

# Osazuwa J. Okundaye-Santos

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## Overview

**Summary:** I am an interdisciplinary researcher investigating how computational systems and human experience co-evolve through the lens of embodied interaction. My work bridges human-computer interaction, computational design, and learning sciences to examine how technology extends human skill, perception, and creativity. I lead research programs that explore (1) cognitive augmentation through interactive and generative systems, (2) the movement of information between digital and physical media via tangible interfaces and 3D-printed materials, (3) making-based approaches to STEM and engineering education, and (4) the creative and ethical dimensions of multimodal generative AI.

**Domains of Interest:** Human-Computer Interaction (HCI), Computational Design, Digital Fabrication, Embodied Interaction, Tangible User Interfaces (TUIs), Engineering Education (EER) and Learning Sciences, and Generative Artificial Intelligence for Creative Practice.

## Concentration:

- **HCI:** Experimental and Mixed-Method Evaluation, and Computational Making and Micro-Manufacturing for STEM Learning.
- **Human Factors:** Distributed Cognition and Episodic Memory in physical/digital work environments
- **Digital Fabrication:** 3D-Printed Interactive Materials, Material-Computation Integration, and Tangible User Interfaces (TUIs) for Design and Sensing.
- **Generative AI Systems:** Bias and Representation in Generative Models, AI-Augmented Creativity, and Custom and Domain-Specific Model Training.

## Education

- **Ph.D. Human-Computer Interaction** | Texas A&M University | 2017–2024
- **M.C.S. Computer Science (Non-Thesis)** | Texas A&M University | 2022–2024
- **M.S. Visualization** | Texas A&M University | 2013–2017
- **B.S. Psychology** | Texas A&M University | 2008–2012

## RESEARCH & PROFESSIONAL EXPERIENCE

- **Researcher, Human-AI Interaction AI & Robotics Research Group – Texas A&M University | 2024 –2025**
  - Led interdisciplinary studies on representational bias and alignment in generative AI, for fairness principles to sustainable and socially responsible model development.
  - Designed and implemented large-scale prompt-image datasets to evaluate diffusion models (DALL·E, Midjourney), revealing systematic disparities in urban-rural and cultural representation.
  - Developed bias-aware model auditing guidelines for designers and researchers, contributing to responsible prompt engineering and human-AI co-creation workflows.
  - Formulated ethical AI design frameworks grounded in embodied interaction and contextual sensitivity, positioning representational fairness as essential to trustworthy and inclusive AI systems.

- **Research Associate, Human Computer Interaction and Engineering Design Group – Texas A&M University | 2023–2025**
  - Developed a [kerf-based 3D printing method](#) enabling flexible, deformable interaction devices that serve as testbeds for context-aware AI interfaces.
  - Designed and evaluated 3D-printed prototypes with sensing, integrating low-level sensor data for contextual state recognition and feedback modeling.
  - Published findings at ACM TEI 2025, demonstrating how embodied prototyping informs responsible AI interface design.
- **Graduate Research Intern/SWE, PhD — Google, Android Nearby Team · Mountain View, CA | 2022**
  - Developed and trained neural network classifiers combining UWB and BLE signal data to achieve robust indoor device positioning/proximity detection (AUC = 0.93).
  - Delivered prototype implementations aligned with product requirements for secure, context-aware device interaction within Android’s communication ecosystem.
  - Collaborated with cross-functional ML and UX engineering teams, translating research into deployable AI-enhanced interaction systems.
- **Research Collaborator, Remote Learning Robotics Project – NSF-funded Telepresence Robotics for Hands-On Distance Instruction (TEILab) | 2017–2022**
  - Coordinated a multi-year, NSF-funded initiative targeting underserved high school students along the Texas-Mexico border, serving as lead instructor and curriculum designer to bridge the digital divide through interdisciplinary STEM education.
  - Designed and implemented a "Making through Micro Manufacturing" pedagogy that integrated CAD/CAM, electronics, and systems engineering, enabling students to gain digital fabrication skills by producing instructional science kits for local elementary schools.
  - Pioneered a scalable "distance apprenticeship" model utilizing telepresence robotics and undergraduate mentorship, effectively expanding the program’s reach to multiple districts while fostering student self-efficacy and a resilient “Maker Mindset”.
- **Doctoral Researcher, TAMU Embodied Interaction Lab (TEILab) – Texas A&M University | 2017–2022**
  - Conducted quantitative eye-tracking and pupillometry studies to model cognitive workload and visual engagement during task resumption.
  - Developed Python-based data processing pipelines for multimodal attention datasets and statistical modeling of user performance.
  - Proposed human-centered design strategies for adaptive work interfaces supporting cognitive and physical well-being.
  - Created the Work Context Manager, a tangible user interface system bridging physical and digital task transitions through embedded sensing. Published in ACM CHI 2017 as “*Context Switch Through Tangible Artifacts*”.
- **Instructor of Record for ‘Introduction to 3D Modeling and Animation’ – Department of Visualization | Fall 2014, Spring 2017**
  - Designed a curriculum sequence using a waterfall approach to build an efficient animation pipeline in Autodesk Maya, covering interface control, polygonal and NURBS modeling, shading, texturing, UV mapping, skeletal rigging, keyframe animation (joints and blend shapes), lighting, rendering, and particle effects.
  - Independently developed course assignments and projects, later shared with future instructors.

