Kalie Knecht

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Education

University of California, Berkeley — **Berkeley, CA**
Doctor of Philosophy in Nuclear Engineering (Expected May 2024) *GPA: 3.59* — August 2019 - Present

- Advisor: Prof. Kai Vetter
- Graduate Certificate in Applied Data Science
- Dissertation Title: **Enhanced use of contextual data for quantitative gamma-ray imaging in nuclear safeguards applications**

University of Tennessee — **Knoxville, TN**
Bachelor's of Science in Honors Nuclear Engineering *GPA: 3.96* — August 2014 - May 2019

Research Experience

Lawrence Berkeley National Laboratory — **Berkeley, CA**
Graduate Student Researcher — August 2019 - Present

- Generated 3D Compton Images from radiation data collected at Fukushima Daiichi Nuclear Power Station and Chernobyl Nuclear Power Plant.
- Using scene data collected by a free-moving gamma-ray detector and auxilliary contextual sensor package to optimize measurement positions for quantitative gamma-ray imaging.
- Using 3D object detection and 3D semantic segmentation machine learning techniques to identify and label discrete objects in LiDAR point clouds.
- Developing genetic and other algorithmic approaches to identify optimal measurement positions for quantitative gamma-ray imaging.

Los Alamos National Laboratory — **Los Alamos, NM**
Space Science and Applications Intern — June 2020 - August 2020

- Participated in the NSSC-LANL Keepin Summer Program - an eight week extended research internship with nonproliferation related research project and a companion symposium series linking nuclear security science, technology, and policy.
- Developed software to analyze the charge collection in a two-pixel semiconductor detector to be used in a space radiation telescope.

Oak Ridge National Laboratory — **Oak Ridge, TN**
Safeguards & Security Technology Intern — May 2019 - August 2019

- Investigated current international safeguards methods for research reactors.
- Collected data from HFIR-REDC Pu-238 production process to determine characteristics of normal operation at a research reactor with collocated hot cell facilities.

Argonne National Laboratory — **Lemont, IL**
Nuclear Science & Engineering Intern — May 2018 - August 2018

- Developed code in Fortran to update SAS4A/SASSYS-1 input preprocessor to allow free format input.
- Extended unit testing capabilities of SAS4A/SASSYS-1.

University of Tennessee — **Knoxville, TN**
Nuclear Engineering Undergraduate Research Assistant — January 2017 - May 2019

- Advisor: Dr. Steven Skutnik
- Simulated transition from an open to closed nuclear fuel cycle using Cyclus.
- Interpreted data collected from Cyclus using Python.

Materials Science & Engineering Undergraduate Research Assistant — May 2015 - January 2017

- Advisor: Dr. William Weber
- Synthesized a sample for study using conventional solid-state synthesis.
- Conducted an in-situ high temperature x-ray diffraction (XRD) study and analyzed XRD patterns.

Teaching Experience

University of California, Berkeley **Berkeley, CA**
NE 104 Graduate Student Instructor August 2021 - December 2021

- Undergraduate radiation detection (NE 104): semiconductor and scintillator detector operation, manufacturing, signal generation, readout techniques, applications and limitations.
- Supervised students in the laboratory and instructed students in scientific writing.

NE 104 Graduate Student Instructor August 2020 - December 2020

- Recorded laboratory experiments and edited videos to ensure safe & equitable learning during the COVID-19 pandemic.

University of Tennessee **Knoxville, TN**
Undergraduate Teaching Assistant August 2018 - May 2019

- Developed weekly review sessions for Thermal Science and Reactor Theory courses.
- Provided tutoring services for students enrolled in Thermal Science and Reactor Theory.

Leadership Experience

UCB Radwatch
Graduate Student August 2019 - Present

- Engaging with the community regarding the risks and hazards of radiation in our environment.
- Managing Twitter account (@UCBRadWatch).
- Transitioning website to Wordpress and ensuring website information is current and accurate.

Society of Women Engineers
UCB GradSWE New Student Chair August 2022 - May 2023

- Organized "Grad School 101" workshops to facilitate the transition to graduate school for first year students.
- Oversaw the GWE Buddies peer mentoring program that pairs first year students with returning graduate students.

UCB GradSWE Co-President August 2021 - July 2022

- Organized a team of 23 officers to manage the UCB GradSWE Section.
- Coordinated with other graduate engineering student societies to plan a welcome back event for over 200 engineering graduate students.

GradSWE Mentoring Team October 2019 - June 2021

- Coordinated webinars for graduate students to build skills during COVID-19 crisis.
- Redesigned matching process, reducing wait time for matching from 4 months to 1 month.

Skills

Programming Languages:	Python and Fortran
Code Proficiencies:	MCNP, GOTHIC, and Cyclus
Databases:	HDF5
Version Control:	git and SVN
Operating Systems:	Windows, macOS, and Linux
Laboratory Skills:	X-ray Diffraction, Radiation Measurements, and Gamma Ray Spectrum Analysis

Honors and Awards

Virgil Shrock Award for Outstanding Service	May 2022
Best Student Paper on Radiation Detection and Imaging	Dec 2021
Virgil Shrock Award for Outstanding Service	May 2021
Virgil Shrock Award for Outstanding Mentorship	May 2020

Publications, Proceedings, & Papers

1. **K. Knecht** et. al., "Enhanced use of contextual data for quantitative Compton Imaging," in Proc. NSS/MIC, 2023.

2. **K. Knecht** et. al., "Scene-Informed Optimal Measurement Positions for Quantitative Safeguards Measurements," in Proc. INMM and ESARDA Joint Annual Meeting, 2023.

3. **K. Knecht** et. al., "Scene-Informed Optimization of Measurement Locations for Radiological Assessments," in Proc. NSS/MIC, 2022.

4. **K. Knecht**, "From the Field," in Berkeley Science Review, May 2022, https://www.berkeleysciencereview.com/article/2022/05/03/from-the-field.

5. **K. Knecht** et. al., "3D Compton Imaging of Distributed Sources around the Chernobyl Nuclear Power Plant," in Proc. NSS/MIC, 2021, pp. 1-4.

6. J. Hecla and **K. Knecht** et. al., "Polaris-LAMP: Multi-Modal 3-D Image Reconstruction With a Commercial Gamma-Ray Imager," in IEEE Transactions on Nuclear Science, vol. 68, no. 10, pp. 2539-2549, Oct. 2021, doi: 10.1109/TNS.2021.3110162.

7. **K. Knecht** et. al., "Evaluating 3D Gamma-ray Imaging Techniques for Distributed Sources at the Fukushima Daiichi Nuclear Power Station," in Proc. NSS/MIC, 2020, pp. 1-5.