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**PERSONAL DATA**

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**RESEARCH DIRECTION & INTERESTS**

Computational displays are emerging as transformative platforms for augmented reality (AR) and virtual reality (VR). My goal is to develop **an end-to-end pipeline—from graphics to human visual perception**—that advances display technologies and delivers perceptual realism. A major challenge lies in bridging the gap between machine intelligence and human perception driven by visual stimuli. My integrated approach spans graphics, displays, and optics to explore new design spaces and ultimately pursue the “**Visual Turing Test**” with next-generation computational displays.

I take **a fundamental approach to understanding how humans respond to high-dimensional light**, using these insights to guide the human-vision-inspired design of hardware (displays, imaging electronics, vision sensors) and software (efficient algorithms for robotic vision). This synergy of perception, hardware, and computation aims to establish next-generation spatial computing platforms for seamless human computer interaction.

Broadly, my research interests span AR/VR, computational 3D displays, computational imaging, computational optics, visual perception, computer graphics, and human computer interaction.

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**EDUCATION**

<b>M.S. - Ph.D.</b>	Electrical and Computer Engineering Seoul National University, Seoul, Republic of Korea Advisor: Byoungcho Lee (before his passing), Yoonchan Jeong Thesis: Perceptual studies on holographic near-eye displays	2017.3 – 2023. 8
<b>B.S.</b>	Electrical and Computer Engineering Seoul National University, Seoul, Republic of Korea	2012. 3 – 2017. 2

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**WORK EXPERIENCE**

<b>Research Associate</b>	University of Cambridge, Cambridge, UK - Advisor: Prof. Rafał K. Mantiuk, Graphics & Displays	2024. 3 – <i>present</i>
<b>Postdoctoral Researcher</b>	Seoul National University, Seoul, South Korea - Advisor: Prof. Yoonchan Jeong, OEQELAB	2023. 9 – 2024. 2
<b>Research Collaborator</b>	Meta, Seoul, South Korea - Manager: Wai Sze Tiffany Lam, Optics & Display Research	2023. 6 – 2023. 8
<b>Research Scientist Intern</b>	Meta Reality Labs, Redmond, WA, USA - Manager: Ying ‘Melissa’ Geng, Optics & Display Research	2022. 8 – 2023. 1

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**HONOR AND AWARDS**

[A1] Best Paper Award (Honorable Mention) (~5% among the acceptances), ACM SIGGRAPH Asia, 2024

- [A2] Sejong Science Fellowship (overseas track) (~\$50,000), NRF Korea, 2024
- [A3] Technical Paper Award (Silver Prize), Samsung Display, 2023 – [SIGGRAPH Asia, 2023]
- [A4] Best Paper Award, OSK Conference on Optoelectronics and Optical Communications (COOC), 2023
- [A5] Researcher of the Year Award (Project), SNU OEQELAB, 2020
- [A6] Best Poster Paper Award, International Meeting on Information Display (IMID), 2019

## SELECTED PUBLICATIONS

(†: joint co-first author, \*: corresponding author)

- [S1] **D. Kim**, M. Ashraf, A. Chapiro, and R. Mantiuk. “Supra-threshold Contrast Perception in Augmented Reality” (Conditionally accepted as conference proceeding at **SIGGRAPH Asia 2025**)
- Summary: Low-level study on supra-threshold contrast vision of human perception
- [S2] A. Chapiro, **D. Kim\***, Y. Asano, and R. Mantiuk. “AR-DAVID: Augmented Reality Display Artifact Video Dataset” ACM Transactions on Graphics (**SIGGRAPH Asia 2024**), vol. 43, no. 6, article 186, 2024. (**Best Paper Award (Honorable Mention)**)
- Summary: First large-scale perceptual AR video quality dataset
- [S3] **D. Kim†**, S.-W. Nam†, S. Choi†, J.-M. Seo, G. Wetzstein, and Y. Jeong. “Holographic Parallax Improves 3D Perceptual Realism” ACM Transactions on Graphics (**SIGGRAPH 2024**), vol. 43, no. 4, article 68, 2024.
- Summary: Parallax cue in holography improves 3D perceptual realism validated with modern holographic displays of state-of-the-art 3D/4D quality & public demonstration [SIGGRAPH E-tech, 2024]
- [S4] **D. Kim**, K. Bang, S. Lee, C. Jang, G. Li, and W.-T. Lam. “Full-color time-sequential super multi-view near-eye display with front-lit waveguide illumination”, Optics Express, vol. 32, no. 14, pp. 23975-23988, 2024.
- Summary: Viable solution of super multi-view VR displays towards an eyeglasses-form-factor
- [S5] S.-W. Nam†, Y. Kim†, **D. Kim**, and Y. Jeong “Depolarized Holography with Polarization-multiplexing Metasurface” ACM Transactions on Graphics (**SIGGRAPH Asia 2023**), vol. 42, no. 6, article 202, 2023.
- Summary: Co-design of hologram and metasurface for speckle reduction in holographic displays
- [S6] **D. Kim†**, S.-W. Nam†, B. Lee, J.-M. Seo, and B. Lee, “Accommodative holography: improving accommodation response for perceptually realistic holographic displays,” ACM Transactions on Graphics (**SIGGRAPH 2022**), vol. 41, no. 4, article 111, 2022.
- Summary: Speckle reduction and perceptual optimization both improve monocular accommodation response, as validated by first user experiments in modern holographic displays
- [S7] B. Lee, **D. Kim**, C. Chen, S. Lee, and B. Lee, “High-contrast, speckle-free, true 3D holography via binary CGH optimization,” Scientific Reports, vol. 12, article 2811, 2022.
- Summary: First differentiable optimization of binary hologram with state-of-the-art 3D quality.
- [S8] **D. Kim†**, S.-W. Nam†, K. Bang, B. Lee, S. Lee, Y. Jeong, J.-M. Seo, and B. Lee, “Vision-correcting

