Nick Antipa

Curriculum Vitae

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Education

2014-present **PhD Candidate, University of California Berkeley**, *Electrical Engineering*.
Expected Summer 2019

Advisors: Laura Waller and Ren Ng

Research Area: Computational Imaging

2009 **MS, University of Rochester**, *Optics*.

Advisor: Julie Bentley

Thesis: *Effective Utilization of Off-the-Shelf Optics: Balancing application, performance, and cost.*

2008 **BS, University of California Davis**, *Optical Science and Engineering*, GPA 3.89.

Employment

2014-present **Graduate Student Researcher, UC Berkeley**, *Electrical Engineering and Computer Science (EECS)*.

2009-2014 **Optics Engineer, Lawrence Livermore National Lab**, *National Ignition Facility (NIF)*, Livermore, California.

Research and Major Projects

2017-present **Compact Neural Imaging Devices**.
I am currently designing compact (2 to 3 grams) head mountable fluorescent microscopes capable of time-resolved, *in-vivo* 3D imaging of flourescent neural signal on freely behaving animals (e.g. mice).

2017-present **Lensless Single-Shot Volumetric Imaging**.
This lensless system consists solely of a diffuser placed in front of an image sensor. By solving a large-scale compressed sensing-style inverse problem, 3D images of sparse scenes can be recovered from a single 2D measurement. I and my collaborators are working to extend this approach to create extremely thin, depth-capable imagers.

2018-present **Simultaneous end-to-end optimization of optics and image reconstruction**.
Using machine learning-inspired techniques, the goal of this work-in-progress is to simultaneously optimize the optics and the reconstruction algorithm for task-specific sensing problems (e.g. neural imaging).

2014-2016 **Single-Shot Diffuser-Encoded Light Fields**.
By placing a diffuser inside a traditional lens-based camera, a 4D light field can be reconstructed from a single 2D diffuse image.

Honors and Awards

2019 **Best Paper**, *Video from Stills: Lensless Imaging with Rolling Shutter*, IEEE International Conference on Computational Photography (ICCP).

2017 **Best Demo**, *DiffuserCam: A Diffuser-Based Lensless Camera*, IEEE International Conference on Computational Photography (ICCP).

2016 **Best Paper**, *Single-Shot Diffuser-Encoded Light Field Imaging*, IEEE International Conference on Computational Photography (ICCP).

2015 **Outstanding Graduate Student Instructor**, *Electrical Engineering 118/218a: Introduction to Optical Engineering*, UC Berkeley.

2012 **Engineering Division Award**, *Outstanding contribution to the National Ignition Facility Capsule Mapping System*, Lawrence Livermore National Laboratory.

2011 **NIF and Photon Science Award**, *Outstanding Contributions in Ignition Capsule Metrology*.

2010 **NIF and Photon Science Award**, *Development of Prototype Capsule Surface Inspection*.

2008 **Graduate with Highest Honors**, *UC Davis*.

2008 **Applied Science Departmental Citation**, *UC Davis*.

Journal or Journal Equivalent Publications

2019 Kristina Monakhova, Joshua Yurtsever, Grace Kuo, **Nick Antipa**, Kyrollos Yanny, and Laura Waller. Learned reconstructions for practical mask-based lensless imaging. *Optics Express*, 27(20):28075–28090, 2019.

2019 **Nick Antipa***, Patrick Oare*, Emrah Bostan, Ren Ng, and Laura Waller. Video from stills: Lensless imaging with rolling shutter. In *2019 IEEE International Conference on Computational Photography (ICCP)*, pages 1–8. IEEE, 2019.

2018 **Nick Antipa***, Grace Kuo*, Reinhard Heckel, Ben Mildenhall, Emrah Bostan, Ren Ng, and Laura Waller. Diffusercam: lensless single-exposure 3d imaging. *Optica*, 5(1):1–9, 2018.

2016 Nicolas C Pégard, Hsiou-Yuan Liu, **Nick Antipa**, Maximillian Gerlock, Hillel Adesnik, and Laura Waller. Compressive light-field microscopy for 3d neural activity recording. *Optica*, 3(5):517–524, 2016.

2016 **Nicholas Antipa**, Sylvia Necula, Ren Ng, and Laura Waller. Single-shot diffuser-encoded light field imaging. In *Computational Photography (ICCP), 2016 IEEE International Conference on*, pages 1–11. IEEE, 2016.

2013 **Nick Antipa**, SH Baxamusa, ES Buice, AD Conder, MN Emerich, MS Flegel, CL Heinbockel, JB Horner, JE Fair, LM Kegelmeyer, and others. Automated ICF capsule characterization using confocal surface profilometry. *Fusion Science and Technology*, 63(2):151–159, 2013.

Conference Abstracts and Technical Reports

2018 Grace Kuo, **Nick Antipa**, Ren Ng, and Laura Waller. 3d fluorescence microscopy with diffusercam. In *Computational Optical Sensing and Imaging*, pages CM3E–3. Optical Society of America, 2018.

2017 Grace Kuo, **Nick Antipa**, Ren Ng, and Laura Waller. Diffusercam: diffuser-based lensless cameras. In *Computational Optical Sensing and Imaging*, pages CTu3B–2. Optical Society of America, 2017.

