

# Kristina Monakhova

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## Education

### University of California, Berkeley

PH.D. CANDIDATE IN ELECTRICAL ENGINEERING AND COMPUTER SCIENCES

- Advisor: Prof. Laura Waller

Berkeley, CA

2022 (expected)

### The State University of New York at Buffalo

BS, ELECTRICAL ENGINEERING, TECHNICAL GPA: 4.00 / 4.00

Buffalo, NY

2016

## Research Focus

My research involves combining computational imaging with machine learning to make small, cheap, and capable task-specific cameras. My work is at the intersection of signal processing, optics, optimization, compressive sensing, and machine learning. I've worked on speeding up inverse problems using unrolled optimization, single-shot 3D microscopy, and I'm currently working on on-chip compressive hyperspectral imaging.

**Keywords:** signal processing, optics, inverse problems, compressive sensing, optimization, machine learning

## Experience

<b>Berkeley Artificial Intelligence Research (BAIR)</b> , Research Assistant in Prof. Laura Waller's group	2017-present
<b>Intel Intelligent Systems Lab</b> , graduate researcher with Vladlen Koltun	spring 2021
<b>MIT Lincoln Laboratory</b> , Advanced Sensor Systems and Test Beds Intern	summer 2016
<b>University at Buffalo Nanosatellite Laboratory</b> , undergrad researcher with Dr. Crassidis	2012-2016
<b>Northrop Grumman Electronic Systems</b> , hardware engineering winter intern	winter 2015
<b>Northrop Grumman Aerospace Systems</b> , systems engineering summer intern	summer 2015
<b>Carnegie Mellon Robotics Institute</b> , RISS REU with Dr. Red Whittaker	summer 2014
<b>NASA Marshall Space Flight Center</b> , NASA Robotics Academy summer researcher	summer 2013

## Academic Honors & Awards

<b>UC Berkeley EECS Demetri Angelakos Memorial Achievement</b>	2021
<b>UC Berkeley EECS Chairs' Graduate Award</b>	2020
<b>UC Berkeley EECS Excellence Award</b>	2016
<b>National Science Foundation Graduate Research Fellowship (NSF GRFP)</b>	2016
<b>National Defense Science and Engineering Graduate Fellowship (NDSEG)</b> , (declined for NSF GRFP)	2016
<b>Barry M. Goldwater Scholarship</b>	2015
<b>University at Buffalo Presidential Scholarship</b> , four year full-ride scholarship	2012 – 2016

## Teaching

### GRADUATE TEACHING ASSISTANT, UC BERKELEY

#### EE16A - Designing Information Devices and Systems I

Fall 2020

Discussion TA, lead interactive discussion sections over Zoom, wrote exam question.

#### EE16A - Designing Information Devices and Systems I

Summer 2020

Content development - adapted single-pixel imaging lab for remote instruction.

Created jupyter notebook-based programming assignments and interactive lab discussions for new graduate class on compressive sensing and low-rank models. Gave bi-weekly discussion section and taught one lecture.

## Publications

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\*indicates equal contribution

### JOURNAL PUBLICATIONS

1. **Kristina Monakhova\***, Vi Tran\*, Grace Kuo, Laura Waller, "Untrained networks for compressive lensless photography," Opt. Express 29, 20913-20929 (2021) [pdf]
2. **Kristina Monakhova\***, Kyrollos Yanny\*, Neerja Aggarwal, Laura Waller, "Spectral DiffuserCam: lensless snapshot hyperspectral imaging with a spectral filter array," Optica, 7 (10), pp. 1298–1307, 2020 [pdf]
3. Kyrollos Yanny\*, Nick Antipa\*, William Liberti, Sam Dehaeck, **Kristina Monakhova**, Fanglin Lina Liu, Konlin Shen, Ren Ng, and Laura Waller, "Randoscope: Computational Single-shot Miniature 3D Fluorescence Microscope," Light: Science & Applications, 9 (171), 2020 [pdf]
4. **Kristina Monakhova**, Joshua Yurtsever, Grace Kuo, Nick Antipa, Kyrollos Yanny, and Laura Waller, "Learned reconstructions for practical mask-based lensless imaging," Opt. Express 27, 28075-28090 (2019) [pdf]