holographic display: evaluation of aberration correcting hologram,” Biomedical Optics Express, vol. 12, no. 8, pp. 5179-5195, 2021.

- Summary: Modelling aberration of systematic and visual optics with optical path tracing for rendering aberration-corrected hologram and followed by user validations with holographic displays

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## RESEARCH EXPERIENCE

### Holographic Displays

- Speckle reduction
  - with profile-engineered light sources and partially coherent light sources
  - with jointly designed metasurface and hologram
  - with jointly optimized hologram frames for temporal multiplexing
- Computer-generated hologram optimization for a limited bit-depth, phase/amplitude-only spatial light modulator with different graphical assets
  - with RGB image / RGB-depth map / Light field
- Optical/visual aberration correction
- Model training with camera-in-the-loop strategies
- Acceleration of computer-generated hologram rendering speed with parallel computation

### Light field Displays

- Compressive light field displays with additive/attenuation-based layers
- Super multi-view displays with directional backlight

### Computational Imaging

- Elemental image acquisition with light field camera
- Quantitative phase imaging with digital holography

### Vision Science and Applied Perception

- User experiment design, conduct, and analysis:
  - Optometry-based experiments (accommodation response, eye tracking, eye aberration measurement)
  - Psychophysics experiments (QUEST, method of adjustment)
  - Subjective quality evaluation experiments (pairwise comparison)
  - Interaction-based experiments (feature matching)
  - Questionnaire-based experiments (motion sickness measurement)
- Image processing based on human visual characteristics (color vision, spatio-temporal vision, contrast vision, binocular vision) and optical characteristics of the human eye (abnormal curvature, apodization, aberration)

### Perceptual Graphics with Machine Learning

- ‘White-box’ perceptual quality metrics for display evaluations
  - Model training with different datasets
    - Psychophysics-based low-level model training
    - Metric calibration with display – quality dataset
  - Open-sourcing large-scale dataset
  - Evaluation of quality metrics
- ‘Explainable’ perceptual loss functions for optics/graphics optimization

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## SKILLS

- **Programming languages & tools:**
  - Programming: MATLAB, Python, PyTorch
  - Optical design: ZEMAX
  - Hardware control: Labview, Arduino

- Rendering acceleration: CUDA
- Graphics rendering: Unity C#, Blender
- Prototype design: Autodesk Fusion 360
- Vision science experiment: Psychtoolbox
- Statistics: Scipy
- Collaborative tools: git
- **Experiment experiences:**
  - **Computational displays:**
    - Holographic display - phase modulators, digital micromirror devices
    - Light field display - multi-layer, multi-view, integral-imaging
    - High dynamic-range display
    - Laser/LED-based experiments
    - Multi-device analog synchronization (display - light source - scanning device (MEMS))
    - AR/VR Bench-top displays implementation and HMD prototyping
    - Calibration - 2D/3D geometry, display photometry, colorimetry
  - **Subjective/objective user experiments:**
    - Quality assessments - pairwise comparison
    - Optometry - eye-tracker, power refractor, aberrometer
    - Psychophysics - QUEST, method of adjustment
  - **Computational imaging:**
    - Digital holography
    - Adaptive optics
- **Language:**  
Korean (Native) / English (Fluent)

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## RESEARCH EXPERIENCE - *Projects*

### Evaluation metric of graphic data based on three-dimensional display for immersive extended reality

*September. 2024 – August. 2025*

**Principal Investigator (Funding amount: 73,500,000 KRW/yr, 1yr)**, National Research Foundation of Korea

- I investigate the evaluation metric of graphic data delivered by volumetric 3D displays, and extend the metric as a loss function to optimize the display graphics specifically tailored to human visual system.