- Student core impacts include: 1) Introduction to best practices in animation production; 2) Exploration of key software tools for animation pipeline; 3) Familiarization with core animation terminology.
- **Teaching Assistant for VIST 271, Computation for Visualization II – Department of Visualization | Fall 2016**
  - VIST 271 is the second course in a two-part object-oriented programming sequence for undergraduate visualization students. It teaches C++ in the context of graphics programming for games, animation, and simulation. Using OpenGL and GLUT, students learn to build interactive, well-structured programs that support future coursework in the visualization curriculum.
  - Developed programming assignments, trouble-shoot students' code, and assisted with grading assignments and tests.
  - Developed course materials continued to be used by instructor after my involvement.
- **Teaching Assistant for VIST 271, Computation for Visualization II – Department of Visualization | Fall 2016**
  - Served as a Graduate Research Assistant (5 person-months) under the NSF grant "Convergence HTF: From Making to Micro-Manufacture," supporting the exploration of Human-Technology Frontier themes.
  - Facilitated site-level setup activities and served as the primary note-taker during discussion sections to capture insights from cross-disciplinary stakeholders in academia, industry, and government.
  - Managed comprehensive logistical operations for the workshop, including participant outreach, travel and lodging arrangements, schedule creation, and the administration of workshop funds and expenses.

## Publications

### Peer-Reviewed Journals

1. Qiu, S., **Okundaye, O.**, Zhao, J., Quek, F., Natarajarathinam, M., (2025). Does Horizontal Learning in Career Technical Education with Making and Micromanufacturing Boost Students' Self-Efficacy? *International Journal of Innovation and Learning* 2025 (In-press).
2. **Okundaye, O.**, Natarajarathinam, M., Qiu, S., Kuttolamadom, M. A., Chu, S., & Quek, F. (2022). Making STEM real: the design of a making-production model for hands-on STEM learning. *European Journal of Engineering Education*, 47(6), 1122-1143.

### Peer-Reviewed Conference Proceedings

1. **Okundaye-Santos Jr, O. J.**, Poluri, K., Darnal, A., Muliana, A. H., & Kim, J. (2025, March). 3D Printed Kerf Structures. In *Proceedings of the Nineteenth International Conference on Tangible, Embedded, and Embodied Interaction* (pp. 1-15).
2. Qiu, S., **Okundaye, O.**, Natarajarathinam, M., Chu, S. L., Kuttolamadom, M., Li, Q., & Quek, F. (2022, August). 'All Together Now'-Integrating Horizontal Skills in Career Technical Education Classes with Making and Micro-manufacturing. In *2022 ASEE Annual Conference & Exposition*.
3. **Okundaye, O. J.**, Natarajarathinam, M., Kuttolamadom, M., Quek, F., & Chu, S. L. (2021, July). How Deep is Your Knowledge? Consideration to the Breadth and Depth of Knowledge of CAD/CAM in M3-powered Technology CTE Classes. In *2021 ASEE Virtual Annual Conference Content Access*.
4. Thakare, K., **Okundaye, O. J.**, Li, Q., Natarajarathinam, M., Chu, S. L., Kuttolamadom, M., & Quek, F. (2021, July). Design and Development of a Horizontal CTE Curriculum to Prepare Students for the New Manufacturing Economy (Work in Progress). In *2021 ASEE Virtual Annual Conference Content Access*.

