

# YOUNGJIN KIM

PhD Candidate

Seoul National University, Seoul, South Korea

Email	Google scholar	Website	Linkedin
<a href="mailto:ttw8592@snu.ac.kr">ttw8592@snu.ac.kr</a>	<a href="#">Click here</a>	<a href="#">Click here</a>	<a href="#">Click here</a>

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## EDUCATION

<b>B.S.</b>	Electrical and Computer Engineering Seoul National University, Seoul, Republic of Korea Advisor: Byung Gook Park (deceased)	2012. 3 – 2019. 2
<b>M.S. - Ph.D.</b>	Electrical and Computer Engineering Seoul National University, Seoul, Republic of Korea Former advisor: Byoungcho Lee (deceased) Current advisor: Yoonchan Jeong ( <a href="mailto:yoontan@snu.ac.kr">yoontan@snu.ac.kr</a> )	2019.3 – 2025. 2 (expected)

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## PROFESSIONAL EXPERIENCE

<b>Visiting Researcher</b>	Stanford University, CA, USA	2023. 12 – 2024. 2
- Professor: Mark Brongersma, Department of Materials Science and Engineering		
<b>Research Scientist Intern</b>	Meta Reality Labs, Washington, USA	2024. 6 – 2024. 10
- Department: Optics & Display Research		

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## 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

### 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  $\mu$ LED 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.

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## JOURNAL PUBLICATIONS

First Author (4)

† : equal contribution

1. **Y. Kim**, G. -Y. Lee, J. Sung, J. Jang, and B. Lee, "[Spiral Metalens for Phase Contrast Imaging](#)," **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](#)," **ACM Transactions on Graphics (SIGGRAPH Asia)**, vol. 42, no. 6, article 200, 2023.
3. **Y. Kim†**, T. Choi†, G. -Y. Lee, C. Kim, J. Bang, J. Jang, Y. Jeong, and B. Lee, "Metasurface Folded Lens System for Ultrathin Cameras," **Science Advances**, 2024 (Accepted).
4. Y. Park†, **Y. Kim†**, C. Kim, G. -Y. Lee, H. Choi, T. Choi, Y. Jeong, and B. Lee, "Neural Metalens for Broadband and Wide-angle Imaging," 2024 (Submitted).

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## JOURNAL PUBLICATIONS

Co-Author (6)

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](#)," **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](#)," **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**, vol. 11, no. 8, pp. 3221-3231, 2024.
5. T. Choi, C. Choi, J. Bang, **Y. Kim**, H. Son, C. Kim, J. Jang, Y. Jeong, and B. Lee, "Multiwavelength Achromatic Deflector in the Visible using a Single-layer Freeform Metasurface," **Nano Letters**, vol. 24, no. 35, pp. 10980-10986, 2024.
6. E. Lee, Y. Jo, S. -W. Nam, M. Chae, C. Chun, **Y. Kim**, Y. Jeong, and B. Lee, "Speckle Reduced Holographic Display System with a Jointly Optimized Rotating Phase Mask," **Optics Letters**, vol. 49, no. 19, pp. 5659-5662, 2024.

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## 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.
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