

# Erik H. Kramer

## Education

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### University of California, Los Angeles (UCLA) - PH.D. AND M.S. IN MECHANICAL ENGINEERING

Dec 2024

- Dissertation: *Robotic Physical Emulation of Virtual Dynamic Environments: Applications in Full Body Haptics and Spacecraft Development*

### University of California, Berkeley - B.A. IN PHYSICS AND B.S. IN MECHANICAL ENGINEERING

May 2015

## Skills

**Technical** Mechanical design, Data analysis, Experiment design, Prototyping, Geometric dimensioning & tolerancing, FEA, Cleanroom assembly  
**Hardware** Robotic arms, Additive manufacturing/3D printers, Sensors, Material testing systems, Soldering/Wire bonder, Basic machine shop tools  
**Software** SolidWorks, Slicing software, Git, Robot Operating System (ROS), Bluehill Universal, Photoshop, Excel/MS Office/G Suite, Linux  
**Coding** MATLAB, C/C++, Python, LaTeX

## Robotic Hardware & Systems Experience

### NASA Jet Propulsion Laboratory

#### ROBOTICS MECHANICAL ENGINEER INTERN

Mar. 2024 - Present

- Led development and delivery of the central structure subsystem for a mine exploration rover, incorporating a bearing mechanism for a roll DoF
- Owned full-cycle development of a robotic in-space servicing, assembly, and manufacturing testbed, from conceptual design to system bring-up
- Leveraged SolidWorks and MATLAB to design a robotic arm optimized for digging operations while ensuring its compatibility with heritage hardware
- Applied rapid design philosophies and techniques to quickly develop test rigs and robot hardware components for rover field testing campaigns

#### ROBOTICS TECHNOLOGIST INTERN

Mar. 2022 - Mar. 2024

- Architected features for a robot arm & lander testbed using C++, such as sampling sequences and a ROS interface for an autonomy subsystem
- Received Notable Organizational Value Added Award for outstanding development of a low-gravity dynamics motion controller for a physical testbed
- Improved reliability of a motion planning optimizer for a 7-DOF arm using inverse kinematics and increased solving speed by approximately 30%
- Analyzed large data sets of robot telemetry to understand the root cause of unexpected hardware faults during operation and implement code fixes

### UCLA Bionics Lab - GRADUATE RESEARCH ENGINEER

Sept. 2015 - Present

- Led a team in the end-to-end development of a robotic exoskeleton, providing hands-on work for design, fabrication, assembly, testing, and software
- Translated high level requirements into hardware configurations via kinematic model analysis in MATLAB, achieving >96% user coverage
- Utilized CAD to design small connectors and large structures for manufacturability with traditional processes such as CNC and welding
- Collaborated with analysts to perform hand calculations and conduct stress FEA, ensuring safety factors of structural weldments met requirements
- Converted CAD models into ASME Y14.5 GD&T standard drawings and interfaced with vendors to facilitate production and acquire COTS parts
- Integrated FT sensors with 5 industrial robotic arms by developing real-time C++ software, resulting in multi-robot coordinated admittance control

## Hardware Design & Science Experience

### Super Cryogenic Dark Matter Search - UNDERGRADUATE RESEARCH ENGINEER

Feb. 2013 - June 2015

- Designed metallic and composite cryogenic instrument thermal standoffs and drafted part drawings using ASME Y14.5 GD&T standards
- Conducted stress and thermal simulations via FEA and custom MATLAB scripts on 3 potential designs to support trade studies
- Liaised with in-house machine shop to deliver hardware prototypes and build mechanical test support equipment
- Qualified hardware by performing load and thermal tests utilizing material testing systems and cryostats

### Berkeley Particle Cosmology Group - UNDERGRADUATE RESEARCH SCIENTIST

Feb. 2013 - June 2015

- Translated rough ideas from science authorities into mechanical designs, such as cold plates, for use in a sub-kelvin high vacuum environment
- Assembled components in a cleanroom and maintained low-temp experiments in bath cryostat vacuum chambers and a dilution refrigerator
- Developed procedures and documented build and test instructions for experiments determining low-temp properties of engineering materials

## Mechanical Design Projects (selected)

### Spacecraft Design for Mock Europa Plume Sample Return Mission

Apr. 2023 - June 2023

- Employed SolidWorks to design and model 100+ conceptual flight hardware components and perform FEM modal analysis for launch load survival
- Collaborated to define level 1-3 requirements, do risk assessment, design subsystems, and perform trade studies under the guidance of a JPL fellow

### Safe High Speed Human Robot Interactions Demonstrated via a Robotic Knife Game

Apr. 2017 - June 2017

- Designed and fabricated a parallel manipulator mechanism using actuators, sensors, 3D-printed components, and a microcontroller

### Costume and Mechatronic Prop Design

July. 2006 - Present

- Built replicas and wearables including a Mars 2020 RC rover and an animatronic tail by utilizing mechanical, electrical, and software design processes

## Leadership & Administration Experience

### Physics & Astronomy Department at UCLA - LEAD TEACHING FELLOW

Sept. 2016 - Mar. 2022

- Managed a team of 6 graduate student scientists teaching STEM undergraduates
- Co-led re-design of physics labs for remote learning, including developing online resources and creating lecture material
- Taught space science, astronomy, circuit design, microcontrollers, electromagnetism, Python, data analysis, technical writing, and mechanics