Ananya Nandy

Ph.D. Candidate @ UC Berkeley · Decision Making, Human-Centered Computing, & Design
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Quantitative researcher experienced in developing behavioral experiments and interactive interfaces (web-based and VR) to understand and support decision making in complex domains such as engineering and product design.

Education

University of California, Berkeley Exp. Aug 2024
Ph.D. Mechanical Engineering (Minor in Human-Computer Interaction), GPA: 3.97/4.0

Massachusetts Institute of Technology (MIT) Jun 2019
B.S. Mechanical Engineering, GPA: 4.9/5.0

Research Experience

UC Berkeley – Graduate Researcher Aug 2019 – Present
Cognition and Computation in Design (Co-Design) Lab - Prof. Kosa Goucher-Lambert *Berkeley, CA*

- Conceptualized and implemented studies on decision making and human-machine alignment resulting in publications (6 conference, 4 journal (2 under review), 2 workshop) and associated presentations
- Developed and launched multiple interactive interfaces (web-based and virtual reality) to collect data
- Derived quantitative insights through analysis of various data types (behavioral, text, images)

Spatial Interactions in VR for Design Space Exploration - Collaboration with Berkeley HCI (Prof. Björn Hartmann)

- Co-developed novel gesture and action-based interactions using Unity and Meta Quest 2 to facilitate search over thousands of design alternatives (generated using Rhino3D/Grasshopper software)
- Conducted user study in 3D and VR with 28 participants to evaluate user behavior and interaction usability
- Analyzed sequential actions and self-reported quantitative data on perceptions using Python
- Presented findings through publications at HCI and design venues *(see CHI LBW '22 and ICED '24)*

Supporting Human Decision Making and Intent through Computation

- Deployed real-time human-in-the-loop optimization models to quantify subjective dimensions within 3D designs *(see IDETC '23 and JCISE '24)*
- Conducted online user study using custom web application (using Flask, HTML, CSS, JavaScript, OpenJSCAD, and Bayesian optimization in PyTorch) with 55 participants to evaluate behavior, perceptions, and outcomes
- Developed behavioral experiment to investigate AI-assisted decision making in uncertain multi-objective scenarios
- Deployed study to 90 participants using Unity web application connected to AWS DynamoDB database and analyzed data using generalized linear mixed models in R
- Presented findings through publications at HCAI and design venues *(see NeurIPS Workshop on HCAI '21, DCC '22, and Design Science '24)*

Cognitive and Computational Representations of Similarity

- Compared network modeling and other quantitative measures for computing similarity between complex engineering systems to provide insights for computational design-by-analogy tools *(see JMD Mar '22)*
- Used surveys to collect over 1000 triplet ratings for human similarity assessment and developed low-dimensional triplet embeddings to quantify human perceptions of similarity *(see JMD Apr '22)*

Toyota Research Institute – Human-Centered AI Research Intern May 2023 – Aug 2023
Future Product Innovation Group - Dr. Shabnam Hakimi and Dr. Matthew Klenk *Los Altos, CA*

- Conceptualized and led project to characterize human-led multi-modal translation (text and 3D) to provide insight into how text-input generative AI models can support design innovation *(see DCC '24)*
- Developed interface in Unity to deploy study to 500 online participants and log outcomes, actions, and perceptions
- Analyzed and extracted features from image and semantic data using Python
- Developed statistical models of experimental manipulations and outcomes in R
- Developing Bayesian state-action model of sequential data

Leadership, Teaching, & Mentorship

Graduate Women in Engineering Board – New Student Committee Chair Aug 2023 – Present
Leading committee to organize outreach, professional development, and mentorship for first-years.