### CONFERENCE PUBLICATIONS

1. Richard W. Shuai\*, Kyrollos Yanny\*, **Kristina Monakhova**, Laura Waller, "MultiWienerNet: Deep Learning for Fast Shift-Varying Deconvolution," Imaging and Applied Optics Congress, CTh5A.5, Optical Society of America, 2021.
2. **Kristina Monakhova\***, Kyrollos Yanny\*, and Laura Waller, "Snapshot hyperspectral imaging using a random phase mask and spectral filter array," Imaging and Applied Optics Congress, pp. JF2F.4, Optical Society of America, 2020. [pdf]
3. Grace Kuo, **Kristina Monakhova**, Kyrollos Yanny, Ren Ng, and Laura Waller, "Spatially-varying microscope calibration from unstructured sparse inputs," Imaging and Applied Optics Congress, pp. CF4C.4, Optical Society of America, 2020. [pdf]
4. Ellin Zhao, Nicolas Deshler, **Kristina Monakhova**, Laura Waller, "Multi-sensor lensless imaging: synthetic large-format sensing with a disjoint sensor array," Imaging and Applied Optics Congress, pp. CF2C.6, Optical Society of America, 2020. [pdf]
5. Kyrollos Yanny, Nick Antipa, William Liberti, Sam Dehaeck, **Kristina Monakhova**, Fanglin Lina Liu, Konlin Shen, Ren Ng, and Laura Waller, "Compressed Sensing Mask-based Miniature 3D Fluorescence Microscopy" Imaging and Applied Optics Congress, pp. CW4B.5, Optical Society of America, 2020. [pdf]
6. **Kristina Monakhova**, Nick Antipa, and Laura Waller, "Learning for lensless mask-based imaging," in Computational Optical Sensing and Imaging, pp. CTu3A–2, Optical Society of America, 2019 [pdf]

### WORKSHOPS AND POSTERS

1. **Kristina Monakhova\***, Vi Tran\*, Grace Kuo, Laura Waller, "Untrained networks for compressive lensless photography" in CVPR Computational Cameras and Displays (CCD) Workshop, June 2021 (spotlight talk)
2. **Kristina Monakhova\***, Kyrollos Yanny\*, Neerja Aggarwal, Laura Waller, "Spectral DiffuserCam: lensless snapshot hyperspectral imaging with a spectral filter array," in CVPR Computational Cameras and Displays (CCD) Workshop, June 2020 (spotlight talk)
3. Grace Kuo, Fanglin (Linda) Liu, **Kristina Monakhova**, Kyrollos Yanny, Ren Ng, Laura Waller, "On-chip fluorescence microscopy with a random microlens diffuser", in 2020 ICCP Conference, St. Louis, MO, Apr. 2020 (poster)
4. **Kristina Monakhova**, Joshua Yurtsever, Grace Kuo, Nick Antipa, Kyrollos Yanny, Laura Waller, "Unrolled, model-based networks for lensless imaging", 2019 NeurIPS Deep Inverse Workshop (poster)
5. **Kristina Monakhova**, Nick Antipa, Laura Waller, "Learning reconstructions for lensless imaging", in 2019 Physics in ML Workshop, Berkeley, CA, May. 2019 (poster)
6. **Kristina Monakhova**, Kyrollos Yanny, Fanglin Linda Liu, Evan Shelhamer, Emrah Bostan, Laura Waller, "Deep Diffusers - machine learning for lensless imaging", in 2018 ICCP Conference, Pittsburgh, PA, May. 2018 (poster)
7. Regina Eckert, **Kristina Monakhova**, Zachary F. Philips, Yongbing Zhang, Lei Tian, Laura Waller, "Advances in 3D Fourier Ptychography", in 2017 ICCP Conference, Stanford, CA, May. 2017 (poster)

