Curriculum Vitae

Gun-Yeal Lee

Postdoctoral Researcher
Stanford University, CA, USA
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EDUCATION

09/2015 – 08/2021 **Ph.D. in Electrical and Computer Engineering**
Seoul National University, Seoul, South Korea
Advisor: Prof. Byoungho Lee
Thesis Title: "Metasurface optical elements for holography and imaging"

03/2011 – 02/2015 **B.S. in Electrical and Computer Engineering**
B.S. in Physics
Seoul National University, Seoul, South Korea
Advisor: Prof. Byoungho Lee & Prof. DaiSik Kim

RESEARCH EXPERIENCE

09/2022 – present **Postdoctoral Researcher**
Stanford University, CA, USA
Advisor: Prof. Gordon Wetzstein

09/2021 – 08/2022 **Postdoctoral Researcher**
Inter-university Semiconductor Research Center, Seoul National University, Seoul, South Korea
Advisor: Prof. Byoungho Lee
(Alternative military service of South Korea until August 2022)

03/2015 – 08/2015 **Research Intern**
Optical Engineering and Quantum Electronics Laboratory, Seoul National University, Seoul, South Korea
Advisor: Prof. Byoungho Lee

HONORS AND AWARDS

- **NRF Postdoctoral Fellowship**
  Nurturing Next-generation Researchers Program, National Research Foundation of Korea (NRF), 2022
- **Outstanding Doctoral Thesis Award**
  Department of Electrical and Computer Engineering, Seoul National University, 2021.
- **Best Graduate Student Award**
  Seoul National University, 2021.

- **Doyeon Academic Paper Award**
  Seoul National University, South Korea, 2020.
- **Best Paper Award of 2020**
  WILEY ETRI Journal, Electronics and Telecommunications Institute (ETRI), 2020.
- **SPIE Optics and Photonics Education Scholarship**
  International Society for Optics and Photonics (**SPIE**), USA, 2020
- **Best Paper Award**
  Conference on Optoelectronics and Optical Communications, Daegu, South Korea, June 2018.
- **Incubic/Milton Chang Award**
  Optica (formerly known as The Optical Society of America), Washington, USA, 2017.
- **Emil-wolf Award – Finalist**
  Optica (formerly known as The Optical Society of America), Washington, USA, 2017.
- **Best Paper Award**
  META'17 (The 8th international conference on metamaterials, photonic crystals and plasmonics), Incheon, South Korea, July, 2017.
- **Best Paper Award & Best Student Award**
  International Conference on Optical and Photonic Engineering, Chengdu, China, Sep, 2016.
- **Best Paper Award - Grand Prize** (1st place out of 600 papers)
  Nano Korea 2016, Ilsan, South Korea, July, 2016.
- **National Science & Technology Scholarship**
  Korea Student Aid Foundation (KOSAF), South Korea, 2013-2015

RESEARCH INTERESTS

- Nanophotonics, Metasurfaces, and Flat optics
- Optical imaging, Photography, and Microscopy
- Optical displays, Holography, and Augmented/Virtual Reality (AR/VR) displays
- Computational imaging, Computational displays, and Computational optics

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RESEARCH EXPERIENCE – PROJECTS

- **Metalens planar optic system for ultra-slim camera module**
  Researcher, Academic project with Samsung Science & Technology Foundation
  Jun. 2020 – Aug. 2022

  Contribution: proposed a main idea of the project, write project proposal as a leader of graduate students,
- **Research for integrated meta-photonics system and its application to mobile real-time 3D imaging**
  Researcher, Academic project with National Research Foundation of Korea
  Mar. 2020 – Aug. 2022

- **Research for metalens and its application to next-generation image systems**
  Researcher, Academic project with National Research Foundation of Korea
  Mar. 2017 – Feb. 2020
- **Realization of metalens and complex hologram for virtual and augmented reality**
  Researcher, Academic project with National Research Foundation of Korea
  Sep. 2015 – Aug. 2022
- **National Creative Research Center for Active Plasmonics Application Systems**
  Researcher, Academic project with National Research Foundation of Korea
  Mar. 2012 – Feb. 2016

JOURNAL PUBLICATIONS

(Google Scholar profile: https://scholar.google.com/citations?user=SlXpVNkAAAAJ&hl=en&oi=ao)

†: equal contribution

- ## Journal Articles – First authorship (9)

1. Manu Gopakumar†, **Gun-Yeal Lee†**, Suyeon Choi, Brian Chao, Yifan Peng, Jonghyun Kim, and Gordon Wetzstein, "Full-colour 3D holographic augmented-reality displays with metasurface waveguides," ***Nature***, vol. 629, pp. 791-797, 2024.

