Suyeon Choi

Curriculum Vitae

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Appointments

10/2024- **Postdoctoral Scholar**, *Electrical Engineering*, Stanford University, Stanford, CA.

Education

9/2020–9/2024 **Ph.D.**, *Electrical Engineering*, Stanford University, Stanford, CA.
Thesis title: Design of holographic display systems based on artificial intelligence
Advisor: Gordon Wetzstein

9/2019–6/2021 **M.Sc.**, *Electrical Engineering*, Stanford University, Stanford, CA.
Advisor: Gordon Wetzstein

3/2013–2/2019 **B.Sc.**, *Electrical Engineering*, Seoul National University, Seoul, Korea.
Advisors: Deog-kyoon Jeong, Soo-Mook Moon, and Byoungho Lee.

Honors and Awards

2023 SPIE Optics and Photonics Education Scholarship
2023 Frontiers of Science Award, International Congress of Basic Science [4]
2022 Meta Research PhD Fellowship - AR/VR Computer Graphics
2022 NVIDIA Graduate Fellowship Finalist
2020 School of Engineering Fellowship, Stanford University
2019 Kwanjeong Scholarship
2019 Korea Government Scholarship
2019 Yongwoon Scholarship, declined due to period overlap with other PhD scholarships.
2019 2nd Prize, SPIE Student Optical Design Challenge 2019 [C1]
2013 Presidential Science Scholarship, Korea
2012 Youth Scholarship, Woongjin Foundation
2012 Silver Medal, the International Physics Olympiad (IPhO)

Publications

*denotes equal contribution.

Peer-reviewed Journals and Top Conferences

[14] B. Chao, M. Gopakumar, **S. Choi**, J. Kim, L. Shi, and G. Wetzstein, "Large Étendue 3D Holographic Display with Content-Adaptive Dynamic Fourier Modulation", *Proc. SIGGRAPH Asia 2024.*

[13] M. Gopakumar*, G. Y. Lee*, **S. Choi**, B. Chao, Y. Peng, J. Kim, G. Wetzstein, "Full-color 3D holographic augmented reality displays with metasurface waveguides", *Nature*, 2024

[12] 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, (Proc. SIGGRAPH 2024)*.

[11] B. Chao, M. Gopakumar, **S. Choi**, and G. Wetzstein, "High-Brightness Holographic Projection", *Optics Letters*, 2023.

[10] **S. Choi***, M. Gopakumar*, Y. Peng, J. Kim, M. O'Toole, and G. Wetzstein, "Time-multiplexed Neural Holography: A Flexible Framework for Holographic Near-eye Displays with Fast Heavily-quantized Spatial Light Modulators", *Proc. SIGGRAPH 2022.*

[9] J. Kim, M. Gopakumar, **S. Choi**, Y. Peng, W. Lopes, and G. Wetzstein, "Holographic glasses for Virtual Reality", *Proc. SIGGRAPH 2022.*

[8] **S. Choi***, M. Gopakumar*, Y. Peng, J. Kim, and G. Wetzstein, "Neural 3D Holography: Learning Accurate Wave Propagation Models for 3D Holographic Virtual and Augmented Reality Displays", *ACM Transactions on Graphics (Proc. SIGGRAPH Asia 2021)*.

[7] Y. Peng*, **S. Choi***, J. Kim, and G. Wetzstein, "Speckle-free Holography with Partially Coherent Light Sources and Camera-in-the-loop Calibration", *Science Advances*, 2021.

[6] M. Gopakumar, J. Kim, **S. Choi**, Y. Peng, and G. Wetzstein, "Unfiltered Holography: Optimizing High Diffraction Orders without Optical Filtering for Compact Holographic Displays", *Optics Letters*, 2021

[5] **S. Choi**, J. Kim, Y. Peng, and G. Wetzstein "Optimizing image quality for holographic near-eye displays with Michelson Holography", *Optica*, 2021.

[4] Y. Peng, **S. Choi**, N. Padmanaban, and G. Wetzstein "Neural Holography with Camera-in-the-loop Training", *ACM Transactions on Graphics (Proc. SIGGRAPH Asia 2020)*.

[3] D. Yoo*, S. Lee*, Y. Jo, J. Cho, **S. Choi**, and B. Lee "Volumetric Head-Mounted Display with Locally Adaptive Focal Blocks", *IEEE Transactions on Visualization and Computer Graphics*, 2022.

[2] 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 (Proc. SIGGRAPH Asia 2019)*.

[1] **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*, 2019.