## Talks

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<b>Compressive snapshot hyperspectral Imaging using a diffuser and a spectral filter array</b>	fall 2020
Berkeley Photobears Lightning Talk Series	
<b>Practical mask-based lensless imaging reconstructions based on physics and deep learning</b>	fall 2019
Berkeley Center for Computational Imaging Seminar Series	
<b>Using physics and deep learning for practical imaging without a lens</b>	fall 2019
Berkeley Artificial Intelligence Research Lab Seminar Series	

## Advising

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### GRADUATE RESEARCH

Yaying Zhao (UC Berkeley master's student, now at Facebook)	summer 2020
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### UNDERGRADUATE RESEARCH

Mbalenhle Holt (BAIR REU, targeted at HBCUs)	summer 2021
Georgia Channing (SUPERB REU)	summer 2021
Shamus Li (currently at UC Berkeley)	spring 2021 - present
Vi Tran (Transfer to Excellence REU, now at UC Berkeley)	summer/fall 2020
Trisha Sanghal (currently at UC Berkeley)	2019-2020
Jonathan Fung (now at Scale AI)	fall 2019
Kristie Diep (currently at UC Berkeley, BioESP REU)	summer 2019
Ellin Zhao (now a PhD student at UCLA with Prof. Achuta Kadambi)	2018- 2020
Joshua Yurtsever (now at Google)	2018-2020
Nico Deshler (SUPERB REU, now a PhD student in Optics at University of Arizona)	2018-2020

## Service & Mentoring

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<b>Berkeley Artificial Intelligence Research Mentoring (BAIR) Program</b>	2018-present
Mentored undergraduate students interested in research and AI	
<b>UC Berkeley EECS Peer Mentor</b>	2019-present
Hold regular office hours to discuss issues and support junior PhD students	
<b>WICSE 1st year mentoring program</b>	2017-present
Serve as a mentor for 1st year female-identifying PhD students in the EECS Department	
<b>UC Berkeley Transfer-to-Excellence (TTE) REU</b>	summer 2020
Mentoring an undergraduate researcher throughout summer REU program targeted at community college students coming from low-income backgrounds or underserved communities.	
<b>EE Visit Days Coordinator</b>	spring 2020
Organized the first Virtual Visit Days for admitted EECS PhD students. Organized peer advising program, matching all admitted students with a current graduate student mentor. Coordinated with underrepresented minority groups to hold virtual panels and discussions for admits. Coordinated student volunteers to promote casual admit-student interaction in a virtual setting, including virtual tours and hangouts.	
<b>UC Berkeley EECS PhD Admissions Committee</b>	winter 2020
Reviewed PhD applications for the Signal Processing track in the EECS department.	
<b>UC Berkeley Bioengineering Scholars Program (BioESP) Mentor</b>	summer 2019
Mentored bioengineering undergraduate researcher throughout summer research program.	
<b>UC Berkeley SUPERB REU Mentor</b>	summer 2018
Mentored undergraduate researcher during summer REU on a project involving thin, 3D cameras in array geometries. Student was selected to represent UC Berkeley at 2018 REU Symposium.	
<b>Electrical Engineering Graduate Student Association</b>	2017-2018
Served as social chair, worked to create inclusive and friendly environment for graduate students.	

## Women in Computer Science and Electrical Engineering (WICSE)

2017-2018

Organized events to promote diversity and inclusively within the EECS PhD program, including visit day events for female-identifying students, and mentorship program for 1st year PhD students

## Professional Activities

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### PROFESSIONAL HONORS

Selected Participant, Rising Stars in EECS	2020
Selected Participant, NextProf Nexus Workshop	2020
Selected Participant, Future Digileaders, KTH Royal Institute of Technology	2019

### PROGRAM COMMITTEES

CVPR Computational Cameras and Displays Workshop	2021
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### PAPER REVIEWING

IEEE Transactions on Pattern Analysis and Machine Intelligence	2020-present
IEEE Transactions of Computational Imaging	2018 - present
Optical Society of America (OSA) - Continuum, Optics Letters, Optics Express	2019-present