2017 **Nick Antipa**, Grace Kuo, Ren Ng, and Laura Waller. 3d diffusercam: Single-shot compressive lensless imaging. In *Computational Optical Sensing and Imaging*, pages CM2B–2. Optical Society of America, 2017.

2016 AV Hamza, A Nikroo, E Alger, **N Antipa**, LJ Atherton, D Barker, S Baxamusa, S Bhandarkar, T Biesiada, E Buice, and others. Target development for the national ignition campaign. *Fusion Science and Technology*, 69(1):395–406, 2016.

2016 Gautam Gunjala, Aamod Shanker, Volker Jaedicke, **Nick Antipa**, and Laura Waller. Optical transfer function characterization using a weak diffuser. In *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXIII*, volume 9713, page 971315. International Society for Optics and Photonics, 2016.

2015 Nicolas C Pegard, Evan Lyall, Alan Mardinly, **Nick Antipa**, Laura Waller, and HIllel Adesnik. High-speed 3d brain activity quantification with compressive light-field microscopy. In *Novel Techniques in Microscopy*, pages NW2C–3. Optical Society of America, 2015.

2015 Nicolas Pégard, Hsiou-Yuan Liu, **Nick Antipa**, Laura Waller, and Hillel Adesnik. Functional brain imaging at cellular resolution with compressive light-field microscopy. In *Imaging Systems and Applications*, pages JTh4A–3. Optical Society of America, 2015.

2015 LC Carlson, EL Alfonso, H Huang, A Nikroo, ME Schoff, MN Emerich, T Bunn, **Nick Antipa**, and JB Horner. Automation of NIF target characterization and laser ablation of domes using the 4pi system. *Fusion Science and Technology*, 67(4):762–770, 2015.

2014 JD Lindl, OL Landen, J Edwards, EI Moses, and others. Erratum to physics of plasmas 21, 020501 (2014). *Phys. Plasmas*, 21:129902, 2014.

2013 DM Haas, H Huang, AQL Nguyen, K Sequoia, RB Stephens, A Nikroo, and **Nick Antipa**. Advancements in capsule surface defect characterization. *Fusion Science and Technology*, 63(2):160–168, 2013.

2013 Eric Buice, Richard C Montesanti, **Nicholas Antipa**, Alan D Conder, Michael A Johnson, and John S Taylor. Method and system for inspecting surfaces of miniature components, May 16 2013. US Patent App. 13/662,434.

* indicates co-first authorship

2013 SH Baxamusa, SD Bhandarkar, JL Reynolds, B Maranville, J Horner, DC Mason, CL Heinbockel, **Nick Antipa**, and AD Conder. A solvent cleaning process for the outer surface of plastic ICF capsules. *Fusion Science and Technology*, 63(2):169–176, 2013.

2012 Daniel Potter and **Nick Antipa**. Visualization of target inspection data at the national ignition facility. *Fusion Engineering and Design*, 87(12):2136–2139, 2012.

2012 **Nick Antipa**. The capsule-fill-tube-assembly mapping system. *Proc. 20th Target Fabrication Mtg*, pages 20–24, 2012.

2011 ES Buice, ET Alger, **Nick Antipa**, SD Bhandarkar, TA Biesiada, AD Conder, EG Dzenitis, MS Flegel, AV Hamza, CL Heinbockel, and others. Development of a 3d surface mapping system to inspect capsule fill-tube assemblies used in laser-driven fusion targets. Technical report, Lawrence Livermore National Lab.(LLNL), Livermore, CA (United States), 2011.

2011 ES Buice, ET Alger, **Nick Antipa**, SD Bhandarkar, TA Biesiada, AD Conder, EG Dzenitis, MS Flegel, AV Hamza, CL Heinbockel, and others. 3d surface mapping of capsule fill-tube assemblies used in laser-driven fusion targets. Technical report, Lawrence Livermore National Lab.(LLNL), Livermore, CA (United States), 2011.

Students Mentored

Undergrad **Sylvia Necula**, *Georgia Tech*, Summer 2015.

Jon Silberstein, *UC Berkeley*, Fall 2015.

Camille Biscarrat, *UC Berkeley*, Spring 2017 - Summer 2018.

Shreyas Parthasarathy, *UC Berkeley*, Spring 2017 - Summer 2018.

Essence Hansberry, *UC Berkeley*, Summer 2017.

Patrick Oare, *UC Berkeley*, Summer 2018 - present.

Grad **Kyrollos Yanny**, *UC Berkeley*, Spring 2017 - present.

Teaching

2018 **EE123: Digital Signal Processing**, *Graduate Student Instructor*, Fall.

2015 **EE118/218a: Introduction to Optical Engineering**, *Graduate Student Instructor*, Fall.

Skills

Coding Proficient: MATLAB, Comfortable: Python

Lens Design Comfortable: Zemax OpticStudio, Familiar: Code V

Other things Inverse problems for computational imaging, Image processing, fiber optics, optical metrology, interferometry, depth sensing, lens design, fourier optics, geometric optics, microscopy, compact imaging devices