

Subramanian Chidambaram

Amazon, Human-in-the-Loop Science Team
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CURRICULUM VITAE

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RESEARCH STATEMENT

My current research interests lie at the intersection of Human-Computer Interaction (HCI) and Artificial Intelligence (AI). As a postdoctoral scientist, I design, develop, explore, evaluate, and apply advancements in intelligent user interface frameworks for AI applications. My current work focuses on Conversational AI, Model Steerability, and Human-AI Agent interactions. I leverage my background in HCI to enhance the data annotation processes for machine learning model development.

I earned my Ph.D. from Purdue University's C Design Lab, where I specialized in designing, developing, and evaluating novel 3D interfaces and interaction techniques, combining them with ML models to progress Extended Reality (XR) applications. I am deeply passionate about the potential of AI to transform human interactions with technology and its implications for our future. My aim is to integrate my expertise in HCI with my current research in AI to drive innovation and enrich everyday life. My research has been published at premier venues for HCI research, including ACM CHI, CSCW, UIST, Ubicomp, DIS, and ISMAR.

EDUCATION

Purdue University, West Lafayette, IN, USA Aug 2017 – Dec 2022
Doctorate of Philosophy (Ph.D), Mechanical Engineering
Thesis: *Exploration Of Codeless In-situ Extended Reality Authoring Environment For Asynchronous Immersive Spatial Instructions*
Advisors: Karthik Ramani

Purdue University, West Lafayette, IN, USA Aug 2015 - Aug 2017
Master's of Science (MS), Aeronautical and Astronautical Engineering
Minor: Computational Science & Engineering

Vellore Institute of Technology, Vellore, India Jul 2011 - May 2015
Bachelor's of Technology with Honors, Mechanical Engineering

RESEARCH EXPERIENCE

Amazon Web Services, Santa Clara, CA, USA Dec 2022 - Present
Postdoctoral Scientist, Human-in-the-Loop Science Team
with: Alex C. Williams and Erran Li

Autodesk Research, Toronto, Canada Jul 2022 - Oct 2022
Research Intern, User Interface Research Group
with: Qian Zhou, Fraser Anderson, and George Fitzmaurice

Indian Space Research Organisation, Thiruvananthapuram, India Jan 2015 - May 2015
Design Intern, Vikram Sarabhai Space Centre
with: A. Rajarajan

Vellore Institute of Technology, Vellore, India Jul 2012 - Dec 2014
Undergraduate Research Assistant, Mechanical Engineering
with: Geetha Manivasagam and Satyajit Ghosh

PUBLICATIONS

Under Review

- [R.1] **Chidambaram^{*}, S.**, Li^{*}, E., Bai, M., Li, X., Lin, K., Zhou, X., Williams, A., Socratic Human Feedback (SoHF): Understanding Socratic Feedback Based Steering Strategies Used by Expert Programmers for Code-generation with LLMs (Under Review EMNLP 2024)
- [R.2] **Chidambaram, S.**, Williams, A., Bai, M., Virk, S., Haffner, P., Lease, M., Li, E., Annotama: Enabling Immersive At-Desk Annotation Experiences in Virtual Reality with 3D Point Cloud Dioramas (Under Review ACM SUI 2024)

arXiv.org e-Print Archive

- [A.1] **Chidambaram^{*}, S.**, Jain[†], R., Reddy, S., Unmesh, A., Ramani, and K. AnnotateXR: An Extended Reality Workflow for Automating Data Annotation to Support Computer Vision Applications (Accepted at ASME JCISE)
- [A.2] Jain, R., Shi, J., Benton, A., Rasheed, M., **Chidambaram, S.**, and Ramani, K. Visualizing Causality in Mixed Reality for Manual Task Learning: An Exploratory Study (Under Review TVCG)

