**YOUNGJIN KIM**

PhD Candidate

Seoul National University, Seoul, South Korea

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**EDUCATION**

**B.S.** Electrical and Computer Engineering 2012. 3 – 2019. 2

Seoul National University, Seoul, Republic of Korea

Advisor: Byung Gook Park (deceased)

**M.S. - Ph.D.** Electrical and Computer Engineering2019.3 – 2025. 2 (expected)

Seoul National University, Seoul, Republic of Korea

Former advisor: Byoungho Lee (deceased)

Current advisor: Yoonchan Jeong ([yoonchan@snu.ac.kr](mailto:yoonchan@snu.ac.kr))

**PROFESSIONAL EXPERIENCE**

**Visiting Researcher** Stanford University, CA, USA2023. 12 – 2024. 2 - Professor: Mark Brongersma, Department of Materials Science and Engineering

**Research Scientist Intern** Meta Reality Labs, Washington, USA2024. 6 – 2024. 10 - Department: Display & Optics

**RESEARCH EXPERIENCE**

* **Metasurfaces / Nano-optics**
* Physical understanding of nanostructures’ optical response
* Metasurfaces / Nano-optics design using near-field and far-field simulations
* Hands-on nanofabrication using lithography-techniques
* **Waveguide system design**
* Waveguide-type folded metasurface system design using ray-tracing or wave-optics simulations
* Hands-on wafer double-side nanofabrication using lithography-techniques
* **Data-driven optimization of optical systems through machine-learning framework**
* Joint optimization of metasurface and spatial light modulator (SLM) phase profiles
* End-to-end optimization of metalens imaging system (Hardware + Software co-design)
* Metasurface proxy model design for fully differentiable optimization framework
* **Inverse design of metasurface through optical simulation algorithms**
* Metasurface blazed grating optimization through rigorous coupled-wave analysis using automatic differentiation
* **Application to imaging system / 3D holographic display / optical neural network**

**SKILLS**

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| **Numerical**  **simulations** | **Optical near-field simulations:**  RCWA (Python, Pytorch), FEM (COMSOL Multiphysics), FDTD (Lumerical)  **Optical far-field simulations:**  Ray-optic simulation (Zemax), Wave-optic simulation (MATLAB, Python, Pytorch)  **Computational optics design:**  Data-driven optimization through machine-learning framework (Pytorch), Inverse design of periodic nanostructures using automatic-differentiation (Pytorch)  **Programming languages & tools:**  MATLAB, Python (Pytorch), ZPL (for Zemax) |
| **Experimental**  **experiences** | Optical microscopy, Photography, Holographic display with spatial light modulator, Laser/LED-based experiments |
| **Device fabrication** | **Nanofabrication:**  Focused ion beam (FIB) milling, Electron beam lithography, Photolithography (Aligner, Maskless lithography), Electron beam evaporator, Plasma-enhanced chemical vapor deposition (PECVD), Reactive ion etching (RIE)  **Measurement:**  Scanning electron microscope (SEM), Ellipsometry |
| **Languages** | Korean (Native) / English (Fluent) |

**RESEARCH EXPERIENCE *- Projects***

* **Metalens planar optic system for ultra-slim camera module**

Researcher, Samsung Science & Technology Foundation

Jun. 2020 – July. 2023

* **Improvement of μLED optical characteristics using metasurface technology.**

Researcher, Samsung Display

March. 2021 – Feb. 2023

* **Research for integrated meta-photonics system and its application to mobile real-time 3D imaging**

Researcher, National Research Foundation of Korea

Mar. 2020 - November. 2022

* **Development of virtual reality technology using metasurface optics**

Researcher, Samsung Display

March. 2020 – Feb. 2021

**HONOR AND AWARDS**

* **Seoul National University Joint International Research Grant**

Seoul National University, 2023.

* **Silver Prize, Samsung Display Industry-Academia Technical Paper Awards**

Samsung Display, 2023.

