DONGJIN SEO

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EDUCATION

[2] **Korea Advanced Institute of Science and Technology (KAIST)** **2019 - 2021**
M.S. in Electrical Engineering (Academic Advisor: Prof. Min Seok Jang) [thesis] Daejeon, South Korea
- Research Subject: Prediction and Optimization of Photonic Structures with Deep Learning

[1] **Korea Advanced Institute of Science and Technology (KAIST)** **2011 - 2019**
B.S. in Electrical Engineering Daejeon, South Korea
- Research Subject: Cleanroom Experience (Photolithography, Etching, Development) / Semiconductor Process
- On Leave 2014 - 2016 for National Military Service

CAREER

[6] **Electromagnetics and Intelligent Design Lab @ Hanyang University** [website] **Sep 2023 -**
- Position: Senior Researcher (Supervisor: Prof. Haejun Chung)
- Subject: Deep Learning and Nanophotonics Research

[5] **Glorang (Education Startup Company)** [website] **May 2022 -**
- Position: Team Lead (AI Team)
- Subject: Applying Deep Learning Algorithms to the Education Industry

[4] **Spidercore (AI & Biology Startup Company)** [website] **Dec 2021 - May 2022**
- Position: Researcher (AI Team)
- Subject: Search for Biomarkers (e.g. ASO candidates) via Deep Learning Technology

[3] **KC ML2 (AI & Semiconductor Company)** [website] **Feb 2021 - Aug 2021**
- Position: Researcher
- Subject: Deep Learning for Inverse Design

[2] **SK Hynix (Semiconductor Company)** [website] **Jun 2018 - Aug 2018**
- Position: Intern (QLC Device Team)
- Subject: Measurement and Test of NAND Flash Device

[1] **Cheesecake Studio (Startup Company)** **April 2016 - Jan 2017**
- Position: Chief Executive Officer, Founder
- Subject: Writing Music with AI

PUBLICATION

[2] **Structural Optimization of a One-Dimensional Freeform Metagrating Deflector via Deep Reinforcement Learning** ☆ **2022**
D Seo†, DW Nam†, J Park, CY Park*, MS Jang*. *ACS Photonics* [paper] [press]
☆ selected as the [Front Cover] of 2022 Feb. Issue

[1] **Inverse design of organic light-emitting diode structure based on deep neural networks** **2021**
S Kim, JM Shin, J Lee, C Park, S Lee, J Park, D Seo, S Park, CY Park, MS Jang*. *Nanophotonics* [paper]

ORAL PRESENTATION

[2] **Adjoint Method for Data Augmentation of Photonic Structures** **Aug 2023**
D Seo, C Kang, H Chung. *Optica Imaging Congress*

[1] **Deep reinforcement learning enables freeform structure optimization of 1D metagrating deflector** **Oct 2022**
D Seo, DW Nam, J Park, CY Park, MS Jang. *SPIE Optical Engineering + Applications* [video]

PUBLICATION UNDER REVIEW

[3] **A3SA: Advanced Data Augmentation via Adjoint Sensitivity Analysis**
C Kang†, D Seo†, S V Boriskina, H Chung*. (*submitted to npj Computational Materials*) [preprint]

[2] **ASOptimizer^{TM}: optimizing antisense oligonucleotides through deep learning for IDO1 gene regulation** (*submitted to Nucleic Acids Research*)
G Hwang†, M Gwon†, D Seo, DH Kim, K Lee, E kim, M Kang*, J Ryu*.

[1] **Physics-informed Reinforcement Learning for the Optimization of the One-dimensional Beam Deflectors** (*submitted to Advanced Optical Materials*)
C Park†, S Kim†, W Jeong†, J Park, D Seo, Y Kim, C Park, CY Park*, MS Jang*. [preprint]

PATENT

[4] **Personality Test Question Generation Method using a Question-Answering Network Based on a Language Model** [patent] **2023**
Korean Patent / Registration No. 10-2591769-0000 / Registration Date 2023.10.17
Inventors: Y Kwon, S Choi, D Seo, T Hwang.