### AR image/video quality metrics

*March. 2024 – present*

**Research Associate (PI: Prof. Rafal K. Mantiuk, co-PI: Dr. Alexandre Chapiro, Funding amount: unknown)**, University of Cambridge, in collaboration with Meta Reality Labs, Applied Perception Science Team

- I investigate the optical and perceptual factors that influence the image and video quality presented on the optical see-through AR displays, and extend these findings to improve the state-of-the-art perceptual quality metrics and loss functions for images and videos in AR.

### Compact 3D VR light field displays

*Aug. 2022 – Jan. 2023 (full-time, on-site), June 2023 – Aug. 2023 (part-time, remote)*

**Research Scientist Intern (Advised by: Dr. Kiseung Bang, Dr. Wai Sze Tiffany Lam, Dr. Ying “Melissa” Geng)**, Meta Reality Labs, Optics & Display Research, Redmond, WA, USA.

- I investigated a viable solution for realizing a super-multi-view display in an eyeglass form factor. I designed and implemented a bench-top prototype of the display, conducted optical/user experiments, and rendered light field content with geometric calibration. As a result, I participated in two internal lab demos, and culminated a paper [Optics Express, 2024].

**Development of optimal user experience (UX) in various screen form factors***December. 2019 - December. 2020***Lead Researcher (PI: Prof. Byoungho Lee, co-PI: Prof. Yung Kyung Park, Funding amount: 260,000,000 KRW/yr, 1 yr)**, Samsung Electronics, Visual Display division

\* Joint project with Prof. Jong-Mo Seo (Seoul National University), Prof. Yung Kyung Park (Ewha University), Prof. Heejin Choi (Sejong University)

- I built immersive VR spaces and conducted user experiments to configure the optimal layouts of user interface in wide field of view condition. In detail, I constructed two UHD-resolution display systems with tiled flat panels (2x2 65-inch FHD panels)/an UHD projector (130 inch ~ 300 inch) with additional user-interactive graphical user interface, conducted user experiments with an eye tracker and simulator sickness questionnaires.
- I designed the user studies and analyzed the measured data (gaze direction, eye blinking, subjective score).
- I conducted user experiments after the ethics approval from host institutional review board and wrote the application documents for following projects:
  - Optimal User Experience Acquisition on Screen Form Factor

**Development of vision assistant HMD and contents for legally blind and low visions***March. 2019 – February 2024***Researcher (Lead Researcher, Jan. 2021 – Aug. 2022) (PI: Prof. Byoungho Lee, Funding amount: 250,000,000 KRW/yr, 8 yrs)**, Institute for Information & Technology Planning (IITP)

- I developed vision assistant head-mounted displays (HMDs) for users with refractive errors and visual field disorders. I built display prototypes (primarily holographic near-eye displays), measured subjects' refractive errors, optimized user-specific images, accelerated image rendering, evaluated display performance and showcased the results in public demonstrations (2019 IMID, 2020 CES, 2024 SIGGRAPH).
- I conducted user experiments after the ethics approval from host institutional review board and wrote the application documents for following projects:
  - Reliability Evaluation of Holographic Near-eye Displays for Low Vision Assistance [Biomedical Optics Express, 2021]
  - Evaluation of Holographic Contents with Accommodation Response Measurement and Pairwise Comparison [SIGGRAPH, 2022]
  - Evaluation of 3D Holographic Contents Depending on Hologram Rendering Target based on Visual Difference [SIGGRAPH, 2024]
- I helped conducting user experiments after the ethics approval from host institutional review board and wrote the application documents for following projects:
  - Reliability Evaluation of Vision Assistant Near-eye Display using Retinal Projection for Uncorrected Refractive Error
  - Reliability Evaluation of Retinal Projection Displays for Low Vision Assistance

**Development of viewing zone expansion for projection holographic HUD device***March. 2018 – March. 2020***Researcher (PI: Prof. Byoungho Lee, Funding amount: 80,000,000 KRW/yr, 3 yrs)**, Samsung Display

- I developed a viewing zone expanded holographic head-up display (HUD) device with multiple laser diodes and a single SLM. I designed the optical system of HUD device with ZEMAX. It achieved 6x expanded viewing zone.