UC Berkeley Master of Engineering Capstone Mentor Sept 2023 – May 2024
A. Baradaran, R. Oberoi, V. Kansal: Trust Measurement for Human-Machine Interaction

Human-Centered Design Methods – Graduate Student Instructor (GSI) Fall 2020, 2022, 2023
Mentoring 14 teams through human-centered design process. 🏆 **Outstanding GSI Award**

UC Berkeley Engineering Design Scholar Program Mentor Summer 2020, 2021, 2023
Antonio Herrera: Human-AI Interactions in Engineering Design (journal co-author)
Resham Khanna: XR as a Design Aid
Amy Jiang: Encouraging Sustainable Behavior through Gaming

Skills

Research Methods: Experimental Design, Statistical Analysis, Computational Modeling, Interactive Interfaces

Programming Languages: Python, R, HTML/CSS/Javascript, C# (for Unity & Rhino/Grasshopper), MATLAB

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

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

Publications

Peer-Reviewed Journal Articles

4. Computationally adapting designs to align with semantic attributes: understanding how an interactive optimization method influences outcomes and human perceptions
   Ananya Nandy, Kosa Goucher-Lambert.
   Journal of Computing and Information Science in Engineering. Submitted.
3. Adopting "Blackbox" Design Advice: The Influence of Imperfect Suggestions during AI-Assisted Decision Making
   Ananya Nandy, David Antonio Herrera, Kosa Goucher-Lambert
   Design Science. Under Review.
2. Do Human and Computational Evaluations of Similarity Align? An Empirical Study of Product Function
   Ananya Nandy, Kosa Goucher-Lambert
   Journal of Mechanical Design. April 2022.
1. Evaluating Quantitative Measures for Assessing Functional Similarity in Engineering Design
   Ananya Nandy, Andy Dong, Kosa Goucher-Lambert
   Journal of Mechanical Design. March 2022. ★ **Featured Article**

Peer-Reviewed Conference Proceedings

6. Semantic properties of word prompts shape design outcomes: understanding the influence of semantic richness and similarity
   Ananya Nandy, Monica Van, Jonathan Li, Kosa Goucher-Lambert, Matthew Klenk, Shabnam Hakimi
   Design Computing and Cognition (DCC'24). Under Review.
5. Adaptive Optimization of Subjective Design Attributes: Characterizing Individual and Aggregate Perceptions
   Ananya Nandy, Kosa Goucher-Lambert
   ASME International Design Engineering Technical Conferences (IDETC'23). August 2023.
4. VR or Not? Investigating Interface Type and User Strategies for Interactive Design Space Exploration
   Ananya Nandy, James Smith, Nicholas Jennings, Michael Kuniavsky, Björn Hartmann, Kosa Goucher-Lambert
   International Conference on Engineering Design (ICED'23). July 2023.
3. How does machine advice influence design choice? The effect of error on design decision making
   Ananya Nandy, Kosa Goucher-Lambert
   Design Computing and Cognition (DCC'22). July 2022. 🏆 **Best Paper in Design Cognition/Neurocognition**

2. Aligning Human and Computational Evaluations of Functional Design Similarity
   Ananya Nandy, Kosa Goucher-Lambert
   ASME International Design Engineering Technical Conferences (IDETC'21). August 2021. ★ **Nominated for Best Design Theory & Methodology Paper**
1. A Comparison of Vector and Network-Based Measures for Assessing Design Similarity
   Ananya Nandy, Andy Dong, Kosa Goucher-Lambert
   ASME International Design Engineering Technical Conferences (IDETC'20). August 2020.

Extended Abstract & Workshop Papers

2. GeneratiVR: Spatial Interactions in Virtual Reality to Explore Generative Design Spaces
   Nicholas Jennings, **Ananya Nandy**, Xinyi Zhu, Yuting Wang, Fanping Sui, James Smith, Björn Hartmann
   ACM Conference on Human Factors in Computing Systems Extended Abstracts (CHI '22 LBW). May 2022.
1. Considerations for Collaborative Human-AI Decision-Making in Engineering Design
   Ananya Nandy, Kosa Goucher-Lambert
   NeurIPS 2021 Workshop on Human Centered AI. December 2021.