[3] **Method for Sampling Process of Personality Test Using Question and Answer Network Representing Group of Respondents Based on BERT** [patent] **2023**
Korean Patent / Registration No. 10-2583818-0000 / Registration Date 2023.09.22
Inventors: Y Kwon, S Choi, D Seo, T Hwang.

[2] **Method and System for Designing Optimal Sequence of RNA Therapeutics** [patent] **2023**
Korean Patent / Registration No. 10-2546977-0000 / Registration Date 2023.06.20
Inventors: D Seo, M Kang, G Hwang, K Lee.

[1] **Method and System for Designing RNA Therapeutics** [patent] **2023**
Korean Patent / Registration No. 10-2499895-0000 / Registration Date 2023.02.09
Inventors: D Seo, M Kang, G Hwang, K Lee.

SELECTED RESEARCH EXPERIENCE

[5] **Collaborative Researcher at Hanyang University** **Sep 2022 - Sep 2023**
- performed collaborative research and provided mentorship and guidance to students
- Subject: Deep Learning and Data Science Approach for Photonics Devices
- Skills acquired: Mentoring, Meep Simulation

[4] **Venture Research Program for Master's and PhD Students in the College of Engineering, KAIST** **May 2020 - Dec 2020**
- Subject: Inverse Design of Manufacturable 2D Plasmonic Metasurface
- Skills acquired: RCWA Simulation, Reinforcement Learning, Deep Learning

[3] **Commisioned Research by Electronics and Telecommunications Research Institute (ETRI)** **April 2020 - Nov 2020 / April 2019 - Nov 2019**
- Subject: Developing a Simulation for the Light Structure of a Transparent Photoswitch Sensor
- Skills acquired: Lumerical FDTD Simulation, Synopsys LightTools (Ray Optics) Simulation

[2] **Undergraduate Research Program (URP) at KAIST** **2014 Spring**
- Advisor: Prof. Wonhee Lee
- Subject: Thermal Conduction Pressure Gauge based on Mean-free-path Reduction in Nanostructure
- Skills acquired: Cleanroom Skills such as Photolithography, Plasma Etching, Development, CAD of Photomask

[1] **Undergraduate Research at KAIST** **2013 Summer**
- Advisor: Prof. Yong-hee Lee
- Subject: Photonic Crystal Simulation with MPB(MIT Photonic Bands) Program
- Skills acquired: Photonic Crystal Simulation

HONORS AND AWARDS

[4] **Winning Team of 'AI Grand Challenge: Policy Assistance AI'** [website] **July 2023**
- hosted by *the Ministry of Science and ICT of South Korea*
- Position: Team Leader
- Subject: Developing an AI for the interpretation of governmental documents using NLP and CV techniques

[3] **2022 Korea Talent Award** [website] [press] **Dec 2022**
- bestowed by *the Deputy Prime Minister and Minister of Education of South Korea*

[2] **Best Paper Award (Honorable Mention)** [website] **Sep 2017**
- bestowed by *the School of Humanities & Social Science, KAIST*

[1] **Exemplary Soldier Award** **May 2016**
- bestowed by *Senior Superintendent of the Guard of Government Complex Daejeon*
(one person per platoon, Top 5%)

ADDITIONAL EXPERIENCE

[2] **DIYA (Do It Yourself AI)** [website] [GitHub] [YouTube] **Feb 2021 -**
- Korean Nationwide AI Study Club
- Club President since Feb 2022

[1] **Military Service** **Aug 2014 - May 2016**
- served as an Auxiliary Police
- was awarded an Exemplary Soldier Award from the troop

SKILLS

- Deep Learning Theory
- Programming in Python
- Autograd Library (Pytorch, JAX)
- Electromagnetic Simulation
- Photonics
- Nanofabrication
- 3D Printing
- PCB Design and Wire Bonding
- Teaching and Mentoring
- Creativity and Love for Research