**Research and development of overlapped fingerprint identification technology using laser***March. 2017 – March. 2018***Researcher (PI: Prof. Byoungho Lee, Funding amount: 680,000,000 KRW/yr, 5 yrs)**, Projects for Research and Development of Police Science and Technology under Center for Research and Development of Police Science and Technology and Korean National Police Agency.

- I conducted an optical experiment in which latent fingerprints were dyed and then excited with a high-power laser to capture their fluorescence using a high-profile hyperspectral camera.

**Development of printed lens array and optical path control technology for flexible bezelless display***November. 2017 – May. 2020***Researcher (Lead Researcher, Jan. 2019 – May. 2020) (PI: Prof. Yongtaek Hong, co-PI: Prof. Byoungho Lee, Funding amount: unknown)**, Ministry of Trade, Industry and Energy

- I implemented a simulation tool of ray tracing given that the printed cylindrical lens is placed between the tiled, flexible bezelless displays.

**REFEREED JOURNAL PUBLICATIONS**

(†: joint co-first author, \*: corresponding author)

- [J1] A. Chapiro, **D. Kim\***, Y. Asano, and R. Mantiuk. “AR-DAVID: Augmented Reality Display Artifact Video Dataset” ACM Transactions on Graphics (**SIGGRAPH Asia 2024**), vol. 43, no. 6, article 186, 2024. (**Best Paper Award (Honorable Mention)**)
- [J2] **D. Kim†**, S.-W. Nam†, S. Choi†, J.-M. Seo, G. Wetzstein, and Y. Jeong. “Holographic Parallax Improves 3D Perceptual Realism” ACM Transactions on Graphics (**SIGGRAPH 2024**), vol. 43, no. 4, article 68, 2024.
- [J3] **D. Kim**, K. Bang, S. Lee, C. Jang, G. Li, and W.-T. Lam. “Full-color time-sequential super multi-view near-eye display with front-lit waveguide illumination”, Optics Express, vol. 32, no. 14, pp. 23975-23988, 2024.
- [J4] C. Chen, S.-W. Nam, **D. Kim**, J. Lee, Y. Jeong, and B. Lee “Ultrahigh-fidelity full-color holographic display via color-aware optimization” Photonix, vol. 5, no. 1, 2024.
- [J5] S.-W. Nam†, Y. Kim†, **D. Kim**, and Y. Jeong “Depolarized Holography with Polarization-multiplexing Metasurface” ACM Transactions on Graphics (**SIGGRAPH Asia 2023**), vol. 42, no. 6, article 202, 2023. – [A3]
- [J6] S.-W. Nam, **D. Kim**, and B. Lee “Accelerating a spatially varying aberration correction of holographic displays with low-rank approximation” Optics Letters, vol. 47, no. 13, pp. 3175-3178, 2022. (**Editor’s pick**)
- [J7] **D. Kim†**, S.-W. Nam†, B. Lee, J.-M. Seo, and B. Lee, “Accommodative holography: improving accommodation response for perceptually realistic holographic displays,” ACM Transactions on Graphics (**SIGGRAPH 2022**), vol. 41, no. 4, article 111, 2022.
- [J8] D. Lee, K. Bang, S.-W. Nam, B. Lee, **D. Kim**, and B. Lee, “Expanding energy envelope in holographic display via mutually coherent multi-directional illumination,” Scientific Reports, vol. 12, no. 1, 1-13, 2022.
- [J9] B. Lee, **D. Kim**, C. Chen, S. Lee, and B. Lee, “High-contrast, speckle-free, true 3D holography via binary CGH optimization,” Scientific Reports, vol. 12, article 2811, 2022.
- [J10] C. Chen, **D. Kim**, D. Yoo, B. Lee, and B. Lee, “Off-axis camera in the loop with noise reduction strategy for high-quality hologram generation,” Optics Letters, vol. 47, no. 4, pp. 790-793, 2022.
- [J11] S. Lee, S. Lee, **D. Kim**, and B. Lee, "Distortion corrected tomographic near-eye displays using light field optimization," Optics Express, vol. 29, no. 17, pp. 27573-27586, 2021.
- [J12] **D. Kim†**, S.-W. Nam†, K. Bang, B. Lee, S. Lee, Y. Jeong, J.-M. Seo, and B. Lee, “Vision-correcting

