



# Ananya Nandy

Ph.D. Candidate @ UC Berkeley · Decision Making, Human-Centered Computing & Engineering Design

 <https://ananyan.github.io/>  [google scholar](#)

## Education

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### Ph.D., Mechanical Engineering

Exp. Aug 2024

University of California, Berkeley

*Dissertation: Human-Machine Alignment for Early-Stage Design*

*Committee: Kosa Goucher-Lambert, Björn Hartmann, Hannah Stuart*

*Minors: Human-Computer Interaction and Computational Modeling of Cognition*

### M.S., Mechanical Engineering

Dec 2022

University of California, Berkeley

### B.S., Mechanical Engineering

Jun 2019

Massachusetts Institute of Technology (MIT)

## Experience

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### Toyota Research Institute - Human-Centered AI Research Intern

May 2023 - Aug 2023

*Future Product Innovation Group - Advised by Shabnam Hakimi and Matthew Klenk*

Los Altos, CA

- Conceptualized and led project to analyze human-led multi-modal translation (from abstract words to 3D) to provide insights into how text-input generative AI models can support design innovation
- Developed 3D interface (using Unity) to log sequential task actions and survey to capture self-reported information
- Deployed interface as web app to conduct online study with over 500 participants
- Analyzed quantitative data (input experimental manipulations and outcome states) using statistical modeling
- Used machine learning techniques in Python for data processing and classification (analyzing image and text)
- Collaborated with Toyota stakeholders and worked within team of researchers and software engineers

### UC Berkeley - Graduate Researcher

Aug 2019 - Present

*Cognition and Computation in Design (Co-Design) Lab - Advised by Kosa Goucher-Lambert*

Berkeley, CA

- Led quantitative analyses of decision-making to improve human-machine alignment for engineering design tools
- Developed and deployed multiple user interfaces (web-based and virtual reality) to collect behavioral data
- Worked within multi-disciplinary teams including engineers, computer scientists, and cognitive scientists
- Disseminated findings through 6 conference paper presentations, 4 journal articles, and 2 workshop papers, communicating to multidisciplinary audiences and resulting in a best paper award and a best paper nomination

#### **AI-Assisted Decision Making**

- Conceptualized and implemented experimental study on the impact of AI-assisted decision making in technical, multi-objective contexts
- Developed user interface (using Unity and deployed as a web app) to collect behavioral and self-reported measures

#### **Human-Machine Alignment**

- Applied network modeling to quantify similarity for complex engineering systems and developed low-dimensional embeddings from large-scale survey data to compare human vs. machine similarity representations
- Developed real-time human-in-the-loop models (using Bayesian optimization in PyTorch) to enable personalized optimization during ergonomic design
- Developed web-based interface (using Flask, HTML, CSS, and JavaScript with a Python-language backend) to deploy models in an online study, resulting in personalized outcomes

#### **Spatial Interactions in VR for Design Space Exploration - with Berkeley HCI (Advised by Björn Hartmann)**

- Co-developed novel gesture and action-based interactions using Unity and Meta Quest 2 to facilitate intuitive, non-semantic searches across thousands of alternatives
- Designed and conducted a user study in 3D and VR environments
- Analyzed sequential actions and quantitative survey data to develop guidelines for interaction design

### MIT Media Lab - Undergraduate Researcher

Sept 2018 - May 2019

*Responsive Environments Group*

Cambridge, MA

- Manufactured novel electro-mechanically robust connector systems to attach stretchable electronic sensor modules
- Characterized resistance and strain to failure of connected modules during tensile testing

## Skills

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**Research Methods:** Experimental Design, Interface Development, Statistical Data Analysis, Computational Modeling

**Programming Languages:** Python (Fluent), R (Proficient), Javascript (Proficient), HTML/CSS (Familiar), MATLAB (Familiar), C# (Proficient for use with Unity & Rhino/Grasshopper)

**Tools, Packages, & Software:** Unity, Flask, Python Data Science Stack (pandas, numpy, scipy, scikit-learn), Bayesian optimization in PyTorch, Hugging Face Transformers, CAD (Autodesk Fusion 360, SolidWorks, OpenSCAD/JSCAD)

