Erik H. Kramer

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Education

University of California, Los Angeles (UCLA) - Ph.D. and M.S. in Mechanical Engineering *Expected Fall 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, Cura, Git, Bluehill Universal, Photoshop, Excel/MS Office/G Suite, Linux
Coding	MATLAB, C/C++, Python, LaTeX

Robotic Hardware & Systems Experience

NASA Jet Propulsion Laboratory - Robotics Engineering Intern *Mar. 2022 - Present*

- Architected features for a robot arm & lander testbed with a team of 3, such as a control method to physically emulate non-earth gravity dynamics
- Improved reliability of a motion planning optimizer for a 7-DOF arm using inverse kinematics and increased solving speed by approximately 30%
- Developed Robot Operating System (ROS) action servers within a multi-author C++ environment, providing an interface for an autonomy subsystem
- Analyzed large data sets of robot telemetry to understand the root cause of unexpected hardware faults during operation and implement code fixes
- Produced MATLAB plots to clearly communicate key findings from analysis for presentations at supervisor meetings and management reviews

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 robotic arms by developing hardware interfaces and software, resulting in a safety-conscious admittance controller

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
- Engaged with senior engineers to integrate piece-part designs into a co-developed complex CAD assembly

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

Gripper Mechanism for Assisting People with Diminished Finger Dexterity *Jan. 2016 - Mar. 2016*

- Optimized a design to leverage additive manufacturing strengths by incorporating pre-assembled articulating components and complex geometry
- Applied lessons learned about printer precision and part tolerances to improve design after each prototype iteration on a FDM/FFF printer

Costume Design and Construction *July. 2006 - Present*

- Built mechatronic props such as an animatronic tail and articulating ”steam powered” hands utilizing 3D printers, microcontrollers, and servos

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