Peer-Reviewed Conference Proceedings

- [C.1] **Chidambaram, S.**, Reddy, S., Rumble, M., Ipsita, A., Villanueva, A., Redick, T., Stuerzlinger, W., Ramani, K. EditAR: A Digital twin authoring and editing environment to create instructional content for AR/VR and video media. In *2022 IEEE International Symposium on Mixed and Augmented Reality*. Singapore, 2022.
- [C.2] Villanueva, A., Liu, Z., Zhu, Z., **Chidambaram, S.**, Ramani, K., ColabAR: A Toolkit for Remote Collaboration in Tangible Augmented Reality Laboratories. In *ACM Conference On Computer-Supported Cooperative Work And Social Computing*. Virtual, 2022.
- [C.3] Paredes, L., Reddy, S.S., **Chidambaram, S.**, Vagholkar, D., Zhang, Y., Benes, B., and Ramani, K. FabHandWear: An End-to-End Pipeline from Design to Fabrication of Customized Functional Hand Wearables. In *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, Virtual, 2021.
- [C.4] **Chidambaram, S.**, Huang, H., He, F., Qian, X., Villanueva, A. M., Redick, T., Wolfgang, S., and Ramani, K. ProcessAR: An augmented reality-based tool to create in-situ procedural 2d/3d ar instructions. In *Designing Interactive Systems Conference 2021*. Virtual, 2021.
- [C.5] **Chidambaram[†], S.**, Zhang[†], Y., Sundararajan, V., Elmqvist, N., and Ramani, K. Shape Structuralizer: Design, Fabrication, and User-driven Iterative Refinement of 3D Mesh Models. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (p. 663). ACM. Glasgow, SCT, May 2019.
- [C.6] Yoon, S. H., Huo, K., Zhang, Y., Chen, G., Paredes, L., **Chidambaram, S.**, and Ramani, K. iSoft: a customizable soft sensor with real-time continuous contact and stretching sensing. In *Proceedings of the 30th Annual ACM Symposium on User Interface Software and Technology*. Quebec, CA. 2017.

Peer-Reviewed Journal Publications

- [J.1] Unmesh, A., Jain, R., Shi, J., Chaitanya, V., **Chidambaram, S.**, Quinn, A., and Ramani, K. Interacting Objects: A dataset focusing on spatio-temporal object-object relations for richer dynamic scene representation. In *IEEE Robotics and Automation Letters* (January 2024).
- [J.2] Ipsita, A., Duan, R., Li, H., **Chidambaram, S.**, Cao, Y., Liu, M., Quinn, A., and Ramani, K. The Design of a Virtual Prototyping System for Authoring Interactive VR

^{*} - Equal contribution

[†] - Equal contribution

Environments from Real World Scans. In *Journal of Computing and Information Science in Engineering* (July 2023).

- [J.3] Adam, G., **Chidambaram, S.**, Reddy, S. S., Ramani, K., and Cappelleri, D. J. Towards a Comprehensive and Robust Micromanipulation System with Force-Sensing and VR Capabilities. In *Micromachines* (June 2021).
- [J.4] Ritesh, K., Raunak, B., and **Subramanian, C.**. Advanced Suction Device with Continuous Oxygen Supply for Performing Meconium Suction and Identical Procedures. In *Journal of Biomedical Science and Engineering* (2014).

Peer-Reviewed Conference Extended Abstract

- [EA.1] Ipsita. A., Duan. R., Li. H., Cao. Y., **Chidambaram. S.**, Liu. M., and Ramani. K. VRFromX: From Scanned Reality to Interactive Virtual Experience with Human-in-the-Loop. In *CHI Conference on Human Factors in Computing Systems Extended Abstracts (CHI '21 EA)* (May 2021).
- [EA.2] **Chidambaram, S.**, Verma, A., Goenka, A., Y., and Ghosh, S., A Novel Sounding Protocol for Lower Boundary Layer Characterization. In *31st Conference on Environmental Information Processing Technologies* (January 2015).

