Jinhyeong Yoon
(Ph.D. Candidate)

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Research Fields

- **Integrated Silicon Photonics**
- **Optical Phased Array (OPA) LiDAR**
- **Nanophotonics**
- **Inverse Design**

Education

KAIST (Daejeon, Republic of Korea) Feb. 2020 ~ Present
M.S. and Ph.D. integrated candidate in Electrical Engineering;
- Dissertation topic: Inverse design of high-performance silicon-based optical phased array for precise three-dimension imaging
- Advisor: Prof. Hamza Kurt
- Co-Advisor: Prof. Hyo-Hoon Park

Kyung Hee University (Suwon, Republic of Korea) Mar. 2014 ~ Feb. 2020
B.S. in Electrical Engineering; GPA: 4.06/4.3

Research Project Experiences

○ Korea Advanced Institute of Science and Technology, KAIST (Daejeon, Korea)

- **Development of smart 3D image sensors based on silicon optical phased array**
  Funded by Ministry of Science and ICT, Republic of Korea.
  Feb. 2020 ~ Feb. 2022
  - Team member (Silicon OPA design / Experimental demonstration of 3D imaging)

- **Silicon-based opto-electronic interface technology for high-speed and low-power data transmission**
  Funded by Korea Evaluation Institute of Industrial Technology, Republic of Korea.
  Feb 2020 ~ Dec. 2020
  - Team member (Silicon-based interface platform design & experimental demonstration)

- **Development of optical phased array technology for next-generation LiDAR application**
  Funded by the Hyundai Motor Company, Republic of Korea.
  Feb. 2020 ~ Dec. 2020
  - Team member (Silicon OPA LiDAR design / Experimental demonstration of LiDAR application)

- **Commercialization of high-speed wireless optical transceiver module using optical phased array for beam-forming technique**
  Funded by Nano Institute of Technology, Republic of Korea.
  Feb. 2020 ~ Dec. 2021
  - Team member (Silicon OPA LiDAR design / Experimental demonstration of data communication using OPA)

- **Design and research of optical true time delay line integration system with high-speed precise control**
  Funded by Agency for Defense Development, Republic of Korea.
  Jan. 2022 ~ Ongoing
  - Team member (Silicon-based optical true time delay line design & experiment)

- **Inverse design of silicon photonic devices for innovate performance improvement of optical phased array and optical transceivers**
  Funded by Ministry of Science and ICT, Republic of Korea.
  Mar. 2022 ~ Ongoing
  - **Team leader**

○ École Polytechnique Fédérale de Lausanne, EPFL (Lausanne, Switzerland)

- **Design of high-efficiency Si integrated optical antenna for high-power optical phased array**
  Funded by ETH Zürich, Switzerland & Ministry of Science and ICT, Republic of Korea.
  Nov. 2023 ~ Feb. 2024
  - **Principal investigator**
  - **Visiting Ph.D. Student (Advisor: Olivier J.F. Martin)**

Technical Skills

- **Fabrication skills**
  - CMOS-compatible process
  - Electron-beam lithography (EBPG 5000+)
  - Equipment: AMS200, EVG150, SM-150, DP650, Veeco IBE, Zeiss Merlin, etc.
- **Simulation tools**
  - Ansys Lumerical (FDTD, MODE, CHARGE, etc.)
  - OpticStudio (Zemax)
  - Rsoft
- **Design tools**
  - Optodesigner
  - L-edit
  - CAD
- **Programming skills**
  - Python
  - Matlab
  - Mathematica
- **Language skills**
  - Korean
  - English

Awards

- **Best student paper**
  - Title: Lens-assisted two-dimensional receiver based on grating array for wide angle detection.
  - Conference: *Optica Advanced Photonics Congress 2023, Busan, Republic of Korea*
  - Presenter/date: Jinhyeong Yoon / 12. July. 2023

Publications

- **Journal paper**

[1] Jae-Yong Kim, Junhyeong Kim, **Jinhyeong Yoon**, Seokjin Hong, Berkay Neseli, Namhyun Kwon, Jong-Bum You, Hyeonho Yoon, Hyo-Hoon Park, and Hamza Kurt, "Deep neural network-based phase calibration in integrated optical phased arrays," Scientific Reports 13(1), 19929 (2023)

[2] **Jinhyeong Yoon**, Jae-Yong Kim, Junhyeong Kim, Seokjin Hong, Berkay Neseli, Joonyong Park, Hyo-Hoon Park, and Hamza Kurt, "Cladding modulated silicon waveguide Bragg grating with TM-polarized light for optical true time delay line," Applied Physics Letters 123(19), (2023)