- holographic display: evaluation of aberration correcting hologram,” Biomedical Optics Express, vol. 12, no. 8, pp. 5179-5195, 2021.
- [J13] S. Lee, C. Yoo, H. Yoon, **D. Kim**, G. Kim, B. Lee, and Y. Hong, "3D printing-based mirrored image component for seamless modular curved-edge displays," Optics Express, vol. 29, no. 10, pp. 14745-14756, 2021.
- [J14] S. Lee†, **D. Kim**†, S.-W. Nam, B. Lee, J. Cho, and B. Lee, "Light source optimization for partially coherent holographic displays with consideration of speckle contrast, resolution, and depth of field," Scientific Reports, vol. 10, article 18832, 2020.
- [J15] S.-W. Nam, S. Moon, B. Lee, **D. Kim**, S. Lee, C.-K. Lee, and B. Lee, "Aberration-corrected full-color holographic augmented reality near-eye display using a Pancharatnam-Berry phase lens," Optics Express, vol. 28, no. 21, pp. 30836-30850, 2020.
- [J16] S. Lee, **D. Kim**, S.-W. Nam, and B. Lee, "Speckle reduced holographic displays using tomographic synthesis," Optics Letters, vol. 45, no. 17, pp. 4686-4689, 2020.
- [J17] Y. Jo, S. Lee, D. Yoo, S. Choi, **D. Kim**, and B. Lee, "Tomographic projector: large scale volumetric display with uniform viewing experiences," ACM Transactions on Graphics (SIGGRAPH Asia 2019), vol. 38, no. 6, article 215, 2019.
- [J18] B. Lee, C. Jang, **D. Kim**, and B. Lee, "Single grating reflective digital holography with double field of view," IEEE Transactions on Industrial Informatics, vol. 15, no. 11, pp. 6155-6161, 2019.
- [J19] S. Choi, S. Lee, Y. Jo, D. Yoo, **D. Kim**, and B. Lee, "Optimal binary representation via non-convex optimization on tomographic displays," Optics Express, vol. 27, no. 17, pp. 24362-24381, 2019.
- [J20] C. Yoo, K. Bang, C. Jang, **D. Kim**, C.-K. Lee, G. Sung, H.-S. Lee, and B. Lee, "Dual-focal waveguide see-through near-eye display with polarization-dependent lenses," Optics Letters, vol. 44, no. 8, pp. 1920-1923, 2019.
- [J21] **D. Kim**, S. Lee, S. Moon, J. Cho, Y. Jo, and B. Lee, "Hybrid multi-layer displays providing accommodation cues," Optics Express, vol. 26, no. 13, pp. 17170-17184, 2018.
- [J22] S. Lee, J. Cho, B. Lee, Y. Jo, C. Jang, **D. Kim**, and B. Lee, "Foveated retinal optimization for see-through near-eye multi-layer displays," IEEE Access, vol. 6, no. 1, pp. 2170-2180, 2018.

## PRESENTATION at INTERNATIONAL CONFERENCES

(†: joint co-first author, \*: corresponding author)

- [C1] **D. Kim**, M. Ashraf, A. Chapiro, and R. Mantiuk. "Supra-threshold Contrast Perception in Augmented Reality" (Conditionally accepted as conference proceeding at **SIGGRAPH Asia 2025**)
- [C2] **D. Kim**, "Towards Building Perceptual Metrics for Next-generation Displays" The 25th International Meeting on Information Display (IMID 2025), Busan, Korea, Aug. 2025. (**Invited paper**)
- [C3] Z. Chen, **D. Kim**, R. Mantiuk, and K. Akşit, "Content-adaptive targeting scheme for holographic displays", Photonics West, SPIE, Jan. 2025
- [C4] S.-W. Nam†, **D. Kim**†, S. Choi†, J. Lee, S. Lee, M. Gopakumar, B. Chao, G. Wetzstein, and Y. Jeong, "Holographic Parallax", SIGGRAPH Emerging Technologies, Denver, Colorado, Jul. 2024 (**Public demonstration**)