Conference Proceedings - Others

[C2] **S. Choi**, Y. Peng, J. Kim, and G. Wetzstein "High-quality holographic displays using double SLMs and camera-in-the-loop optimization", Proc. SPIE 11765, *Optical Architectures for Displays and Sensing in Augmented, Virtual, and Mixed Reality (AR, VR, MR) II*, 2021.

[C1] D. Yoo*, S. Lee*, Y. Jo, J. Cho, **S. Choi**, and B. Lee, "15 focal planes head-mounted display using LED array backlight", Proc. SPIE 11040, *SPIE Photonics West Student Optical Design Challenge*, 2019.

Conference Proceedings - Invited papers

[I4] **S. Choi**, M. Gopakumar, Y. Peng, J. Kim, M. O'Toole, and G. Wetzstein, "Partially coherent neural holography with fast spatial light modulators," Proc. SPIE 12435, Emerging Digital Micromirror Device Based Systems and Applications XV (SPIE Photonics West 2023). **(Invited Paper)**

[I3] M. Gopakumar, **S. Choi**, J. Kim, Y. Peng, and G. Wetzstein, "Enabling ultra-compact, high-quality 3D displays with neural holography", Proc. SPIE 12445, Practical Holography XXXVII: Displays, Materials, and Applications, (SPIE Photonics West 2023). **(Invited Paper)**

[I2] **S. Choi**, Y. Peng, M. Gopakumar, J. Kim, G. Wetzstein, "Enabling Augmented-Reality Near-Eye and Head-Up Displays with Neural Holography", in *SID Symposium Digest of Technical Papers, 2022* **(Invited Paper)**

[I1] M. Gopakumar, Y. Peng, **S. Choi**, J. Kim, G. Wetzstein, "Advances in Neural Holographic Displays for Virtual and Augmented Reality", in *SID Symposium Digest of Technical Papers, 2022* **(Invited Paper)**

Public Demonstrations

2024 **Holographic Parallax**, S.-W. Nam*, D. Kim*, S. Choi*, M. Gopakumar, J. Lee, S. Lee, B. Chao, G. Wetzstein, and Y. Jeong, ACM SIGGRAPH 2024 Emerging Technologies.

2023 **Neural Holographic Near-eye Displays for Virtual Reality**, S. Choi*, M. Gopakumar*, B. Chao*, G. Y. Lee, J. Kim, G. Wetzstein, ACM SIGGRAPH 2023 Emerging Technologies.

2020 **Neural Holography**, Y. Peng, S. Choi, N. Padmanaban, J. Kim, G. Wetzstein, ACM SIGGRAPH 2020 Emerging Technologies.

Invited Talks

06/2025 Design of Holographic Display Systems based on Artificial Intelligence, *CVPR Computational Cameras and Displays Workshop*, Nashville, TN.

03/2025 Design of Holographic Display Systems based on Artificial Intelligence, *SID Bay Area Chapter*, Palo Alto, CA.

09/2024 Design of Holographic Display Systems based on Artificial Intelligence, *SIGGRAPH Silicon Valley Chapter*, Santa Clara, CA.

07/2024 Design of Holographic Display Systems based on Artificial Intelligence, *Hyundai NGV*, Virtual.

10/2023 Neural Holography for Next-generation Virtual and Augmented Reality Displays, *Optica Incubator Meetings (Optical Waveguides: A Key to Socially Acceptable AR Glasses?), Tacoma, WA.*

09/2023 Neural Holography for Next-generation Virtual and Augmented Reality Displays, *University College London, High-beams Seminar, Virtual.*

09/2023 Neural Holography for Next-generation Virtual and Augmented Reality Displays, *Applied Materials*, Santa Clara, CA.

02/2023 Neural Holography for Next-generation Virtual and Augmented Reality Displays, *Seoul National University (SNU), Dept. of Computer Science*, Seoul, Korea.

02/2023 Neural Holography for Next-generation Virtual and Augmented Reality Displays, *KAIST, Dept. of Computer Science*, Daejeon, Korea.

02/2023 Neural Holography for Next-generation Virtual and Augmented Reality Displays, *KAIST, Dept. of Physics*, Daejeon, Korea.

02/2023 Neural Holography for Next-generation Virtual and Augmented Reality Displays, *Pohang University of Science and Technology (POSTECH)*, Pohang, Korea.

02/2023 Neural Holography for Next-generation Virtual and Augmented Reality Displays, *Electronics and Telecommunications Research Institute (ETRI)*, Daejeon, Korea.

02/2023 Partially-Coherent Neural Holography and Holographic Glasses, *Annual Conference of Optical Society of Korea*, Busan, Korea.

02/2023 Partially-Coherent Neural Holography, *SPIE Photonics West, Emerging Digital Micromirror Device Based Systems and Applications XV*, San Francisco, CA.

