







Luocheng Huang

Graduate Researcher

 luocheng@uw.edu  801-888-8159  Seattle, WA
 0000-0002-6684-3954  Luochenghuang  <https://huanghub.com>

Education

Sep 2019 – Jun 2023 | **University of Washington, Seattle**
Ph.D. in Electrical and Computer Engineering

Jun 2017 – Sep 2019 | **University of Washington, Seattle**
Master of Science in Materials Science and Engineering

Sep 2013 – Jun 2017 | **University of Washington, Seattle**
Bachelor of Science in Materials Science and Engineering

Experience

Jul 2023 – Aug 2023 | **University of Washington, Seattle**
Postdoctoral Fellow

- Development of a multi-scale optimization framework for diffractive optical systems.

Sep 2019 – Jun 2023 | **University of Washington, Seattle**
Graduate research assistant

2023 | Optical Neural Network

- Designed an incoherent optical neural network capable of classifying MNIST characters using a meta-optical doublet. [1]

2022 | Meta-optical Fiber Endoscope

- Designed large meta-optics for real time full-color imaging in a meta-optical fiber endoscope [4]

Polarization Sensitive Foveated LWIR meta-optics

- Designed polarization sensitive meta-optics in the LWIR regime, which has polarization multiplexed focal lengths. [7]

2021 | All-silicon LWIR Metalens

- Built a metalens imaging platform in the long wavelength infrared (LWIR) regime [10].

Inverse Designed Achromatic LWIR

- Inverse designed an achromatic LWIR imaging system, which is currently being fabricated. The optimization of the optics is enabled by techniques such as automatic differentiation and deep learning.

Liquid Crystal Tunable Metasurface

- Designed metasurfaces with tunable functionalities such as notch filters and beam steering using liquid crystal. Fabricated these metasurface for liquid crystal integration.

2020 | Extended Depth of Focus Metasurface

- Built an achromatic imaging platform combining the form factor of ultra-thin metasurface and computational imaging [14]. This imaging system utilizes the extended depth of focus (EDOF) property to enable full-color imaging.

Forward Designed Composite Metasurface

- Developed a doublet metasurface fabrication process flow. Designed metasurface doublets using Zemax. Developed python script to automate optimization and analyses on Zemax.

2019	Simulation Parallelization <ul style="list-style-type: none"> ◦ Developed pipelines to run RCWA and FDTD simulations on the UW high performance computing cluster to considerably speed up the simulation workflows.
Jun 2022 – Dec 2022	Meta Reality Labs, Redmond <i>Intern</i> <ul style="list-style-type: none"> ◦ Worked as an optical research scientist intern.
Oct 2017 – Jun 2018	University of Washington – DIRECT Program <i>Trainee</i> <ul style="list-style-type: none"> ◦ Developed Thermoelectric Materials Artificial Neural Network (TEMANN), a python package that can be used to predict Seebeck coefficients for novel materials. https://github.com/Luochenghuang/TEMANN/ ◦ Completed courses on various topics concerning artificial neural networks including architectures, hyper-parameter tuning, regularization, optimization, etc.
Jul 2018 – Jun 2019	American Institutional Assets, Seattle <i>Intern</i> <ul style="list-style-type: none"> ◦ Help to develop an organic liquid fertilizer that has anti-bacterial, anti-fungal, and anti-parasitic properties. Also drip irrigation compatible.

Leadership and Teaching Experience

Sep 2019 – Jun 2021	University of Washington, Seattle <i>Teaching assistant</i> <ul style="list-style-type: none"> ◦ Held quiz sections and office hours for EE215 and EE299.
Sep 2016 – Jun 2017	American Ceramic Society – Keramos UW Chapter <i>President</i> <ul style="list-style-type: none"> ◦ Organized weekly meetings, and coordinated outreach events.

Technical Skills

Programming	Python, MATLAB, Java, JavaScript, HTML/CSS, L ^A T _E X
Softwares	Zemax, Lumerical, SolidWorks, Proxmox, HAProxy, Tensorflow, PyTorch, SLURM
Optics	Alignment, PSF/Strehl Ratio measurement, optical stage and scientific camera automation (visible/LWIR), visible/LWIR sources, lasers, fiber optics, spectrometers, power meters.
Nanofabrication	ABM Semi-Auto aligner, Heidelberg DWL66 ⁺ , spin coater, Profilometer (DektakXT), EBeam Lithography (JBX6300FS), ellipsometer (Woollam Alpha SE), SEM, Optical Microscopy, Quorum sputter coater, E-beam Evaporator (SEC-600), ICP-Fluorine etcher, Evatec LLS EVO Sputter System, Barrel Asher, SPTS PECVD, Disco Wafer Dicer.
Prototyping	Soldering, breadboarding, table/band/scroll/miter/oscillating saw, jigsaw, router, planer, orbital/belt sander, lathe, 3D printing.