- [C5] **D. Kim**, S.-W. Nam, J. -M. Seo, B. Lee, and Y. Jeong, "Perceptually realistic 2D, 3D holographic displays" The 23th International Meeting on Information Display (IMID 2023), Busan, Korea, Aug. 2023. **(Invited paper)**
- [C6] **D. Kim**, B. Lee, S.-W. Nam, and B. Lee, "Perceptual Reality Through Holographic Near-Eye Displays," OPTICA 2022 Frontiers in Optics + Laser Science, Rochester, NY, USA, paper FM5A1. Sep. 2022. **(Invited paper)**
- [C7] C. Chen, **D. Kim**, S.-W. Nam, J. Lee, and B. Lee, "Auto-color-balance Holographic Display: Laser-camera-in-the-loop Optimization," OPTICA 2022 Frontiers in Optics + Laser Science, New York, USA, paper JTU5B.52, Sep. 2022.
- [C8] S.-W. Nam, **D. Kim**, and B. Lee, "Evaluation of low-rank approximation for spatially-varying aberration correction in holographic displays," OPTICA Digital Holography and Three-Dimensional Imaging, Cambridge, UK, paper W2A.12, Aug. 2022.
- [C9] **D. Kim**, S.-W. Nam, B. Lee and B. Lee, "Wide field of view holographic tiled display through axially overlapped holographic projection" Ultra-High-Definition Imaging Systems V, SPIE Photonics West 2022, Virtual Conference, paper 120250D, Mar. 2022.
- [C10] B. Lee, S.-W. Nam, and **D. Kim**, "Aberration correction in holographic displays," Ultra-High-Definition Imaging Systems V, SPIE Photonics West 2022, Virtual Conference, paper 120250A, March. 2022. **(Invited paper)**
- [C11] S. Lee, S. Lee, **D. Kim**, and B. Lee, "Distortion correction in tomographic near-eye display with light field optimization," The 21th International Meeting on Information Display (IMID 2021), Virtual Conference, paper P7-16, Aug. 2021.
- [C12] B. Lee, **D. Kim**, B. Lee, D. Lee, and S. Lee, "Speckle reduction in holographic displays," Ultra-High-Definition Imaging Systems IV, SPIE Photonics West 2021, Virtual Conference, paper 11709-2, March. 2021. **(Invited paper)**
- [C13] **D. Kim**, S.-W. Nam, and B. Lee, "Analysis in wavefront propagation based on ray tracing for acquisition of aberration-corrected hologram," SPIE/COS Photonics Asia Digital Forum 2020, Virtual Conference, paper 11549-60, Oct. 2020.
- [C14] S.-W. Nam, **D. Kim**, K. Bang, and B. Lee, "Aberration compensation of holographic augmented reality display with optical path length-based ray tracing method," The 20th International Meeting on Information Display (IMID 2020), Virtual Conference, paper 05-09-1277, Aug. 2020. **(Best Poster Paper Award)**
- [C15] **D. Kim**, S.-W. Nam, K. Bang, and B. Lee, "Holographic prescription for vision correction: matching with user's eyeglasses prescription data," The 20th International Meeting on Information Display (IMID 2020), Virtual Conference, paper 01-09-1202, Aug. 2020.
- [C16] **D. Kim**, S.-W. Nam, K. Bang, and B. Lee, "Holographic near-to-eye display for vision-correcting application" 2020 SID Display week, Virtual Conference, paper P.81. 2020. (Oral presentation)
- [C17] **D. Kim**, S. Nam, K. Bang, and B. Lee, "Computer generated hologram for vision correcting application," The 9th Korea-Japan Workshop on Digital Holography and Information Photonics (DHIP 2019), Gwangju, Korea, paper p18-17, Dec. 2019.
- [C18] **D. Kim**, K. Bang, Y. Jeong, and B. Lee, "Compensating high-order optical aberrations induced by abnormal shape of cornea in holographic displays," OSA 2019 Frontiers in Optics + Laser Science APS/DLS, Washington D.C., USA, paper JW4A.102, Sep. 2019.
- [C19] **D. Kim**, S. Lee, Y. Jo, and B. Lee, "Modeling optical aberrations by ray tracing for vision-correcting tomographic display," The 19th International Meeting on Information Display (IMID 2019), HICO, Gyeongju, Korea, paper P02-57, August, 2019. **(Best Poster Paper Award)**