2. Junhyeok Jang†, **Gun-Yeal Lee†**, Jangwoon Sung, and Byoungho Lee, "Independent multichannel wavefront modulation for angle multiplexed meta-holograms," ***Advanced Optical Materials***, vol. 9, no. 17, pp. 2100678, 2021. [Citations: 43]

3. **Gun-Yeal Lee**, Jangwoon Sung, and Byoungho Lee, "Metasurface optics for imaging applications," ***MRS Bulletin***, vol. 45, no. 3, pp. 202-209, 2020. [Citations: 35]

4. **Gun-Yeal Lee**, Jangwoon Sung, and Byoungho Lee, "Recent advances in metasurface hologram technologies," ***ETRI Journal***, vol. 41, no. 1, pp. 10-22, 2019. [Citations: 80]

5. Jangwoon Sung†, **Gun-Yeal Lee†**, Chulsoo Choi, Jongwoo Hong, and Byoungho Lee, "Single-layer bifacial metasurface: full-space visible light control," ***Advanced Optical Materials***, vol. 7, no. 8, article 1801748, 2019. [Citations: 50]

6. **Gun-Yeal Lee†**, Jong-Young Hong†, SoonHyoung Hwang, Seokil Moon, Hyeokjung Kang, Sohee Jeon, Hwi Kim, Jun-Ho Jeong, and Byoungho Lee, "Metasurface eyepiece for augmented reality," ***Nature Communications***, vol. 9, article 4562, 2018. [Citations: 449]

7. **Gun-Yeal Lee**, Gwanho Yoon, Seung-Yeol Lee, Hansik Yun, Jaebum Cho, Kyookeun Lee, Hwi Kim, Junsuk Rho, and Byoungho Lee, "Complete amplitude and phase control of light using broadband holographic metasurface," ***Nanoscale***, vol. 10, pp. 4237-4245, 2018. [Citations: 389]

8. Eui-Young Song†, **Gun-Yeal Lee†**, Hyeonsoo Park, Joonsoo Kim, Jongwoo Hong, Hwi Kim, and Byoungho Lee, "Compact generation of Airy beams with C-aperutre metasurface," ***Advanced Optical Materials***, vol. 5, Issue 10, article 161028, 2017. [Citations: 92]

9. **Gun-Yeal Lee**, Seung-Yeol Lee, Hansik Yun, Hyeonsoo Park, Joonsoo Kim, Kyookeun Lee, and Byoungho Lee, "Near-field focus steering along arbitrary trajectory via multi-lined distributed nanoslits," ***Scientific Reports***, vol. 6, article 33317, 2016.

- ## Journal Articles – Contributing authorship (16)

1. Changhyun Kim, Jongwoo Hong, Junhyeok Jang, Gun-Yeal Lee, Youngjin Kim, Yoonchan Jeong, and Byoungho Lee, "Freeform metasurface color router for deep submicron pixel image sensors," ***Science Advances***, vol. 10, no. 22, eadn9000, 2024.

2. Suyeon Choi, Manu Gopakumar, Brian Chao, Gun-Yeal Lee, Jonghyun Kim, and Gordon Wetzstein, "Neural Holographic Near-eye Displays for Virtual Reality," ***ACM SIGGRAPH 2023 Emerging Technologies***, 2023.

3. Junhyeok Jang, **Gun-Yeal Lee**, Youngjin Kim, Changhyun Kim, Yoonchan Jeong, and Byoungho Lee, "Dispersion-engineered Metasurface Doublet Design for Broadband and Wide-angle Operation in the Visible Range," ***IEEE Photonics Journal***, 2023.

