Ananya Nandy

Quantitative and Systems Researcher · Product Design, Decision Making & Human-Centered Computing

nandy.ananya@gmail.com https://ananyan.github.io/ google scholar

Education

University of California, Berkeley Aug 2024
Ph.D., Engineering Design (GPA: 3.97/4.0)
Minors in Human-Computer Interaction and Computational Modeling of Cognition

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

Experience

National Institute of Standards and Technology (NIST) Nov 2024 – Present
Research Engineer - Life Cycle Engineering Group, Engineering Laboratory *Gaithersburg, MD*

- Serving as a researcher in NIST's Circular Economy program, aiming to improve practices for new product design that retain resources within the economy and identifying methods to trace product data throughout its life cycle
- Defined a reference model for design within a circular economy and developed website to publish the reference model, enabling its interactive exploration (available at: pages.nist.gov/circular-economy-manufacturing-models)
- Developed an automated pipeline in Python to enable the publication of future reference models
- Collaborating with industry stakeholders to publish an ASTM standard for circular product design principles
- Conducting review of design practices within the electronics industry to apply circular product design principles (e.g., how to enable reuse/repair/recycle) to hardware devices

Toyota Research Institute May 2023 – Aug 2023
Research Intern - Future Product Innovation Group, Human-Centered AI Division *Los Altos, CA*

- Conceptualized and led study investigating sequential decision making by 500 participants during a text-to-3D task, providing empirical insights on multi-modality in design innovation and resulting in a conference award
- Developed interactive interface to log actions and outcomes as well as participant survey to capture perceptions
- 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
- Collaborated with Toyota stakeholders and worked within team of researchers and software engineers

UC Berkeley Aug 2019 – Oct 2024
Graduate/Postdoctoral Researcher - Cognition and Computation in Design Lab *Berkeley, CA*

- Investigated human-machine alignment during design activities through quantitative behavioral research
- Developed and deployed multiple user interfaces (web-based and virtual reality) to collect data
- Analyzed data using Python and R, resulting in quantitative insights for understanding and improving design creativity
- Collaborated within multi-disciplinary teams including engineers, computer scientists, and cognitive scientists
- Advised 4 research projects and mentored over 50 design teams comprised of undergraduate and graduate students
- Disseminated findings through 6 conference paper presentations, 4 journal articles, and 2 workshop papers, communicating to multidisciplinary audiences and resulting in 2 best paper awards and 1 best paper nomination

AI-Assisted Decision Making and Human-Machine Alignment for Design

- Designed and executed 2 behavioral experiments with a total of 90 participants to explore AI-assisted decision making and explainable AI in the engineering design domain
- Developed and evaluated real-time human-in-the-loop preference optimization models (via a Flask web app and Bayesian optimization in PyTorch) for computational design
- Collected over 1000 survey ratings and trained computational embeddings to quantify human perceptions of design similarity

Spatial Interactions in VR for Design Space Exploration - collaboration with Berkeley Human-Computer Interaction

- Developed novel gesture and action-based interactions using Unity and Meta Quest 2 to facilitate intuitive, non-semantic searches across thousands of design alternatives
- Designed and conducted an in-person user study with 30 participants in 3D and VR environments, analyzing sequential actions and quantitative survey data to develop guidelines for interaction design

Skills

Programming: Python, R, HTML/CSS/Javascript, C# (Familar), MATLAB (Familiar)

Tools: Python Data Science (pandas, numpy, scikit-learn), BoTorch/PyTorch, Hugging Face Transformers, Unity, Flask

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

Leadership & Mentorship

Graduate Women in Engineering Board – New Student Committee Chair Aug 2023 – Aug 2024
Led committee to organize outreach, professional development, and mentorship for first-years

UC Berkeley MEng Capstone Team 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

Publications

Peer-Reviewed Journal Articles

3. **Ananya Nandy**, David Antonio Herrera & Kosa Goucher-Lambert. Accepted. 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. April 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. March 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**
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**
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 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*.