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- [C20] **D. Kim**, S. Lee, J. Cho, D. Lee, K. Bang, and B. Lee, "Enhancement of depth range in LED-based holographic near-eye display using focus tunable device," The 28th IEEE International Symposium on Industrial Electronics (ISIE), Vancouver, Canada, paper VD-006653, June 2019. (Oral presentation)
- [C21] B. Lee, S. Lee, Y. Jo, and **D. Kim**, "Continuous-depth augmented-reality display device," Advances in Display Technologies IX, SPIE Photonics West 2019, Proc. SPIE, San Francisco, CA, USA, paper 10942-1, Feb. 2019. (**Invited paper**)
- [C22] **D. Kim**, C. Yoo, S. Lee, H. Yoon, B. Park, Y. Hong, and B. Lee, "Optimization of curved mirror structure in seamless tiled display with flexible panels via light field projection," The 8th Japan-Korea Workshop on Digital Holography and Information Photonics (DHIP 2018), Osaka, Japan, paper 19P05, Dec. 2018.
- [C23] **D. Kim**, B. Lee, D. Yoo, S. Lee, and B. Lee, "Integration of relay optics in LED-based reflective off-axis digital holographic microscopy," 7th International Conference on Speckle Metrology (SPECKLE 2018), Poland, paper E1-1, Sep. 2018.
- [C24] **D. Kim**, S. Lee, S. Moon, and B. Lee, "Hybrid light-field display" Advances in Display Technologies VIII, Photonics West 2018, Proc. SPIE, San Francisco, CA, USA, Paper 10556-5, Jan. 2018. (Oral presentation)
- [C25] **D. Kim**, Y. Jeong, and B. Lee, "Pickup for elemental image of multi-view display using light field camera," The 17th International Meeting on Information Display (IMID 2017), Busan, Korea, paper P1-125, August, 2017.
- [C26] J. Jeong, J. Cho, D. Lee, **D. Kim**, and B. Lee, "Generation of wide viewing angle depth map hologram and its realization by complex wavefront printing," OSA Topical Meeting on Digital Holography and Three-Dimensional Imaging (DH), Jeju Island, Korea, paper W2A.20, May 2017.
- [C27] C. Yoo, J.-Y. Hong, **D. Kim**, and B. Lee, "Brightness enhanced see-through multi-view display using projection," The 6th Japan-Korea Workshop on Digital Holography and Information Photonics, Sapporo, Japan, paper P20-35, Dec. 2016.
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## PRESENTATION at DOMESTIC CONFERENCES

- [DC1] **D. Kim**, S.-W. Nam, Y. Kim, Y. Jeong "Metasurface-enabled high-quality computer-generated holography," Optical Society of Korea, Optics and Photonics Congress (Winter) 2024, Suwon Convention Center, Suwon, Korea, Feb. 2024. (Oral Presentation) (**Invited paper**)
- [DC2] **D. Kim**, M. Chae, J. Lee, Y. Jeong, and B. Lee "Recent progress on holographic displays for AR/VR applications," Optical Society of Korea, Optics and Photonics Congress (Summer) 2023, ICC Jeju, Jeju, Korea, Aug. 2023. (Oral Presentation) (**Invited paper**)
- [DC3] **D. Kim**, S.-W. Nam, and Y. Jeong "Computer generated hologram optimization with light field-based focal stack supervision," Optical Society of Korea, Conference on Optoelectronics and Optical Communications (COOC) 2023, Hanhwa Resort, Busan, paper W1I-I.04, May 2023. (Oral Presentation) (**Best Paper Award**)
- [DC4] C. Yoo, J. Jeong, B. Lee, **D. Kim**, E. Lee, and B. Lee, "Retinal-projection Near-eye Display for Pupil movement", Optical Society of Korea, Optics and Photonics Congress (Summer) 2020, BEXCO, Busan, paper WPP-III-1, Jul. 2020.
- [DC5] **D. Kim**, S. Lee, and B. Lee "Analysis of optical gap in multiplicative light field displays based on ray tracing method," Optical Society of Korea, Optics and Photonics Congress (Summer) 2018, BEXCO, Busan, Korea, paper WP-III-6, Aug. 2018.

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- [DC6] **D. Kim**, Y. Jo, S. Lee, S. Moon, and B. Lee, "Attenuation-based multi-layered display providing continuous accommodation cues," Optical Society of Korea, Optics and Photonics Congress (Winter) 2018, Gwanju Kim-Dae-Jung Convention Center, Gwangju, Korea, paper FP-VII-3, Feb. 2018
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## INVITED TALKS