11/2022 Neural Holography for Next-generation AR/VR Display Systems, *2022 SystemX Fall Conference*, Stanford, CA.

09/2022 Partially-Coherent Neural Holography and Holographic Glasses, *Optica Virtual panel discussion, "Could Deep Learning Improve Visual Quality in Holographic Displays?"*, Virtual.

07/2022 Partially-Coherent Neural Holography and Holographic Glasses, *Optica 3D Image Acquisition and Display: Technology, Perception and Applications: Deep Learning and Machine Learning for 3D Imaging*, Vancouver, Canada.

05/2022 Enabling Augmented-Reality Near-Eye and Head-Up Displays with Neural Holography, *SID Display Week*, San Jose, CA.

12/2021 Neural Holography Pro: Computationally Enabling Compact, High-quality 3D Holographic Displays, *Graphics and Mixed Environment Seminar (GAMES)*, Virtual.

11/2021 Enabling Next-generation Holographic Displays with Artificial Intelligence, *Optica Frontiers in Optics LS AR/VR*, Virtual.

02/2021 High-quality holographic displays using double SLMs, *SPIE AR,VR,MR Technical Talks*, Virtual.

12/2020 Neural Holography: High-quality, Real-time Computer-generated Holographic Displays, *Graphics and Mixed Environment Seminar (GAMES)*, Virtual.

Media Coverage

2024 **AI and holographic imaging bring 3D augmented reality to regular glasses**, Stanford News

2022 **Nvidia, Stanford University propose thin and light holographic glasses**, ZDNET

2021 **Stanford researchers are using artificial intelligence to create better virtual reality experiences**, Stanford News
https://news.stanford.edu/2021/11/12/using-ai-create-better-virtual-reality-experiences/

2021 **Improvements to Holographic Displays Poised to Enhance Virtual and Augmented Reality**, Optica Newsroom
https://www.optica.org/about/newsroom/news-releases/2021/improvements-to-holographic-displays-poised-to-enh

2020 **Using AI to Revolutionize Real-Time Holography**, Stanford HAI News
https://hai.stanford.edu/news/using-ai-revolutionize-real-time-holography

Internships

7/2022-9/2022 **Intern**, *Display Systems Research Team*, Meta Reality Labs, Redmond, WA.
Worked with Changwon Jang and Andrew Maimone. Manager: Douglas Lanman

7/2020-9/2020 **Intern**, *New Experience Team*, NVIDIA, Santa Clara, CA.
Culminated in first-authorship on an Optica paper [5].
Worked with Jonghyun Kim, Ward Lopes and David Luebke. Manager: Morgan McGuire

Teaching Experience

Guest Lectures

11/2023 Neural Holography for Next-generation Virtual and Augmented Reality Displays, *University of Utah, ECE 5331 - Optics for Energy Course Guest Seminar, UT*

10/2023 Neural Holography for Next-generation Virtual and Augmented Reality Displays, *the College of New Jersey (TCNJ), the CS Department Colloquia Series, NJ*

10/2023 Neural Holography for Next-generation Virtual and Augmented Reality Displays, *Sungkyunkwan University (SKKU), Dept. of Immersive Media Engineering Colloquia Series*, Seoul.

Teaching Assistant

Spring 23-24, Spring 21-22, Spring 2020-21 EE267: Virtual Reality, Stanford University

Undergraduate Teaching Assistant

Fall 2018 Digital Systems Design and Experiments, Seoul National University

Fall 2017 Introduction to Electromagnetism, Seoul National University

Spring 2015 Introduction to Circuit Theory and Laboratory, Seoul National University

Fall 2014 Digital Logic Design and Lab, Seoul National University

Tutor

Spring/Fall 2018, Spr 2015, Fall 2014 Basic Physics, Seoul National University

2013-2015 Math, Seoul National University Children's Hospital

Services

Program Committee ACM SIGGRAPH Asia, Technical Papers, 2025
IEEE Int. Conference on Computational Photography (ICCP), 2025
IEEE Int. Symposium on Mixed and Augmented Reality (ISMAR), 2023 – 2025

Reviewer	Nature Communications, Nature Machine Intelligence, ACM SIGGRAPH, ACM SIGGRAPH Asia, ACM Transactions on Graphics (TOG), NeurIPS, IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), IEEE Transactions on Visualization and Computer Graphics (TVCG), IEEE VR, IEEE ISMAR, Photonics Research, Optics Letters, Optics Express, Applied Optics, Optics Continuum, Laser & Photonics Reviews, Virtual Reality, Scientific Reports, Eurographics
Member	ACM SIGGRAPH, SPIE, SID, Optica
Student reader	Stanford EE Masters Admissions 2023-2024