Ananya Nandy

Ph.D. Candidate @ UC Berkeley · Decision Making, Engineering Design & Human-Centered AI
https://ananyan.github.io/ google scholar

Education

University of California, Berkeley Exp. Aug 2024
Ph.D. Mechanical Engineering (Minor in Human-Computer Interaction)
Dissertation: Human-Machine Alignment for Early-Stage Design
Committee: Kosa Goucher-Lambert (advisor), Björn Hartmann, Hannah Stuart

Massachusetts Institute of Technology (MIT) Jun 2019
B.S. Mechanical Engineering

Experience

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 multi-modal translation (text and 3D) from 500 participants to provide insights into how LLMs and multi-modal generative AI can support design innovation
- Utilized pre-trained vision/language transformer models in Python to analyze image and semantic data from study
- Developed statistical models in R to analyze experimental manipulations and outcomes, deriving actionable insights for AI-driven design support and resulting in conference publication

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 design support tools
- Developed and deployed multiple web-based and virtual reality (VR) interfaces to collect behavioral data
- 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 and Human-Machine Alignment

- Designed and executed a behavioral experiment to explore AI-assisted decision making, including the impact of explainable AI, in multi-objective scenarios 🏆 **Received Best Paper Award at conference**
- Developed and evaluated real-time human-in-the-loop models (using Python, Flask, HTML, JavaScript and Bayesian optimization in PyTorch) to enable personalized expression of semantic attributes in 3D objects
- Used network modeling and developed low-dimensional embeddings from survey data to quantify human vs. machine representations of similarity

Spatial Interactions in VR for Design Space Exploration - Collaboration 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 (generated through Rhino3D/Grasshopper software)
- Designed and conducted a user study in 3D and VR environments to evaluate interaction usability, analyzing sequential actions and self-reported quantitative data to develop guidelines for interaction design

Skills

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

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

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)

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

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. Under Review.*
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). Accepted.
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.

Leadership, Teaching, & Mentorship

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

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

Human-Centered Design Methods – Graduate Student Instructor (GSI) Fall 2020, 2022, 2023
Mentored over 50 teams through design process 🏆 **2020 Outstanding GSI Award**

UC Berkeley Engineering Design Scholar Program Mentor Summer 2020, 2021, 2023
Mentored 3 undergraduate students through summer research projects