Kristina Monakhova

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Education

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

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

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

Academic Honors & Awards

UC Berkeley EECS Demetri Angelakos Memorial Achievement 2021
UC Berkeley EECS Chairs' Graduate Award 2020
UC Berkeley EECS Excellence Award 2016
National Science Foundation Graduate Research Fellowship (NSF GRFP) 2016
National Defense Science and Engineering Graduate Fellowship (NDSEG), (declined for NSF GRFP) 2016
Barry M. Goldwater Scholarship 2015
University at Buffalo Presidential Scholarship, 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.

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

*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. **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]
2. 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]
3. 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]
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" Imaging and Applied Optics Congress, pp. CW4B.5, Optical Society of America, 2020. [pdf]
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***, 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

Compressive snapshot hyperspectral Imaging using a diffuser and a spectral filter array fall 2020
Berkeley Photobears Lightning Talk Series

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

* denotes student from underrepresented group in EECS

Graduate research

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

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

Berkeley Artificial Intelligence Research Mentoring (BAIR) Program 2018-present
Mentored undergraduate students interested in research and AI

UC Berkeley EECS Peer Mentor 2019-present
Hold regular office hours to discuss issues and support junior PhD students

WICSE 1st year mentoring program 2017-present
Serve as a mentor for 1st year female-identifying PhD students in the EECS Department

UC Berkeley Transder-to-Excellence (TTE) REU summer 2020
Mentoring an undergraduate researcher throughout summer REU program targeted at community college students coming from low-income backgrounds or underserved communities.

EE Visit Days Coordinator 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.

UC Berkeley EECS PhD Admissions Committee winter 2020
Reviewed PhD applications for the Signal Processing track in the EECS department.

UC Berkeley Bioengineering Scholars Program (BioESP) Mentor summer 2019
Mentored bioengineering undergraduate researcher throughout summer research program.

UC Berkeley SUPERB REU Mentor 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.

Electrical Engineering Graduate Student Association 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

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

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