# Luocheng Huang

*Graduate Researcher*

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## Education

Sep 2019 – Ongoing | **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

Oct 2017 – Jun 2018 | **University of Washington – DIRECT Program**
*Trainee*

- Developed Thermoelectric Materials Artifical 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, hyperparameter tuning, regularization, optimization, etc.

Jul 2018 – Jun 2019 | **American Institutional Assets, Seattle**
*Intern*

- Successfully developed an organic liquid fertilizerthat 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**
*Teaching assistant*

- Held quiz sections and office hours for EE215 and EE299.

Sep 2016 – Jun 2017 | **American Ceramic Society – Keramos UW Chapter**
*President*

- Organized weekly meetings, and coordinated out reach events.

## Technical Skills

Programming | Python, MATLAB, Java, JavaScript, HTML/CSS, LaTeX

Frameworks | Proxmox, HAProxy, Tensorflow, SLURM

Softwares | Zemax OpticStudio, Lumerical FDTD, SolidWorks

Fabrication | 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.

## Projects

2021 **All-silicon LWIR Metalens**
- Built a metalens imaging platform in the long wavelength infrared (LWIR) regime [2].

**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 [6]. 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.

**Optical Neural Network**
- Designed an incoherent optical neural network capable of classifying MNIST characters using a meta-optical doublet. The device is currently being fabricated.

2019 **Simulation Parallelization**
- Developed pipelines to run RCWA and FDTD simulations on the UW high performance computing cluster to considerably speed up the simulation workflows.

## Publications

2021 [1] E. Bayati, A. Wolfram, S. Colburn, **L. Huang**, and A. Majumdar. "Design of achromatic augmented reality visors based on composite metasurfaces". In: *Applied Optics* 60.4 (2021), pp. 844–850.

[2] **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: *Optical Materials Express* 11.9 (2021), pp. 2907–2914.

[3] **L. Huang**, J. Whitehead, S. Colburn, and A. Majumdar. "Extended Depth of Focus Metalenses for Achromatic Computational Imaging". In: *CLEO: Science and Innovations*. Optical Society of America. 2021, STh4O–2.

[4] 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: *Nature Communications* 12.1 (Nov. 2021). DOI: 10.1038/s41467-021-26443-0. URL: https://doi.org/10.1038/s41467-021-26443-0.

[5] J. E. Whitehead, A. Zhan, S. Colburn, **L. Huang**, and A. Majumdar. "Fast Extended Depth of Focus Meta-Optics for Varifocal Functionality". In: *arXiv preprint arXiv:2106.15807* (2021).

2020 [6] **L. Huang**, J. Whitehead, S. Colburn, and A. Majumdar. "Design and analysis of extended depth of focus metalenses for achromatic computational imaging". In: *Photonics Research* 8.10 (2020), pp. 1613–1623.

2018 [7] 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: *Optical Materials Express* 8.8 (2018), pp. 2330–2344.

## Honors

2016 | **Livingston Wernecke Memorial Scholarship, UW**
**James I. Mueller Scholarship, UW**

2014 | **Composers Guild 44$^{th}$ 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**