

# Eduardo Hirata-Miyasaki

[edhiratam@gmail.com](mailto:edhiratam@gmail.com) ♦ Campbell, CA ♦ +1 (408) 315-7816 ♦ <https://edyoshikun.github.io>

---

## EDUCATION:

---

**University of California at Santa Cruz**, Santa Cruz, CA, USA

Expected August 2022

Ph.D. Electrical and Computer Engineering

- Thesis: "Deep and Fast High Resolution 3D Imaging"
- Advisor: Dr. Sara Abrahamsson

**University of California at Santa Cruz**, Santa Cruz, CA, USA

June 2018

B.S Bioengineering & Minor in Electrical Engineering

- Capstone: Automatization and Miniaturization of Surface Functionalization Process for Surface Acoustic Wave Devices
- Mentor: Xiangchao 'Jude' Zhu & Dr. Ali Yanik

## TECHNICAL SKILLS:

---

<b>Programming Languages:</b>	C/C++, Python, MATLAB
<b>Image Processing Software:</b>	ImageJ, MATLAB Image Processing Toolbox, Sci-kit Learn
<b>Single Board Computing:</b>	PSoc 5, Xilinx Pynq, Raspberry Pi, STM32
<b>Machine Learning:</b>	Tensorflow, Keras, OpenCV
<b>CAD and Optical Simulations:</b>	SolidWorks/Fusion 360 and CodeV/Zemax
<b>Nanofabrication:</b>	AFM, SEM, Photolithography, Dry Etching, Fused Silica Processing
<b>Languages:</b>	Spanish (Native Speaker), English (Fluent), Japanese (Intermediate)

## RESEARCH EXPERIENCE:

---

**University of California Santa Cruz**, *Graduate Research Student*, Fall 2018- Present

Fast Live-3D microscopy with 25-Plane Multifocus Microscopy (M25)

25-Camera Array Control

- Modeled and built fast fluorescence microscopy imaging based of Fourier diffractive optics for simultaneous multifocal plane imaging using a camera array.
- Automated and developed acquisition pipeline for 25 camera array multifocus microscopy at >100FPS
- Built C/C++ programs and python programs for real time control camera, lasers, and optoelectronic equipment.
- Designed PyQt5 GUI to control automated pipeline and controls for 'non-engineers'.
- Developed pipeline for image registration and analysis of 3D volumes (*e.g C.elegans* and lamprey neural circuits)

Custom Diffractive Optical Element (DOE)

- Simulate and devise multifocus transmissive phase gratings with custom pattern allowing for simultaneous multiple plane imaging in a 5x5 array of sensors with >87% efficiency.
- Fabricated color correcting gratings with ~85% transmission efficiency for aberration free multifocus microscopy
- Designed CAD custom holders for DOEs and optical elements to troubleshoot and operate tool.

Multifocus Structure Illumination Microscopy (MF-SIM)

- Home-built and characterized home build 3D SIM system to perform multiple plane super resolution imaging.
- Nanofabricated custom DOEs to enable multiple plane SIM
- Work on image reconstruction and processing of 3D SIM datasets

**Chan Zuckerberg Biohub**, *Computational Microscopy Intern*, May 2021 -September 2021

Live- uniaxial Permittivity Tensor Imaging (uPTI)

- Built multimodal imaging setup including label free and fluorescence imaging paths.
- Automated and accelerated acquisition hardware enabling live imaging using Xilinx Pynq and Triggerscope
- Characterized imaging pathway and improved sensitivity of Live-uPTI prototype by measuring elliptical states.
- Designed CAD for cell-incubator enclosure around our custom optical setup for live-cell compatibility

**Marine Biological Laboratory**, *Whitman Associate*, June 2019 – August 2019

25-Plane Multifocus Microscopy (M25) Prototype

- Design and build large FOV multifocus microscopy 130x130x50um and fabricated DOEs for Zeiss microscopes
- Built and tested prototype allowing fast live-3D microscopy at 50HZ in multiple model organisms including *C.elegans*, zebrafish, lamprey, and hydra for neural circuit imaging

**University of California Santa Cruz**, *Undergraduate Research Assistant*, November 2017 – June 2018

Miniaturize and Automation of Surface Acoustic Waves Surface Functionalization Process

- Automated the workflow process with state machines using STM32 microcontroller, TCP/Sockets and i2C protocol to control the pumps and valves in the system.

- Characterized pumps to flow 1-1000[ul/min] without perturbations and achieved workflow to inject multiple fluids for surface functionalization process.