5. **Okundaye, O. J.**, Natarajarathinam, M., Chu, S. L., Kuttolamadom, M., Quek, F., & Berman, A. N. (2020, June). Making in The Colonias: Motivating STEM Participation through a Making as Micro-Manufacturing Model. In *2020 ASEE virtual annual conference content access*.
6. **Okundaye, O.**, Chu, S., Quek, F., Berman, A., Hordemann, G., Powell, L., & Yang, L. (2020, October). Telepresence robotics for hands-on distance instruction. In *Proceedings of the 11th Nordic Conference on Human-Computer Interaction: Shaping Experiences, Shaping Society* (pp. 1-11).
7. Berman, A., Quek, F., Woodward, R., **Okundaye, O.**, & Kim, J. (2020, October). "Anyone Can Print": Supporting Collaborations with 3D Printing Services to Empower Broader Participation in Personal Fabrication. In *Proceedings of the 11th Nordic Conference on Human-Computer Interaction: Shaping Experiences, Shaping Society* (pp. 1-13).
8. **Okundaye, O. J.**, Natarajarathinam, M., Kuttolamadom, M., Chu, S. L., Deurmeyer, E., & Berman, A. N. (2019, June). Developing communities of practice through peer mentorship in making through micro-manufacturing model. In *2019 ASEE Annual Conference & Exposition*.
9. Berman, A., Chu, S. L., Quek, F., **Okundaye, O.**, Yang, L., Deurmeyer, E., ... & Doss, J. (2019). Proximal and Distal Mentors: Sustaining Making-Expertise in Rural Schools. In *Proceedings of FabLearn 2019* (pp. 26-33).
10. **Okundaye, O.**, Chu, S., Quek, F., Berman, A., Natarajarathinam, M., & Kuttolamadom, M. (2018, June). From making to micro-manufacture: Catalyzing stem participation in rural high schools. In *Proceedings of the Conference on Creativity and Making in Education* (pp. 21-29).
11. **Okundaye, O. J.**, Kuttolamadom, M., Natarajarathinam, M., Chu, S. L., & Quek, F. (2018, June). Motivating STEM Participation through a 'Making as Micro-manufacture (M3)' Model. In *2018 ASEE Annual Conference & Exposition*.
12. Hordemann, G., Natarajarathinam, M., Chu, S. L., Kuttolamadom, M., Quek, F., & **Okundaye, O. J.** (2020, June). Everybody needs somebody to teach: Embodiment, telecommunication, and telepresence in stem learning. In *2020 ASEE Virtual Annual Conference Content Access*.
13. Angello, G., Chu, S. L., **Okundaye, O.**, Zarei, N., & Quek, F. (2016, June). Making as the new colored pencil: translating elementary curricula into maker activities. In *Proceedings of the The 15th International Conference on Interaction Design and Children* (pp. 68-78).
14. Chu, S. L., Quek, F., Saenz, M., Bhangaonkar, S., & **Okundaye, O.** (2015, November). Enabling instrumental interaction through electronics making: Effects on children's storytelling. In *International Conference on Interactive Digital Storytelling* (pp. 329-337). Cham: Springer International Publishing.

### Peer-Reviewed Conference Posters

1. **Okundaye, O.**, Quek, F., & Chu, S. (2019, June). Broadening participation for remote communities: Situated distance telepresence. In *Proceedings of the 18th ACM International Conference on Interaction Design and Children* (pp. 494-500).
2. **Okundaye, O.**, Quek, F., Sargunam, S. P., Suhail, M., & Das, R. (2017, May). Facilitating context switching through tangible artifacts. In *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems* (pp. 1940-1946).

### Dissertation

- **Okundaye, O. J.** (2024). Mental Context Reinstatement in Digitally Represented Work through Computationally Augmented Physical Artifacts (Doctoral dissertation).