**Prototyping & Fabrication:** 3D Printing, Laser Cutter, Machining, Basic Electronics/Arduino/Raspberry Pi

**Relevant Coursework:** Principles and Techniques of Data Science, User Interface Design, Immersive Computing & Virtual Reality, Designing for Emerging Technologies, Bayesian Models of Cognition, Algorithmic Human-Robot Interaction

## Publications

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### Peer-Reviewed Journal Articles

4. **Ananya Nandy** & Kosa Goucher-Lambert. Under Review. Computationally adapting designs to align with semantic attributes: understanding how an interactive optimization method influences outcomes and human perceptions. *Journal of Computing and Information Science in Engineering*.
3. **Ananya Nandy**, David Antonio Herrera & Kosa Goucher-Lambert. Submitted. Adopting “blackbox” engineering advice: the influence of imperfect suggestions during AI-assisted decision making with multiple objectives. *Artificial Intelligence for Engineering Design, Analysis and Manufacturing*.
2. **Ananya Nandy** & Kosa Goucher-Lambert. 2022. Do Human and Computational Evaluations of Similarity Align? An Empirical Study of Product Function. *Journal of Mechanical Design*.
1. **Ananya Nandy**, Andy Dong & Kosa Goucher-Lambert. 2022. Evaluating Quantitative Measures for Assessing Functional Similarity in Engineering Design. *Journal of Mechanical Design*. ★ **Featured Article**

### Peer-Reviewed Conference Proceedings

6. **Ananya Nandy**, Monica Van, Jonathan Li, Kosa Goucher-Lambert, Matthew Klenk & Shabnam Hakimi. 2024. Semantic properties of word prompts shape design outcomes: understanding the influence of semantic richness and similarity. *Design Computing and Cognition*. 🏆 **Best Paper in Design Cognition/Neurocognition**
5. **Ananya Nandy** & Kosa Goucher-Lambert. 2023. Adaptive Optimization of Subjective Design Attributes: Characterizing Individual and Aggregate Perceptions. *ASME International Design Engineering Technical Conferences*.
4. **Ananya Nandy**, James Smith, Nicholas Jennings, Michael Kuniavsky, Björn Hartmann & Kosa Goucher-Lambert. 2023. VR or Not? Investigating Interface Type and User Strategies for Interactive Design Space Exploration. *International Conference on Engineering Design*.
3. **Ananya Nandy** & Kosa Goucher-Lambert. 2022. How does machine advice influence design choice? The effect of error on design decision making. *Design Computing and Cognition*. 🏆 **Best Paper in Design Cognition/Neurocognition**
2. **Ananya Nandy** & Kosa Goucher-Lambert. 2021. Aligning Human and Computational Evaluations of Functional Design Similarity. *ASME International Design Engineering Technical Conferences*. ★ **Nominated for Best Design Theory & Methodology Paper**
1. **Ananya Nandy**, Andy Dong & Kosa Goucher-Lambert. 2020. A Comparison of Vector and Network-Based Measures for Assessing Design Similarity. *ASME International Design Engineering Technical Conferences*.

### Extended Abstract & Workshop Papers

2. Nicholas Jennings, **Ananya Nandy**, Xinyi Zhu, Yuting Wang, Fanping Sui, James Smith & Björn Hartmann. 2022. GeneratiVR: Spatial Interactions in Virtual Reality to Explore Generative Design Spaces. *ACM Conference on Human Factors in Computing Systems Extended Abstracts*.
1. **Ananya Nandy** & Kosa Goucher-Lambert. 2021. Considerations for Collaborative Human-AI Decision-Making in Engineering Design. *NeurIPS 2021 Workshop on Human Centered AI*.

