

# Subramanian Chidambaram

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

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## RESEARCH STATEMENT

I am a Human-Computer Interaction (HCI) researcher that specializes in the design, development, and study of novel systems, interfaces, and interaction techniques that advance the state of Augmented, Virtual, and Extended Reality (AR/VR/XR). I am currently the inaugural Postdoctoral Scientist of AWS's Human-in-the-Loop Science team, where I lead the development and evaluation of performing VR-based point-cloud data annotation. My PhD research at Purdue University focused on advancements in AR/VR authoring tools, fostering collaboration, and designing effective XR interfaces for spatial skill transfer. My research has been published at premier venues for HCI research, including CHI, UIST, 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.**, Williams, A., Bai, M., Virk, S., Haffner, P., Lease, M., Li, E., Annonama: Enabling Immersive At-Desk Annotation Experiences in Virtual Reality with 3D Point Cloud Dioramas (ACM IMWUT 2024)
- [R.2] **Chidambaram, S.**, Reddy, S., Jain, R., Unmesh, A., Ramani, and K. AnnotateXR: An Extended Reality Workflow for Automating Data Annotation to Support Computer Vision Applications (ACM CHI 2024)
- [R.3] **Chidambaram\*, S.**, Paredes\*, L., Raja, P., Ipsita, A., Reddy, SS., Benes, B., and Ramani, K. WErgo-VR: Exploration of Virtual On-Body Wearables Design With Real-Time Ergonomics Estimation. (ACM CHI 2024)

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\* - Equal contribution

- [R.4] **Chidambaram, S.**, Raja, P., Reddy, S., Dong, Y., Duan, R., and Ramani, K. Immersive Keyboard: Design Guidelines via Empirical Evaluation of Mid-Air and Keyboard/Mouse Interaction for Immersive Cross-Modal Interfaces (CAD Journal)
- [R.5] Glenn, T., Raja, P., Vagholkar, D., **Chidambaram, S.**, and Raman, K. ShARedIoT: Shared Experiences in Co-Located Spaces with Augmented Reality and Internet of Things Devices (CSCW 2024)

#### [arXiv.org e-Print Archive](#)

- [A.1] 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

#### 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., Readdy, 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* [Accepted for publication in April 2024 issue].
- [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 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).

## 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, Mantthaw 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*: 2023; 2020
5. *ACM DIS*: 2023; 2022
6. *ACM VRST*: 2022
7. *ACM NordiCHI*: 2022

8. *IEEE ISMAR: 2022*

9. *IEEE VR: 2023*

## SKILLS

**AR/VR/XR Development:** Unity3D; OpenXR; Oculus SDK; MRTK

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

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

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

**Prototyping:** Laser Cutting; SolidCAM; CATIA; Abaqus

## REFERENCES

**Dr. Alex C. Williams**, Postdoctoral Supervisor

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

*Email:* acwio@amazon.com

**Dr. Erran Li**, Postdoctoral Co-Supervisor

*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