4. Joohoon Kim, Junhwa Seong, Wonjoong Kim, **Gun-Yeal Lee**, Seokwoo Kim, Hongyoon Kim, Seong-Won Moon, Dong Kyo Oh, Younghwan Yang, Jeonghoon Park, Jaehyuck Jang, Yeseul Kim, Minsu Jeong, Chanwoong Park, Hojung Choi, Gyoseon Jeon, Kyung-il Lee, Dong Hyun Yoon, Namkyoo Park, Byoungho Lee, Heon Lee, and Junsuk Rho, "Scalable manufacturing of high-index atomic layer–polymer hybrid metasurfaces for metaphotonics in the visible," ***Nature Materials***, vol. 22, no. 4, pp. 474-481, 2023.

5. Youngjin Kim, **Gun-Yeal Lee**, Jangwoon Sung, Junhyeok Jang, and Byoungho Lee, "Spiral metalens for phase contrast imaging," ***Advanced Functional Materials***, 2021.

6. Jangwoon Sung, **Gun-Yeal Lee**, Chulsoo Choi, Jongwoo Hong, and Byoungho Lee, "Polarization dependent asymmetric transmission using bifacial metasurface," ***Nanoscale Horizons***, vol. 5, no. 11, pp. 1487-1495, 2020.

7. Jangwoon Sung, **Gun-Yeal Lee**, and Byoungho Lee, "Progresses in the practical metasurface for holography and lens," ***Nanophotonics***, vol. 8, no. 10, pp. 1701-1718, 2019.

8. Chulsoo Choi, Seung-Yeol Lee, Sang-Eun Mun, **Gun-Yeal Lee**, Jangwoon Sung, Hansik Yun, Jong-Heon Yang, Hee-Ok Kim, Chi-Young Hwang, and Byoungho Lee, "Metasurface with nanostructured Ge2Sb2Te5 as a platform for broadband-operating wavefront switch," ***Advanced Optical Materials***, article 1900171, 2019.

9. Seokil Moon, Chang-Kun Lee, Seung-Woo Nam, Changwon Jang, **Gun-Yeal Lee**, Wontaek Seo, Geeyoung Sung, Hong-Seok Lee, and Byoungho Lee, "Augmented reality near-eye display using Pancharatnam-Berry phase lenses," ***Scientific Reports***, vol. 9, article 6616, doi: 10.1038/s41598-019-42979-0, 2019.

10. Kyookeun Lee, Hansik Yun, Sang-Eun Mun, ***Gun-Yeal Lee***, Jangwoon Sung, and Byoungho Lee,

"Ultracompact broadband plasmonic polarimeter," ***Laser & Photonics Reviews***, vol. 12, 1700297, 2018.

11. Jinseob Kim, Hyuntai Kim, Gun-Yeal Lee, Juhwan Kim, Byoungho Lee, and Yoonchan Jeong, "Numerical and Experimental Study on Multi-Focal Metallic Fresnel Zone Plates Designed by the Phase Selection Rule via Virtual Point Sources," ***Applied Sciences***, vol. 8, 449, 2018.

12. Hyuntai Kim, Jinseob Kim, Haechan An, Yohan Lee, **Gun-Yeal Lee**, Jeongkyun Na, Kyoungyoon Park, Seungjong Lee, Seung-Yeol Lee, Byoungho Lee, and Yoonchan Jeong, "Metallic Fresnel zone plate implemented on an optical fiber facet for super-variable focusing of light," ***Optics Express***, vol. 25, no. 24, pp. 30290-30303, 2017.

13. Kyookeun Lee, Joonsoo Kim, Hansik Yun, **Gun-Yeal Lee,** and Byoungho Lee, "Interferometric control of plasmonic resonator based on polarization-sensitive excitation of surface plasmon polaritons," ***Optics Express***, vol. 24, no. 19, pp. 21861-21868, 2016.

14. Eui-Young Song†, Seung-Yeol Lee†, Jongwoo Hong, Kyookeun Lee, Yohan Lee, **Gun-Yeal Lee**, Hwi Kim, and Byoungho Lee, "A double-lined metasurface for plasmonic complex-field generation," ***Laser and Photonics Reviews***, vol. 10, no. 2, pp. 299-308, 2016. (Cover image paper)

15. Seung-Yeol Lee, **Gun-Yeal Lee**, and Byoungho Lee, "Plasmonic directional beam switching with tilted nanoslit array surrounded by gratings," ***IEEE Journal of Lightwave Technology***, vol. 34, no. 4, pp. 1368-1372, 2016.