#### TEACHING EXPERIENCE:

**University of California Santa Cruz, Spring 2020**

ECE 103/L: Signals and Systems

Taught and created MATLAB labs covering time domain analysis with convolution, frequency domain Analysis with Fourier series, sampling, and examples of applications in communications and control systems.

**University of California Santa Cruz, Winter 2020**

ECE 101/L: Introduction to Electronic Circuits

Taught labs for introductory circuit design, testing fundamental theorems (Thevenin, Norton, Kirchhoff's Laws, Superposition), 1<sup>st</sup> and 2<sup>nd</sup> order circuits, Op-Amps and filtering.

**Marine Biological Laboratory, Spring 2019**

Analytical and Quantitative Light Microscopy (AQLM) Course

Taught introductory geometric and physical optics, 4f systems, Fourier Optics, basic image processing algorithm, fluorescence microscopy techniques (Widefield, TIRF, SIM, Confocal, Light Sheet).

**University of California Santa Cruz, Winter 2018**

EE 293: Optics and Microscopy Course

Demonstration on introduction to geometric optics, aberration, diffraction, 4f system, Kohler Illumination, and Fourier Optics.

#### PUBLICATIONS:

##### Ph.D. Publications

##### Conference Paper

1. **E. Hirata-Miyasaki**, G. M. Pettersson, K. Zaw, D. D. John, B. Thibeault, B. Lynch, J. Hernandez, and S. Abrahamsson, "Camera-Array 25-Plane Multifocus Microscope for Ultrafast Live 3d Imaging," in Conference on Lasers and Electro-Optics, OSA Technical Digest (Optica Publishing Group, 2020), paper JW3P.4.

##### Undergraduate Publications

2. Y. Peng, **E. Hirata**, W. Pan, L. Chen, J.E. Lu, and S. Chen. "Intraparticle Charge Delocalization through Conjugated Metal-Ligand Interfacial Bonds: Effects of Metal d Electrons", *Chinese Journal of Chemical Physics*, 31, 433 (2018)
3. Y. Peng, J.E. Luo, C.P. Deming, L. Chen, N. Wang, **E. Hirata**, and S. Chen, "Photo-Gated Intervalence Charge Transfer of Ethynylferrocene Functionalized Titanium Dioxide Nanoparticles", *Electrochimica Acta*, 211, 704-710. (2016)

#### SELECTED PRESENTATIONS:

##### Invited Talks

1. S. Abrahamsson and **E. Hirata-Miyasaki**, "High-speed 3D imaging with Multifocus Microscopy", Imaging ONEWORLD, London, UK (Virtual), September 2021
2. S. Abrahamsson and **E. Hirata-Miyasaki**, "25-camera Multifocus Microscope", LS2 Prestige Microscopy, EPFL Switzerland (Virtual) August 2021
3. **E. Hirata-Miyasaki**, "High-speed 3D imaging with Multifocus Microscopy", MBL Imaging Lecture Series (Virtual), Woods Hole, MA, August 2020

##### Conference Presentations

4. **Eduardo Hirata Miyasaki**, Gustav M. Pettersson, Khant Zaw, Demis D. John, Brian Thibeault, Brandon Lynch, Juliana Hernandez, and Sara Abrahamsson "25 plane multifocus microscopy for fast and live 3D imaging (Conference Presentation)", Proc. SPIE 11226, Neural Imaging and Sensing 2020, 1122602 (9 March 2020)
5. **E. Hirata**, G. M. Pettersson, K. Zaw, D. D. John, B. Thibeault, B. Lynch, J. Hernandez, and S. Abrahamsson, "25 Plane Multifocus Microscopy with Camera Array", *Focus on Microscopy*, London, UK, April 2019

##### Poster Presentations

6. **E.Hirata-Miyasaki**, G.Petterson, S.Abrahamsson, "25 Plane Multifocus Microscopy for Live 3D Imaging Seeing is Believing", EMBL Heidelberg, Germany, October 2019
7. **E.Hirata-Miyasaki**, G.Petterson, S.Abrahamsson, "Multifocus Microscopy with Camera Array" *Sculpted Light in the Brain*, Royal Society, London, June 2019
8. **E.Hirata-Miyasaki**, G.Petterson, S.Abrahamsson, "Simultaneous 25 plane 3D Live Imaging System" *Biophysical Society Meeting*, Baltimore, MD, March 2019
9. **E.Hirata\***, A.Gumparathi\*,A.Aljuraidan\*, "Automatized Surface Functionalization for Point-of-Care Devices", *Corporate Sponsor and Engineering Symposium*, UCSC, Santa Cruz, CA June 2018. \*Equal contribution