[3] **Jinhyeong Yoon**, Hyeonho Yoon, Jae-Yong Kim, Junhyeong Kim, Geumbong Kang, Nam-Hyun Kwon, Hamza Kurt, and Hyo-Hoon Park, "Demonstration of high-accuracy 3D imaging using a Si optical phased array with a tunable radiator," Optics Express 31(6), 9935-9944 (2023)

[4] **Jinhyeong Yoon**, Jae-Yong Kim, Junhyeong Kim, Hyeonho Yoon, Berkay Neseli, Hyo-Hoon Park, and Hamza Kurt, "Inverse design of Si-based high-performance vertical emitting metagrating coupler on 220 nm silicon-on-insulator platform," Photonics Research 11(6), 897-905 (2023)

[5] Junhyeong Kim, Berkay Neseli, Jae-Yong Kim, **Jinhyeong Yoon**, Hyeonho Yoon, Hyo-Hoon Park, and Hamza Kurt, "Inverse design of an on-chip optical response predictor enabled by a deep neural network," Optics Express 31(2), 2049-2060 (2023)

[6] Hyeonho Yoon, Hyun-Woo Rhee, Nam-Hyun Kwon, Jae-Yong Kim, Junhyeong Kim, **Jinhyeong Yoon**, and Hyo-Hoon Park, "Demonstration of two-dimensional beam steering through wavelength tuning with one-dimensional silicon optical phased array," Photonics 9(11), 812 (2022)

[7] Jae-Yong Kim, **Jinhyeong Yoon**, Junhyeong Kim, Nam-Hyun Kwon, Hyun-Woo Rhee, Mideum Baek, Yongtae Lee, Hyo-Hoon Park, and Hyeonho Yoon, "Demonstration of beam steering using a passive silica optical phased array with wavelength tuning," Optics Letters 47(19), 4857-45860 (2022)

[8] Junhyeong Kim, Jae-Yong Kim, **Jinhyeong Yoon**, Hyeonho Yoon, Hyo-Hoon Park, and Hamza Kurt, "Experimental demonstration of inverse-designed silicon integrated photonic power splitters," Nanophotonics 11(20), 4851-4590 (2022)

[9] Yongbin Hua, Weiguang Ran, Hoe-Chul Jeong, Yong-Hun Song, Eun-Yeong Park, **Jinhyeong Yoon**, and Jae-Su Yu, "Ethylene glycol-assisted ultrafast synthesis and luminescent properties of novel multifunctional EuSr2F7 and TbSr2F7 nanostructures for WLEDs, displays and anti-counterfeiting," Ceramics International 46(7), 8891-8902 (2020)

■ International conference paper

[1] Junhyeong Kim, Seokjin Hong, Jae-Yong Kim, Berkay Neseli, Jinhyeong Yoon, Hyo-Hoon Park, and Hamza Kurt, "Experimental demonstration of silicon-based on-chip neuromorphic optical computing," *Proc. SPIE. Optical Interconnects XXIV* (2024)

[2] Berkay Neseli, Junhyeong Kim, Jae-Yong Kim, Jinhyeong Yoon, Seokjin Hong, Hyo-Hoon Park, and Hamza Kurt, "Compact multi-functional device for optical communication systems," *Proc. SPIE. Optical Interconnects XXIV* (2024)

[3] Fakhriyya Mammadova, Berkay Neseli, Junhyeong Kim, Jae-Yong Kim, Seokjin Hong, Jinhyeong Yoon, Hyo-Hoon Park, and Hamza Kurt, "Inverse design of Silicon-based photonic digital circuit components using topology optimization," *Proc. SPIE. Optical Interconnects XXIV* (2024)

[4] **(Best Student Paper Awarded) Jinhyeong Yoon**, Jae-Yong Kim, Hyeonho Yoon, Junhyeong Kim, Hyo-Hoon Park, and Hamza Kurt, "Lens-assisted two-dimensional receiver based on grating array for wide angle detection," *Optica Advance Photonics Congress 2023, IW4A.3* (2023)

[5] Junhyeong Kim, Berkay Neseli, Jae-Yong Kim, **Jinhyeong Yoon**, Sumin Jeon, Hyo-Hoon Park, and Hamza Kurt, "Self-training of nanophotonic electromagnetic simulator leveraging generative models," *Optica Advance Photonics Congress 2023, ITh3B.3* (2023)