## Awards & Honors

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<b>Best Design Cognition/Neurocognition Paper Prize (DCC'24 Conference)</b>	Summer 2024
<b>Mechanical Engineering Department Summer Fellowship (UC Berkeley)</b>	Summer 2024
<b>David A. Dornfeld Graduate Fellowship (UC Berkeley)</b>	Spring 2024
<b>Graduate Division Block Grant Award (UC Berkeley)</b>	Summer 2022, Spring 2023
<b>Best Design Cognition/Neurocognition Paper Prize (DCC'22 Conference)</b>	Summer 2022
<b>Conference Travel Grant (UC Berkeley)</b>	Summer 2022, Summer 2023
<b>Outstanding Graduate Student Instructor Award (UC Berkeley)</b>	Fall 2020
<b>Mechanical Engineering Department First Year Fellowship (UC Berkeley)</b>	Fall 2019 - Summer 2020
<b>Tau Beta Pi &amp; Pi Tau Sigma Honor Society (MIT)</b>	Spring 2019

## Teaching

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<b>Human-Centered Design Methods</b>	Fall 2020, 2022, 2023
<i>Graduate Student Instructor</i>	UC Berkeley
<ul style="list-style-type: none"><li>Mentored over 50 graduate-level project teams through human-centered design process (user research, concept generation &amp; selection, prototyping)</li><li>Received Outstanding Graduate Student Instructor Award for Fall 2020 🏆</li></ul>	
<b>Design Methodology</b>	Spring 2022
<i>Graduate Student Instructor</i>	UC Berkeley
<ul style="list-style-type: none"><li>Mentored 14 undergraduate-level project teams in introduction to human-centered design</li><li>Gave guest lecture on concept exploration and prototyping</li></ul>	
<b>Prototyping and Fabrication</b>	Summer 2021
<i>Graduate Student Instructor</i>	UC Berkeley
<ul style="list-style-type: none"><li>Assisted students (UC Berkeley and non-UC Berkeley) from interdisciplinary backgrounds complete projects for remote prototyping class.</li></ul>	
<b>Remote Instruction of Design Skills and Methodologies</b>	Summer 2020
<i>Graduate Student Instructor</i>	UC Berkeley
<ul style="list-style-type: none"><li>Developed resources for Jacobs Institute of Design Innovation to ensure equity in remote instruction of design classes</li></ul>	
<b>Design and Manufacturing II</b>	Spring 2019
<i>Lab Assistant</i>	MIT
<ul style="list-style-type: none"><li>Assisted teams on mold design and manufacturing using CAD/CAM during lab sections</li></ul>	

## Service & Mentorship

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<b>Reviewer</b>	
<i>ASME International Design Engineering Technical Conference (IDETC)</i>	Mar 2022 – Present
<b>Graduate Women in Engineering - New Student Committee</b>	
<i>Chair</i>	Aug 2023 – Present
<ul style="list-style-type: none"><li>Leading committee to organize orientation outreach and events for new students</li><li>Leading buddies mentorship program for first-year women in engineering graduate students</li></ul>	
<i>Committee Member</i>	Aug 2022 – May 2023
<ul style="list-style-type: none"><li>Helped run buddies mentorship program with first-year and returning students</li><li>Organized professional development workshops including Grad School 101 series to support new students' transition to graduate school</li></ul>	
<b>UC Berkeley MEng Team Capstone Mentor</b>	
Arman Baradaran, Rajveer Oberoi, Varin Kansal: Trust Measurement for Human-Machine Interaction	Sept 2023 – May 2024
<b>Berkeley Engineering Design Scholar Program Mentor</b>	
Antonio Herrera: Human-AI Interactions in Engineering Design	Jun 2023 – Aug 2023
Resham Khanna: XR as a Design Aid	Jun 2021 – Aug 2021
Amy Jiang: Encouraging Sustainable Behavior through Gaming	Jun 2020 – Aug 2020

## Other Experience

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### **Busch Vacuum Pumps and Systems - R&D Intern**

Jun 2019 – Aug 2019

*Pre-development Group*

*Baden-Württemberg, Germany*

- Simulated acoustics of claw compressor for the development of a new pulsation dampener
- Designed and executed experiment to characterize claw compressor acoustics for validation

### **Sistine Solar - Product Design Intern**

Jun 2018 – Aug 2018

*Greentown Labs*

*Somerville, MA*

- Developed alpha prototype for device to efficiently apply thin films with custom visuals on solar panels to enable seamless aesthetic blending into surrounding environments

### **Mitsubishi Electric - R&D Intern**

Jun 2017 – Aug 2017

*Smart Systems Group*

*Hyogo, Japan*

- Applied machine learning methods in Python to disaggregate appliance level energy consumption data from smart meter data