June 2023 – Sep 2024

- Developing a framework utilizing DNNs to directly map pilots to optimal parameters in polarized massive-MISO system, resulting in superior performance compared to traditional methods with substantially reduced pilot length

Hymn Generation with GPT

March 2024 – April 2024

- Implemented, trained and fine-tuned a decoder-only transformer (GPT) to generate hymn-like texts in Korean

Convex-Optimization for Antenna Selection in PR-MIMO System

Sep. 2022 – Dec. 2022

- Enhanced polarized antenna selection system via convex-optimization techniques (constraint relaxation, interior point method, newton step, CVX-Solver) which significantly reduced the time complexity from $O(M^5)$ to $O(M^{3.5})$

Beamforming Implementation

August. 2019 – Dec. 2019

- Prototyped analog beamforming in MIMO communication system with USRP device

First Place Award for Senior Capstone Design Competition

PUBLICATIONS

[GOOGLE SCHOLAR LINK](#)

- [1] **Oh, Seungcheol**, Han Han, Joongheon Kim, and Sean Kwon. Double-side polarization and beamforming alignment in polarization reconfigurable miso system with deep neural networks. Submitted to IEEE Wireless Communications Letter, 2024.
- [2] **Oh, Paul** and Sean Kwon. Multipolarization superposition beamforming: Novel scheme of transmit power allocation and subcarrier assignment. IEEE Transactions on Wireless Communications, 22, 2023.
- [3] **Paul S. Oh**, Sean Seok-Chul Kwon, and Andreas F. Molisch. Antenna selection in polarization reconfigurable MIMO (PR-MIMO) communication systems. arXiv, 2021.
- [4] **Oh, Seungcheol Paul** and Seok-Chul Sean Kwon. Capacity of polarized-mimo (p-mimo) system in different wireless channels. In 2018 IEEE Green Energy and Smart Systems Conference (IGESSC), 2018.
2018 IGESSC Best Paper Award.

INVITED TALKS

EE 488: Communication Capstone Design Class, Visiting Lecturer

- Conducted a tutorial for machine learning applied wireless communications
- Presented a tutorial on operating USRPs to design beamforming systems with LabVIEW

Spring 2024

Fall 2019