Erik H. Kramer

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Education

University of California, Los Angeles (UCLA) – Ph.D. and M.S. in Mechanical Engineering *Expected Dec 2024*
- Study Focus: ***Design, Robotics, and Manufacturing*** | Dissertation: ***Robotic Arm Systems for Physical Emulation of Virtual Dynamic Environments***

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*
- Leveraged SolidWorks and MATLAB to design a robotic arm optimized for digging operations while ensuring its compatibility with heritage hardware
- Led development for the central structure subsystem of a mine exploration rover, including CAD, analysis, procurement, assembly, and integration
- 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*
- Formulated design requirements for kinematics and created articulating mechanisms to achieve those specifications
- Fabricated system using COTS actuators, sensors, and fasteners alongside custom 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