16. Seung-Yeol Lee, Kyuho Kim, **Gun-Yeal Lee**, and Byoungho Lee, "Polarization -multiplexed plasmonic phase generation with distributed nanoslits," ***Optics Express***, vol. 23, no. 12, pp. 15598-15607, 2015.

CONFERENCES

First authorship (9)

1. **Gun-Yeal Lee**, Jangwoon Sung, and Byoungho Lee, "Dielectric metasurfaces for arbitrary engineering of multi-channel spinorbit interactions," SPIE Optics + Photonics, Virtual Conference, paper 11498-21, Aug, 2020. (SPIE Optics and Photonics Education Scholarship)

2. **Gun-Yeal Lee**, J.-Y. Hong, and Byoungho Lee, "See-through metalens for augmented reality near-eye display with ultrawide viewing angle," OSA 2019 Frontiers in Optics + Laser Science APS/DLS, Washington D.C., USA, paper FTh1C.2, Sep. 2019.

3. **Gun-Yeal Lee**, Jangwoon Sung, and Byoungho Lee, "Designed conversion of spin and orbital angular momentum," The 13th Pacific Rim Conference on Lasers and Electro-Optics (CLEO-PR 2018), Hong Kong, paper F2B.2, July, 2018.

4. **Gun-Yeal Lee**, Jangwoon Sung, and Byoungho Lee, "Broadband metasurface for chiral phase control," OSA Frontiers in Optics 2017 (FiO 2017), Washington, USA, paper FTu5D.5, Oct. 2017.

5. **Gun-Yeal Lee**, Kyookeun Lee, Yohan Lee, Hyeonsoo Park, Culsoo Choi, and Byoungho Lee, "Continuous control of complex nonlinear susceptibility for harmonic generation using plasmonic metasurface," The 8th International Conference on Metamaterials, Photonic Crystals and Plasmonics - META'17, Incheon, Korea, paper P19, July, 2017. (Best Paper Award)

6. **Gun-Yeal Lee** and Byoungho Lee, "Reflection type metasurfaces for complex-amplitude modulation at visible frequency," Global Nanophotonics 2016, Osaka Japan, paper P-01, Nov. 2016.

7. **Gun-Yeal Lee**, Joonsoo Kim, Yohan Lee, and Byoungho Lee, "Reflection type metasurfaces for complex-amplitude modulation at visible frequency," International Conference on Optical and Photonic Engineering (icOPEN 2016), Chengdu, China, paper N054-A, Sep. 2016. (Best Student Award & Best Paper Award)

8. **Gun-Yeal Lee,** Joonsoo Kim, and Byoungho Lee, "Polarization multiplexed hologram via broadband metasurfaces," Nano Korea 2016, P1601_0896, July 2016. (Best Paper Award - Grand Prize)

9. **Gun-Yeal Lee**, Seung-Yeol Lee, and Byoungho Lee, "Plasmonic Vortex Lens with Distributed Nanoslits for Arbitrary Tuning of Vortex Size," The 11th Conference on Lasers and Electro-Optics Pacific Rim (CLEO-PR 2015), Busan, Korea, paper 26P-72, Aug. 2015.

INVITED TALKS

- **"3D holographic AR glasses with metasurface waveguides"**
  Synopsys, 06/2024
- **"3D holographic AR glasses with metasurface waveguides"**
  Stanford University, invited by Prof. Mark Brongersma, 06/2024
- **"Recent advances in Meta-optics for imaging and AR/VR devices"**
  POSTECH, invited by Prof. Seung-Hwan Baek and Prof. Junsuk Rho, 02/2024
- **"Recent advances in Meta-Optics for imaging and AR/VR devices"**
  Samsung Research, 02/2024
- **"Nanophotonics for optical imaging and displays"**
  Samsung Advanced Instituite of Technology (SAIT), 02/2024
- **"Metasurface Optics for next-generation displays"**
  Seoul National University, GoGE Workshop, 10/2023
- **"Metasurface Optics towards next-generation imaging systems"**
  Stanford University, invited by Prof. Mark Brongersma, 10/2022
- **"Meta-Optics: Fundamentals and Design methods"**
  Synopsys, 09/2022
- **"Metasurface optics towards next-generation imaging systems"**
  Stanford University, invited by Prof. Gordon Wetzstein, 02/2022