

# Kristina Monakhova

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## Education

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### University of California, Berkeley

Berkeley, CA

PH.D. CANDIDATE IN ELECTRICAL ENGINEERING AND COMPUTER SCIENCES

2016 - 2022 (expected)

- Advisor: Prof. Laura Waller

### The State University of New York at Buffalo

Buffalo, NY

BS, ELECTRICAL ENGINEERING, TECHNICAL GPA: 4.00 / 4.00

2012 - 2016

## Research Focus

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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

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<b>Berkeley Artificial Intelligence Research (BAIR)</b> , Research Assistant in Prof. Laura Waller's group	2017-present
<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

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<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

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### GRADUATE TEACHING ASSISTANT, UC BERKELEY

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

Summer 2020

Currently working on adapting imaging lab for remote instruction.

#### EE290T - High dimensional data analysis with low dimensional models

Fall 2018

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\***, Kyrollos Yanny\*, Neerja Aggarwal, Laura Waller, “Spectral DiffuserCam: lensless snapshot hyperspectral imaging with a spectral filter array,” (in review) {pre-print}
2. 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,” (in review)
3. **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. **Kristina Monakhova\***, Kyrollos Yanny\*, and Laura Waller, “Snapshot hyperspectral imaging using a random phase mask and spectral filter array,” in *Computational Optical Sensing and Imaging*, Optical Society of America, June 2020
2. Grace Kuo, **Kristina Monakhova**, Kyrollos Yanny, Ren Ng, and Laura Waller, “Spatially-varying microscope calibration from unstructured sparse inputs,” in *Computational Optical Sensing and Imaging*, Optical Society of America, June 2020
3. Qing Lan Zhao; Nicolas Deshler; **Kristina Monakhova**; Laura Waller, “Multi-sensor lensless imaging: synthetic large-format sensing with a disjoint sensor array.” in *Computational Optical Sensing and Imaging*, Optical Society of America, June 2020
4. 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” in *Computational Optical Sensing and Imaging*, Optical Society of America, June 2020
5. **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\***, 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)
2. 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)
3. **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)
4. **Kristina Monakhova**, Nick Antipa, Laura Waller, “Learning reconstructions for lensless imaging”, in *2019 Physics in ML Workshop*, Berkeley, CA, May. 2019 (poster)
5. **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)
6. 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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**Practical mask-based lensless imaging reconstructions based on physics and deep learning** fall 2019

Berkeley Center for Computational Imaging Seminar Series

**Using physics and deep learning for practical imaging without a lens** fall 2019

Berkeley Artificial Intelligence Research Lab Seminar Series

## Advising

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### GRADUATE RESEARCH

Yaying Zhao (UC Berkeley master’s student)

summer 2020

### UNDERGRADUATE RESEARCH

Vi Tran (Transfer to Excellence REU)	summer 2020
Trisha Sanghal (currently at UC Berkeley)	fall 2019-present
Jonathan Fung (currently at UC Berkeley)	fall 2019
Kristie Diep (currently at UC Berkeley, BioESP REU)	summer 2019
Ellin Zhao (currently at UC Berkeley)	2018- 2020
Joshua Yurtsever (now at Google)	2018-2020
Nico Deshler (currently at UC Berkeley, SUPERB REU)	2018-2020

## Service & Mentoring

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<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>UC Berkeley EECS Peer Mentor</b>	2019-present
Hold regular office hours to discuss issues and support junior PhD students	
<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 (WICSE, QICSE, BGEES, LAGSESS) 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.	
<b>Women in Computer Science and Electrical Engineering (WICSE)</b>	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	
<b>WICSE 1st year mentoring program</b>	2017-present
<b>Berkeley Artificial Intelligence Research Mentoring (BAIR) Program</b>	2018-present
Mentored undergraduate student interested in research	
<b>Students for the Exploration and Development of Space</b>	2013-2014
Served as board member for a nationwide student-run nonprofit organization interested in promoting space research and outreach. Hosted monthly meetings with student chapters to facilitate technology discussion and collaboration. Founded SpaceTalks, a bimonthly Google Hangout series with space industry leaders for student networking opportunities	

## Professional Activities

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### PROFESSIONAL HONORS

Selected Participant, Future Digileaders, KTH Royal Institute of Technology	2019
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### GRANTS

<b>NASA Undergraduate Student Instrument Project Grant</b>	2016
Writing lead for \$100,000 student grant proposal. Grant was awarded and funded the continuation of UB's Nanosatellite Laboratory with a new CubeSat mission to characterize radio noise in orbit with a software defined radio - named LinkSat.	