### Thesis

- **Okundaye Jr, O. J.** (2017). Use, Non-Use, and Appropriation of Large Non-Interactive Public Displays in Higher Education Contexts (Master thesis).

## Professional Activities

- **Guest Lecturer in Texas A&M Embodied Interaction Lab (TEILab) for Eyetracking Walkthrough (Summer 2023):**
  - As a member of the Texas A&M Embodied Interaction Lab (TEILab), I was tasked by the PI to learn and teach the lab how to use a newly acquired portable eye-tracking device. Specifically, I designed a tutorial for the open-source Pupil Core eye-tracking software and hardware platform.
  - Developed and delivered a two-hour tutorial introducing eye-tracking methods with an emphasis for HCI applications.
  - Designed the tutorial session with a focus on introducing new researchers in becoming confident with the eye-tracking as a methodology, explaining its theoretical foundations, how to set it up in practice, data collection, and how to analyze/interpret the collected data.
- **Guest Lecturer in Digital Fabrication Studio (CSCE 667) (Fall 2019, Fall 2023, Fall 2024):**
  - As a member of the Human-Computer Interaction Engineering Design (HCIED) group at Texas A&M, I was invited by the PI, to guest lecture on three course topics. In the first lecture, I taught students Autodesk Fusion 360 for AEC design and fabrication, including exporting models and using CURA slicer with Ender 3 and Ultimaker 3 FDM printers. The second lecture introduced 3D metamaterials, their function, and a prototype CAD-CAM editor (Metamaterial Mechanisms by Ion et al.). Students learned to design flexible, compliant mechanisms for 3D printing and class projects. I later expanded this topic to include 3D Printed Kerf Structures (Okundaye et al.), allowing students to experiment hands-on.
  - Designed and developed lecture and tutorial materials used in subsequent course iterations.
  - Guest lectured six times to classes of 20 students during Fall 2019, 2023, and 2024.

## Technical and Analytical Skills

- **Programming and Data Science:** Python (Pandas, NumPy, Matplotlib, Seaborn, Scikit-learn), C++, MATLAB; data wrangling, statistical modeling, and experimental data visualization.
- **AI & Machine Learning Frameworks:** PyTorch, TensorFlow, diffusion models, LLMs, GANs, CLIP, LangChain; experienced in model auditing, interpretability analysis, dataset curation, and bias evaluation pipelines for generative and multimodal systems.
- **Human-AI Interaction & UX Research Methods:** Human-subjects experimentation, eye-tracking (Tobii Pro, Pupil Labs), pupillometry, usability testing, heuristic evaluation, mixed-methods analysis, and cognitive load modeling.
- **Prototyping & Multimodal Sensing:** Arduino, Raspberry Pi, capacitive and Hall-effect sensors, embedded systems integration, 3D printing (FDM, SLA).
- **Responsible & Human-Centered AI Evaluation:** Fairness assessment, explainability frameworks, user trust and transparency metrics, alignment testing, and interpretability-driven evaluation of generative models.
- **Collaboration & Deployment:** Git, Linux, API integration, IRB protocol management, facilitator training, and cross-functional coordination in mixed academic-industrial R&D environments.

## Service & Affiliations

### Conference Reviewer

- Reviewer for CHI 2025
- Associate Committee Member Reviewer for TEI 2022
- Reviewer for CHI 2021 Late Breaking Work
- Reviewer for IDC 2021 Full and Short Papers

- Reviewer for IDC 2020 Full and Short Papers

### **Volunteer**

- ACM TEI(Tangible, Embedded and Embodied Interaction) Conference (Chicago, Illinois) 2026: Serving as the registration chair for the conference.
- ACM IUI (Intelligent User Interfaces) Conference (College Station) 2021: Serving as the registration chair for the conference.
- SIGCHI Student Volunteer: ACM CHI (Computer Human Interaction) 2017
- Student Volunteer: ACM CHI 2016

### **Organization**

- President Texas A&M ACMSIGCHI Student Chapter (Spring 2018 – 2022)
- “HCI@Viz” Seminar Series Coordinator at Department of Visualization, College of Architecture, Texas A&M University (Summer 2015 to Fall 2015)

### **Affiliations**

- ACM SIGCHI
- American Society for Engineering Education (ASEE)