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.**, Reddy, S., Jain, R., Unmesh, A., Ramani, and K. AnnotateXR: An Extended Reality Workflow for Automating Data Annotation to Support Computer Vision Applications (IEEE ISMAR 2023)

[R.2] **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. (IEEE ISMAR 2023)

[R.3] **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.4] 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

*- Equal contribution

for richer dynamic scene representation (IEEE Robotics & Automation Letters)

[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 2023)

Peer-Reviewed Conference Proceedings

[C.1] **Chidambaram, S.**, Reddy, S., Rumple, 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] 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.2] 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.3] 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, Mantthew Rumple. 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 preforming 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 Rumple (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

ACM: CHI, CHI EA, CSCW, UIST, DIS, VRST, NordiCHI
IEEE: ISMAR

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