Publications

- | | |
|------|--|
| 2023 | <p>[1] L. Huang, Q. A. A. Tanguy, J. E. Froch, S. Mukherjee, K. F. Bohringer, and A. Majumdar. “Photonic Advantage of Optical Encoders”. In: (2023). arXiv: 2305.01743 [physics.optics].</p> <p>[2] A. Wirth-Singh, J. E. Fröch, Z. Han, L. Huang, S. Mukherjee, Z. Zhou, Z. Coppens, K. F. Böhringer, and A. Majumdar. “Large Field-of-View Thermal Imaging via All-Silicon Meta-Optics”. In: (2023). arXiv: 2304.14569 [physics.optics].</p> |
| 2022 | <p>[3] J. E. Fröch, S. Colburn, A. Zhan, Z. Han, Z. Fang, A. Saxena, L. Huang, K. F. Böhringer, and A. Majumdar. “Dual Band Computational Infrared Spectroscopy via Large Aperture Meta-Optics”. In: <i>ACS Photonics</i> (2022).</p> <p>[4] J. E. Froech, L. Huang, Q. A. A. Tanguy, S. Colburn, A. Zhan, A. Ravagli, E. J. Seibel, K. Boehringer, and A. Majumdar. “Real Time Full-Color Imaging in a Meta-Optical Fiber Endoscope”. In: (2022). arXiv: 2211.00808 [physics.optics].</p> <p>[5] L. Huang, S. Colburn, A. Zhan, and A. Majumdar. “Full-Color Metaoptical Imaging in Visible Light”. In: <i>Advanced Photonics Research</i> (2022), p. 2100265. DOI: 10.1002/adpr.202100265.</p> <p>[7] V. Saragadam, Z. Han, V. Boominathan, L. Huang, S. Tan, J. E. Fröch, K. F. Böhringer, R. G. Baraniuk, A. Majumdar, and A. Veeraraghavan. “Foveated Thermal Computational Imaging in the Wild Using All-Silicon Meta-Optics”. In: (2022). arXiv: 2212.06345 [physics.optics].</p> |
| 2021 | <p>[9] E. Bayati, A. Wolfram, S. Colburn, L. Huang, and A. Majumdar. “Design of achromatic augmented reality visors based on composite metasurfaces”. In: <i>Applied Optics</i> 60.4 (2021), pp. 844–850.</p> <p>[10] L. Huang, Z. Coppens, K. Hallman, Z. Han, K. F. Böhringer, N. Akozbek, A. Raman, and A. Majumdar. “Long wavelength infrared imaging under ambient thermal radiation via an all-silicon metalens”. In: <i>Optical Materials Express</i> 11.9 (2021), pp. 2907–2914. DOI: 10.1364/OME.434362.</p> <p>[12] E. Tseng, S. Colburn, J. Whitehead, L. Huang, S.-H. Baek, A. Majumdar, and F. Heide. “Neural nano-optics for high-quality thin lens imaging”. In: <i>Nature Communications</i> 12.1 (Nov. 2021). DOI: 10.1038/s41467-021-26443-0.</p> <p>[13] J. E. Whitehead, A. Zhan, S. Colburn, L. Huang, and A. Majumdar. “Fast Extended Depth of Focus Meta-Optics for Varifocal Functionality”. In: <i>arXiv preprint arXiv:2106.15807</i> (2021).</p> |
| 2020 | <p>[14] L. Huang, J. Whitehead, S. Colburn, and A. Majumdar. “Design and analysis of extended depth of focus metalenses for achromatic computational imaging”. In: <i>Photonics Research</i> 8.10 (2020), pp. 1613–1623. DOI: 10.1364/PRJ.396839.</p> |
| 2018 | <p>[15] S. Colburn, A. Zhan, E. Bayati, J. Whitehead, A. Ryou, L. Huang, and A. Majumdar. “Broadband transparent and CMOS-compatible flat optics with silicon nitride metasurfaces”. In: <i>Optical Materials Express</i> 8.8 (2018), pp. 2330–2344.</p> |

Conferences

- | | |
|------|---|
| 2022 | <p>[6] L. Huang, Z. Coppens, K. Hallman, Z. Han, K. F. Böhringer, N. Akozbek, A. Raman, and A. Majumdar. “All-Silicon Metalens for Long Wavelength Infrared Imaging”. In: <i>2022 Conference on Lasers and Electro-Optics (CLEO)</i>. IEEE. 2022, pp. 1–2.</p> <p>[8] Q. A. Tanguy, H. Hussein, S. Colburn, L. Huang, K. Böhringer, and A. Majumdar. “Electrothermal 1D Varifocal Metalens”. In: <i>CLEO: Science and Innovations</i>. Optica Publishing Group. 2022, JT4Q–1.</p> |
| 2021 | <p>[11] L. Huang, J. Whitehead, S. Colburn, and A. Majumdar. “Extended Depth of Focus Metalenses for Achromatic Computational Imaging”. In: <i>CLEO: Science and Innovations</i>. Optical Society of America. 2021, STh4O–2.</p> |

Honors

2022		Best Applied Research, ECE, UW
2016		Livingston Wernecke Memorial Scholarship, UW James I. Mueller Scholarship, UW
2014		Composers Guild 44th Annual Composition Contest, Utah Utah Best of Young Composer & 2nd Prize & Best of Age Group, Utah
2013		National Scholastic Art & Writing Silver Medalist, New York Utah State Math Contest 1st Team Award & Finalist, Utah