- [T1] Perceptual Reality with Next-generation Computational Displays, Seminar (virtual), Korea Electronics Technology Institute, hosted by Dr. Jisoo Hong (2025.9)
- [T2] Perceptual Reality with Next-generation Computational Displays, Lab Seminar, POSTECH, Pohang, Korea, hosted by Prof. Seung-Hwan Baek (2025.8)
- [T3] Towards Building Perceptual Metrics for Next-generation Displays, IMID, Busan, Korea (2025.8)
- [T4] Perceptual Reality with Next-generation Computational Displays, Lab Seminar, Seoul National University, Seoul, Korea, hosted by Prof. Yoonchan Jeong (2025.8)
- [T5] Perceptual Reality with Next-generation Computational Displays, Department Seminar, KAIST Electrical and Electronic Engineering, Daejeon, Korea (2025.8)
- [T6] Perceptual Reality with Next-generation Computational Displays, Department Seminar, Sungkyunkwan University Electronic and Electrical Engineering, Suwon, Korea (2025.6)
- [T7] Perceptual Reality with Next-generation Computational Displays, Department Seminar (virtual), UNIST Computer Science and Engineering, Korea (2025.5)
- [T8] Towards passing the Visual Turing Test with holographic displays, High-beam Seminar (virtual), University College London, UK, hosted by Prof. Kaan Aksit (2024.10)
- [T9] Enhancing perceptual realism in holographic displays, Samsung Research, Seoul, Korea, hosted by Dr. Youngmo Jeong (2024.8)
- [T10] Perceptual evaluation of holographic near-eye displays, Meta Reality Labs, Sunnyvale, USA, hosted by Dr. Alexandre Chapiro (2024.7)
- [T11] Improving perceptual quality in holographic displays, Group Seminar, University of Cambridge, UK, hosted by Prof. Daping Chu (2024.6)
- [T12] Improving perceptual quality in holographic displays, Rainbow Lab Seminar, University of Cambridge, UK, hosted by Prof. Rafal Mantiuk (2024.3)
- [T13] Metasurface-enabled high-quality computer-generated holography, Annual conference of Optical Society of Korea (Winter), Suwon, Korea (2024.2)
- [T14] Improving perceptual quality in holographic displays, Holography advanced technology workshop, Seoul, Korea (2023.11)
- [T15] Perceptual reality through holographic near-eye displays, Electronics and Telecommunications Research Institute (ETRI), Daejeon, Korea, hosted by Dr. Kihoon Hong (2023.9)
- [T16] Perceptually realistic 2D, 3D holographic displays, IMID, Busan, Korea (2023.8)
- [T17] Recent progress on holographic displays for AR/VR applications, Annual conference of Optical Society of Korea (Summer), Jeju, Korea (2023.8)
- [T18] Perceptual Reality Through Holographic Near-Eye Displays, OSA FiO+LS AR/VR theme, Rochester, NY, USA (2022.10)
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**PUBLIC DEMOS**

- [D1] SIGGRAPH 2024 Emerging Technologies – Holographic Parallax [Kim et al., 2024, SIGGRAPH]
  - [D2] CES 2020 – Tomographic near-eye displays [Lee et al., 2019, Nature Comm.]
  - [D3] IMID 2019 – Tomographic near-eye displays [Lee et al., 2019, Nature Comm.]
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**PATENT**

- [P1] Multi-flexible display device having improved image discontinuity at panel boundary and method of manufacturing double-sided reflector therefor, Y. Hong, S. H. Lee, H. S. Yoon, B. Lee, C. H. Yoo, **D. Kim**, (Korea (granted (2021), KR102257615B1), USA (granted (2022), US11466838B2))
  - [P2] Method for optimizing holographic display and device thereof, B. Lee, B. Lee, **D. Kim**, S. Lee, C. Chen (Korea (granted (2024), KR102683827B1), USA (granted (2025), US20250085664A1))
  - [P3] Holographic display using metasurface and metasurface optimization method, Y. Jeong, S.-W. Nam, Y. Kim, **D. Kim** (Korea (pending), USA (pending, 18/737,648))
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**TEACHING**

- Lecturer
    - *Advanced Graphics and Image Processing* (2/16 hrs), University of Cambridge, Michaelmas term, 2025
  - Guest lecturer
    - *Perceptual Reality with Next-generation Displays* (1hr talk), *Extended Reality*, University of Cambridge, Lent term, 2025, hosted by Dr. Fangcheng Zhong
  - Teaching assistant (Small group teaching)
    - *Advanced Graphics and Image Processing*, University of Cambridge, Michaelmas term, 2025
    - *Introduction to Graphics*, University of Cambridge, Michaelmas term, 2024
  - Teaching assistant
    - *Introduction to Electromagnetics*, Seoul National University, Spring, 2019
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**SERVICES**

- Session Chair:  
KIDS × SID – IMID (2025)
- Reviewer:  
**Journal**  
Nature publishing group – Communications, Scientific Reports  
Optica (Formerly OSA) – Optics Letters, Optics Express, Applied Optics, Biomedical Optics Express  
IEEE – Transactions on Image Processing  
ACM – Transactions on Graphics  
ACS – Photonics  
Elsevier – Displays

**Conference**

ACM – SIGGRAPH (2025), SIGGRAPH Asia (2025)

IEEE – ISMAR (2025, 2024, 2023)

Eurographics (2025)

- Member: ACM, Optica, Optical Society of Korea, SPIE, KIDS
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