

KARA MCDONOUGH

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EDUCATION

University of Oregon– Eugene, OR

June 2019 - September 2020

M.S. Applied Physics

Focus in Optical Materials and Devices

Colorado School of Mines– Golden, CO

August 2015 - May 2019

B.S. Engineering Physics

SKILLS AND TECHNIQUES

Computer Languages

Python, HTML, CSS, Javascript, MATLAB, Mathematica, LabVIEW

Software

SolidWorks, OpticStudio, JMP, Waveforms, LTSpice, Verilog, CircuitLab
Eagle PCB Design

Techniques

Machining with CNC and manual lathes and mills, TIG welding, 3D printing,
preparing optical fibers

TECHNICAL EXPERIENCE

Ouster– San Francisco, CA

Oct 2019 - Current

Hardware Engineering Intern, Oct 2019 - June 2020,

Hardware Engineer, July 2020 - Present

- Built multiple repeatable manufacturing tools, including one to test specially-made lenses and eliminate a third party costly test using various custom fixtures, motorized linear and rotation stages, illumination devices, and CMOS cameras.
- Utilized python and object oriented programming to develop hardware interfaces and various test station procedures.
- Implemented computer vision techniques to detect and characterize image features for the purpose of qualifying units in the production pipeline.
- Gained proficiency in Git by navigating and maintaining a large repository as well as effectively documenting code revision history.
- Interacted with a large production database using JMP, MySQL Workbench and SQLAlchemy to read, write, and view data pertaining to the test station.
- Facilitated exchange of ideas between firmware and manufacturing teams to implement and deploy ancillary features into the production line.

University of Oregon– Eugene, OR

June 2019 - September 2019

Graduate Student, Master's Industrial Internship Program

- Designed and built various free-space instrumentation including beam expanders, video imaging systems, an optical isolator, Michelson Interferometer, Fabry-Perot Etalon, and numerous other optical assemblies to study the Fresnel equations, Fourier optics, diffraction, interference, MTF and aberrations of optical systems.
- Characterized the profile and divergence of a HeNe laser and single-mode fiber using a Thorlabs M² tool.
- Constructed different electronic circuits to drive and characterize (I-V curve, response time and optical spectrum vs. drive current) various (standard diode, LEDs, Laser Diodes and Photodiodes) electronic and optoelectronic devices.
- Electrically and optically analyzed (IV curves, PV curves, spectra) GaAs based semiconductor laser diodes of various lengths as a function of temperature to determine the internal optical loss, quantum efficiency and wavelength tuning constant for the various devices.
- Utilized Zemax OpticStudio to design, simulate and optimize optical systems (in both sequential and non-sequential mode) such as a singlet, doublet, double Gauss & long-working distance objectives, galvanometer & polygon scanners, multi-slit systems, a Mach-Zehnder interferometer and coupling single/multiple sources into an optical fiber.

Squier Research Group– Golden, CO*August 2018 - May 2019**Research Assistant, Spatial Frequency Modulation for Imaging (SPIFI)*

- Increased imaging speeds of a Ti:Sapphire femtosecond laser system to greater than 100 Hz by incorporating an optical delay line (ODL) to vary spatial frequency modulations and thus support one dimensional imaging.
- Assembled a Michelson interferometer to have arm lengths within 15 microns of each other to overlap femtosecond pulses in space and time, which enabled the imaging of a sample through the projection of a time-varying set of spatial frequencies.
- Consolidated electrical connections in the SPIFI set-up through the use of an Analog Discovery 2 to control both driving an ODL and collecting the voltage vs. delay data from a single element detector, which was positioned to collect light either in transmission or reflection from the object.
- Improved scanning speeds from Hz to tens of Hz and achieved the necessary optical time delay in one arm of the interferometer by employing piezoelectric driven actuators to take the place of the ODL.
- Utilized Matlab and Mathematica to Fourier transform the voltage vs. delay signal collected by the photodiode to produce a one-dimensional image of the sample for potential use in imaging biological samples.

National Solar Observatory– Boulder, CO*June 2018 - August 2018**National Science Foundation REU, Factory Acceptance Testing of the Visible Broadband Imager*

- Conducted over 100 different tests to complete Factory Acceptance Testing to verify components of the Visible Broadband Imager (VBI) performance before it was shipped to Hawaii for installation.
- Constructed two technical reports, including a test procedures document and a test results document, which were sent to the Daniel K. Inouye Solar Telescope instrument review board for evaluation.
- Presented to seven other professionals from various disciplines on a weekly basis to report on testing progress and overall system performance.
- Analyzed mechanical stages of the VBI system using a thermal camera to ensure thermal output of each element was within the allowed range of less than 20 Watts, per a design requirements document.

Center for Space Resources– Golden, CO*May 2017 - August 2017**Research Assistant, In Situ Resource Utilization Experimental Probe*

- Developed a LabVIEW program which is currently used to control all mechanical equipment and data collection of probe position, force and torque measurements, chamber temperature, and pressure.
- Controlled numerous vacuum pumps to achieve the necessary chamber pressures for experiments ranging from ambient lab pressure to 10^{-7} Torr.
- Prepared samples of regolith with required moisture content and compaction state to generate stress relaxation characteristic curves.
- Collaborated with eight team members to work on the development of the in situ resource utilization (ISRU) Experimental Probe to study physical properties of lunar, asteroidal and martian simulants as a part of the Institute for Modeling Plasma, Atmospheres, and Cosmic Dust node in NASA's Solar System Exploration Research Virtual Institute.

NON-TECHNICAL EXPERIENCE

Women's Resource Group*2020 - Present**Ouster*

- Established an opt-in, all-inclusive group of people who want to empower and provide continued support for the women at Ouster.
- Took the initiative to bring together people from a variety of different teams and disciplines in the company and provided unique opportunities to share individual insights to inspire positive culture change.

Society of Women in Physics (SWiP)*January 2017 - December 2018**Vice President, Colorado School of Mines Chapter*