[6] Jae-Yong Kim, Muhammad Fasih, Berkay Neseli, **Jinhyeong Yoon**, Junhyeong Kim, Seokjin Hong, Sabaina Ifran, Hyo-Hoon Park, and Hamza Kurt, "Inverse design of ultra-compact silicon add-drop filter using topology optimization," *Optica Advance Photonics Congress 2023, JTu4A.22* (2023)

[7] Junhyeong Kim, **Jinhyeong Yoon**, Jae-Yong Kim, Berkay Neseli, Hyo-Hoon Park, and Hamza Kurt, "On chip photonic artificial intelligence accelerator," *Optica Advance Photonics Congress 2023, JTu4A.14* (2023)

[8] Berkay Neseli, Junhyeong Kim, Jae-Yong Kim, **Jinhyeong Yoon**, Seokjin Hong, Sumin Jeon, Hyo-Hoon Park, and Hamza Kurt, "A new way to define optimization targets for inverse design," *Optica Advance Photonics Congress 2023, IM3C.2* (2023)

[9] **Jinhyeong Yoon**, Hyeonho Yoon, Jae-Yong Kim, Junhyeong Kim, Geumbong Kang, Nam-Hyun Kwon, Seokjin Hong, Hamza Kurt, and Hyo-Hoon Park, "10 m in-door high accuracy distance measurement using Si optical phased array for LiDAR application," *Proc. SPIE. Silicon Photonics XVIII* (2023)

[10] Zunnoor Fayyaz Awan, Muhammad Fasih, **Jinhyeong Yoon**, and Hamza Kurt, "Inversely designed miniature light filtering structures with back-reflection minimization," *Proc. SPIE. Optical Components and Materials XXI* (2023)

[11] Seokjin Hong, **Jinhyeong Yoon**, Junhyeong Kim, Jae-Yong Kim, Berkay Neseli, Hyeonho Yoon, Hyunho Yoon, Hyo-Hoon Park, and Hamza Kurt, "Desing of MMI-based 1x4 power splitters with optimized parabolic input and output ports on SOI platform," *Proc. SPIE. Silicon Photonics XVIII* (2023)

[12] Berkay Neseli, Seokjin Hong, **Jinhyeong Yoon**, Junhyeong Kim, Jae-Yong Kim, Hyunho Yoon, Hyo-Hoon Park, and Hamza Kurt, "Engineering band-edge dynamics of photonic filters via topology optimization," *Proc. SPIE. Photonic and Phononic Properties of Engineered Nanostructures XIV* (2023)

[13] Jae-Yong Kim, Hyeonho Yoon, **Jinhyeong Yoon**, Junhyeong Kim, Namhyun Kwon, Mideum Beak, Yongtae Lee, Hamza Kurt, and Hyo-Hoon Park, "Demonstration of wireless data transmission using passive silica optical phased array," *Proc. SPIE. Free-Space Laser*

Communications XXXVI (2023)

[14] Hyeonho Yoon, Hyun-Woo Rhee, Nam-Hyun Kwon, Jae-Yong Kim, Junhyeong Kim, **Jinhyeong Yoon**, Muhammad Fasih, and Hyo-Hoon Park, "Two-dimensional beam-steering with wavelength control using one-dimensional optical phased array," *Proc. SPIE. Silicon Photonics XVII* (2022)

[15] **Jinhyeong Yoon**, Jae-Yong Kim, Junhyeong Kim, Hyeonho Yoon, Hyo-Hoon Park, and Hamza Kurt, "Inverse design of high-performance grating structure for out-of-plane radiation of waveguide mode," *Proc. SPIE. Silicon Photonics XVII* (2022)

[16] Junhyeong Kim, Jae-Yong Kim, **Jinhyeong Yoon**, Hyeonho Yoon, Hamza Kurt, and Hyo-Hoon Park, "Inverse design of zig-zag shaped 1x4 optical power splitters in SOI platform," *Proc. SPIE. Silicon Photonics XVII* (2022)

[17] Muhammad Fasih, Hyeonho Yoon, Nam-Hyun Kwon, Junhyeong Kim, **Jinhyeong Yoon**, Rabiul Islam Sikder, Hamza Kurt, and Hyo-Hoon Park, "Optical sideband modulation in silicon photonics platform using Mach-Zehnder interferometers," *2022 24th International Conference on Advanced Communication Technology (ICACT)*, 288-292 (2022)

Journal Reviewer

- **Optics Letters** ISSN:0146-9592 (print); 1539-4797 (web)
- **Optics Continuum** ISSN:2770-0208