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 Engineering — 2019.3 – 2025. 2
Seoul National University, Seoul, Republic of Korea
Former advisor: Byoungho Lee (deceased)
Current advisor: Yoonchan Jeong (yoonchan@snu.ac.kr)

PROFESSIONAL EXPERIENCE

Visiting Researcher Stanford University, CA, USA — 2023. 12 – 2024. 2

- Professor: Mark Brongersma, Department of Materials Science and Engineering

Research Scientist Intern Meta Reality Labs, WA, USA — 2024. 6 – 2024. 10

- Department: Optics & Display Research
- Research subject: New waveguide architecture development

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
- **Metasurface folded optics (Waveguide)**
  - Waveguide-type folded metasurface system design using ray-tracing or wave-optics simulations for ultraslim and integrated imaging system
  - Hands-on wafer double-side nanofabrication using lithography-techniques
- **Computational design of optical systems leveraging metasurface optics**
  - 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
  - Metagrating optimization through rigorous coupled-wave analysis using automatic differentiation
- **Application to Cameras / AR,VR systems / Holographic display / Microscopy**

HONOR AND AWARDS

- **Distinguished Dissertation Award**
  Seoul National University, 2025.
- **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 (4)

† : equal contribution

1. **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**, vol. 10, no. 44, pp. eadr2319, 2024.
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. (Top 5% in Computer Graphics)
3. **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.
4. Y. Park†, **Y. Kim**†**,** C. Kim, G.-Y. Lee, H. Choi, T. Choi, Y. Jeong, and B. Lee, "End-to-end Optimization of Metalens for Broadband and Wide-angle Imaging," **Advanced Optical Materials**, 2402853, 2025 (Early View).

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. 3221-3232, 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.

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. 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.

PATENTS

1. Y. Park, **Y. Kim**, G.-Y. Lee, B. Lee, Y. Jeong, "Double sided metalens and electronic device including the same" (US – Application No. 18/490,121)
2. Y. Jeong, S.-W. Nam, **Y. Kim**, D. Kim, "Holographic display using metasurface and metasurface optimization method" (US – Application No. 18/737,648)

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 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