Peer-Reviewed internal Conference - Amazon

- [IC.1] **Chidambaram, S.**, Williams, A., Bai, M., Virk, S., Haffner, P., Lease, M., Li, E., An-noroma: Enabling Immersive At-Desk Annotation Experiences in Virtual Reality with 3D Point Cloud Dioramas (AMLC 2023 AR/VR Workshop track)

PATENTS

- [P.1] **Subramanian Chidambaram**, Alex C. Williams, Erran Li. System and Apparatus for Enabling High-Quality and Efficient Point-Cloud Frame Labeling with Virtual Reality. [Patent Pending]
- [P.2] Karthik Ramani, **Subramanian Chidambaram**, Sai Swarup Reddy, Mantthew Rumble. A digital twin authoring and editing environment for creation of AR/VR and video instructions from a single demonstration. [Patent Pending]
- [P.3] Karthik Ramani, **Subramanian Chidambaram**, Hank Huang, Fengming He. System and method for generating asynchronous augmented reality instructions. US Patent No. 17/085,620. Date of Patent: May 06, 2021.
- [P.4] Ritesh Kumar, Raunak Bhavsar, **Subramanian Chidambaram**. Designed a novel 'Laryngoscope' to perform advanced suction device with continuous oxygen supply for performing Meconium suction on infants. Indian Design Patent No. 262490. Date of Patent: Sept 05, 2014

HONORS AND AWARDS

Graduate School Mentoring Award, Purdue University	2020
Magoon Excellence in Teaching Award, Purdue University	2020
2017 Dassault Systèmes, Additive Manufacturing design hackathon, Winner	2017
CAD Quest, Designing event in Mechnovate, 1st Position	2013
India Math Teachers Association National Mathematics Olympiad, Gold Medalist	2009
St.John's Olympiad for Mathematics, 3rd Place	2009

MENTORING

Graduate Students Mentored

Rahul Jain (Purdue University, Ph.D.), Asim Unmesh (Purdue University, Ph.D.), Ananya Ipsita (Purdue University, Ph.D.), Sai Swarup Reddy (Purdue University, MS), Hank Huang (Purdue University, MS), Andrew Benton (Purdue University, MS), Devashri Vagholkar (Purdue University, MS), Venkatesh Bharadwaj Srinivasan (Purdue University, MS)

Undergraduate Students Mentored

Matthew Rumble (Purdue University, BS), Anthony Eshleman (Purdue University, BS), Andrew Violette (Purdue University, BS), Avneet Singh Bhinder (Purdue University, BS), Wentao Zhong (Purdue University, BS)

TEACHING

Teaching Assistant

Engineering projects in Community Service, Purdue University, IN

2016 - 2020

Taught: 35 undergraduate teams comprising over 500 students across 8 semesters

SERVICE

Reviewer

1. *ACM CHI*: 2024; 2023; 2022
2. *ACM CHI EA*: 2023; 2021; 2020
3. *ACM CSCW*: 2022; 2020
4. *ACM UIST*: 2024; 2023; 2020
5. *ACM DIS*: 2024; 2023; 2022
6. *ACM VRST*: 2022
7. *ACM NordiCHI*: 2022
8. *IEEE ISMAR*: 2022; 2024
9. *IEEE VR*: 2023

SKILLS

XR Development: Unity3D; OpenXR; Oculus SDK; MRTK; visionOS

Programming Languages: C++; C#; Python; C; MATLAB; Mathematica; LaTeX

AI Frameworks: PyTorch; OpenAI APIs; Anthropic API

Python Frameworks: NumPy; Pandas; Scikit-Learn; Matplotlib

Computer Graphics/Vision: OpenCV; OpenGL; Three.js

Cloud Compute Services: AWS EC2, S3, Lambda, SageMaker, Ground Truth

3D Asset Design: Blender; Autodesk; Solidworks; 3D Printing; OpenSCAD; MeshLab

Prototyping: Laser Cutting; SolidCAM; CATIA; Abaqus

REFERENCES

Dr. Alex C. Williams, Postdoctoral Mentor

Applied Scientist II, AWS Sagemaker Ground Truth, Human-in-the-Loop Science

Email: acwio@amazon.com

Dr. Erran Li, Manager

Applied Science Manager, AWS Sagemaker Ground Truth, Human-in-the-Loop Science

Email: lilimam@amazon.com

Dr. Karthik Ramani, PhD Advisor

Donald W. Feddersen Distinguished Professor, Mechanical Engineering, Purdue University

Email: ramani@purdue.edu