* **Scholarship of Foundation for SNU ECE - Kim Jung Sik Fund**

Seoul National University, 2021.

* **Best Poster Paper Awards**

Optics and Photonics Congress, Jeju, South Korea, 2021.

**JOURNAL PUBLICATIONS** First Author (2)

† : equal contribution

1. **Y. Kim,** G. -Y. Lee, J. Sung, J. Jang, and B. Lee,“[Spiral Metalens for Phase Contrast Imaging](https://onlinelibrary.wiley.com/doi/full/10.1002/adfm.202106050),” **Advanced Functional Materials**, vol. 32, no. 5, pp. 2106050, 2022.
2. S. -W. Nam†, **Y. Kim†**, D. Kim, and Y. Jeong, “[Depolarized Holography with Polarization-multiplexing Metasurface](https://arxiv.org/abs/2309.14668),” **ACM Transactions on Graphics (SIGGRAPH Asia)**, vol. 42, no. 6, article 200, 2023.

**JOURNAL PUBLICATIONS** Co-Author (3)

1. S.-J. Kim, C. Kim, **Y. Kim**, J. Jeong, S. Choi, W. Han, J. Kim, and B. Lee, “[Dielectric metalens: properties and three-dimensional imaging applications](https://www.mdpi.com/1424-8220/21/13/4584),” **Sensors**, vol. 21, no. 13, pp. 4584, 2021.
2. J. Jang, G. -Y. Lee, **Y. Kim**, C. Kim, Y. Jeong, and B. Lee, “[Dispersion-Engineered Metasurface Doublet Design for Broadband and Wide-Angle Operation in the Visible Range](https://ieeexplore.ieee.org/abstract/document/10163790),” **IEEE Photonics Journal**, vol. 15, no. 4, pp. 1-9, 2023.
3. C. Kim, J. Hong, J. Jang, G. -Y. Lee, **Y. Kim**, Y. Jeong, and B. Lee, “Freeform Metasurface Color Router for Deep Sub-micron Pixel Image Sensors,” **Science Advances**, vol. 10, no. 22, pp. eadn9000, 2024.
4. H. Son, T. Choi, K. Kim, Y. Kim, J. Bang, S.-J. Kim, B. Lee, and Y. Jeong, “Strong Coupling Induced Bound States in the Continuum in a Hybrid Metal–Dielectric Bilayer Nanograting Resonator,” **ACS Photonics**, 2024.

**CONFERENCES** First Author (5)

1. **Y. Kim**, C. Kim, B. Lee, Y. Jeong, and B. Lee, “Meta-optic Miniaturized Telephoto Lens System,” High Contrast Metastructures XII, SPIE Photonics West 2023, San Francisco, USA, paper 12432-32, Feb. 2023. **(Oral presentation)**
2. **Y. Kim,** C. Kim, and B. Lee, “Phase contrast imaging with multiwavelength achromatic spiral metalens,” OSA Optical Design and Fabrication Congress, Virtual Conference, paper FW4C.3, Jun. 2021. **(Oral presentation)**
3. **Y. Kim**, J. Hong, and B. Lee, “Edge detection metalens with additional spiral phase profiles,” The 20th International Meeting on Information Display (IMID 2020), Virtual Conference, paper 04-10-1232, Aug. 2020. **(Oral presentation)**
4. **Y. Kim,** C. Kim, and B. Lee, “Single-layer edge detecting metalens with combining hyperbolic and spiral phase profiles,” The 14th Pacific Rim Conference on Lasers and Electro-Optics (CLEO PR 2020), Virtual Conference, paper P5-7, Aug. 2020.
5. **Y. J. Kim**, J. Hong, J. Sung, and B. Lee, “Transmission-Type Color Filters with Silicon Mie Resonators using Guided-Mode-Resonance,” OSA Frontiers in Optics + Laser Science APS/DLS, Washington D.C., USA, paper JW4A.74, Sep. 2019.