Apurv Varshney

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Education

Ph.D. in Computer Science 2023 – 2027 (expected)
University of California, Santa Barbara (GPA: 3.93/4.00) *Santa Barbara, CA*

M.S. in Computer Science 2021 – 2023
University of California, Santa Barbara (GPA: 3.93/4.00) *Santa Barbara, CA*

B.Tech in Computer Science and Engineering 2016 – 2020
Indian Institute of Technology (IIT) Goa *Goa, India*

Awards & Recognition

Best Paper Award, IEEE ISMAR (Top 1.1%) 2026
Students in STEM Scholarship, UCSB Office of International Students & Scholars 2025
Outstanding Teaching Assistant Award, UCSB Department of Computer Science 2025
BionicVisionXR featured at the Unity Unite Conference 2024

Experience

Graduate Student Researcher | *Bionic Vision Lab, UCSB (Advisor: Prof. Michael Beyeler)* Jan 2022 – Present

- Research at the intersection of **Computer Vision**, **HCI** and **XR**, developing systems that support wayfinding in demanding environments.
- Study how sensing, scene understanding and interface design work together to support real-time movement and decision-making for Blind people.
- Lead development of **BionicVisionXR**, an open-source toolbox to allow sighted participants to "see through the eyes" of a bionic eye user.

Graduate Student Mentor | *UCSB*

- Mentored **4 undergraduate students** through the Early Research Scholar Program (ERSP), Fall 2023 – Spring 2024, on a year-long project to accelerate **shadow removal models** through **pruning and quantization**.
- Mentored **2 high school students** for 6 weeks through the Research Mentorship Program (RMP), Summer 2023 on testing **model robustness** to image blur and how pre-training and **transfer learning** can help.

Data Science Intern | *eClerx Services, Mumbai* May 2019 – Jul 2019

- Built a model to extract trending financial news from scraped news websites using **NLP & topic modelling** techniques from spaCy. Used SAS Enterprise Miner for data analysis.
- Developed an **OCR model for passports** using **TensorFlow** to eliminate manual entries.

Publications

[1] A. Rastogi, **A. Varshney**, T. Höllerer, M. Beyeler,"Cross-Modal Guidance for Out-of-View Object Search in Simulated Prosthetic Vision," *Preprint*, 2026.

[2] **A. Varshney**, L. M. Turkstra, J. Su, M. Zhou, S. T. Grafton, B. Giesbrecht, M. Hegarty, M. Beyeler, "Actionable Guidance Outperforms Map and Compass Cues in Demanding Immersive VR Wayfinding," *IEEE TVCG*, 2026. **Best Paper Award.**

[3] **A. Varshney**, L. Nadolskis, T. Höllerer, M. Beyeler, "Navigating the Last Mile: Evaluating Head- and Cane-Mounted Cameras for Egocentric Spatial Awareness," *IEEE ISMAR*, 2026.

[4] T. Bullock, E. Machniak, Y. J. Kim, R. Kumaran, J. Kasowski, **A. Varshney**, J. Ram, M. M. Hernandez, S. Johansson, N. M. Dundon, T. Höllerer, B. Giesbrecht, "SABER: Spatial Attention, Brain, Extended Reality," *IEEE VR*, 2026.

[5] J. M. Kasowski, **A. Varshney**, M. Beyeler, "Static or Temporal? Semantic Scene Simplification to Aid Wayfinding in Immersive Simulations of Bionic Vision," *ACM VRST*, 2025.

[6] **A. Varshney**, et al., "Evaluating Camera Placement for Last-Mile Navigation by Blind Users," *CVPR VizWiz Workshop (Poster)*, 2025.

[7] J. M. Kasowski, **A. Varshney**, R. Sadeghi, M. Beyeler, "Simulated prosthetic vision confirms checkerboard as an effective raster pattern for epiretinal implants," *Journal of Neural Engineering*, 2025.

[8] M. Zhou, **A. Varshney**, K. Pena Salcedo, S. T. Grafton, B. Giesbrecht, M. Beyeler, M. Hegarty,"Adaptive Training for Navigation Under Stress: Impacts of Stress Exposure and Spatial Anxiety," *Preprint*, 2025.

[9] J. Skaza, S. Murlidaran, **A. Varshney**, Z. Wen, M. P. Eckstein, M. Beyeler,"Intact early visual representations, not phosphene-adapted features, account for human perceptual behavior with retinal prostheses," *Preprint*, 2025.

[10] **A. Varshney**, M. E. Munns, J. Kasowski, M. Zhou, C. He, S. T. Grafton, B. Giesbrecht, M. Hegarty, M. Beyeler, "Stress affects navigation strategies in immersive virtual reality," *Nature Scientific Reports*, 2024.

[11] **A. Varshney**, J. Nilsen, R. Wadaskar, M. Sra, "Flick Gesture Interaction in Augmented Reality: AR Carrom," *ACM UIST (Poster)*, 2021.

Relevant Projects

Neural Manifold Analyses of Working Memory with a Cortical Visual Prosthesis Spring 2024

- Analyzed the neural dynamics of visual working memory through a **Cortical BCI** in a human for the first time.
- Used dimensionality reduction techniques like GPFA to improve task decoding accuracy on neural recordings.

Graph Approaches for Adaptive AR Spring 2022

- How to assign vitual objects from a AR scene to new optimal positions in an arbitrary real-world location?
- Compared how purely geometric algorithms and **Graph ML** techniques perform on this problem.

Evaluation of Subretinal Prosthetic Implant (PRIMA) Simulation for Visual Acuity Fall 2021

- Built a **gaze-contingent VR experiment** to evaluate the visual acuity achievable with the PRIMA implant, using HTC Vive Pro, Unity and pulse2percept.

Flick Gesture Interaction in Augmented Reality: AR Carrom Spring 2021

- Built an AR app with a flick **gesture mechanic** that uses hand gestures and needs no external hardware, using Unity, **ARCore** and Manomotion.

Performance Analysis and Optimization on Edge AI Devices Spring 2021

- Studied optimization techniques to increase **inference performance** on edge devices; profiled models with Nvidia Nsight and compared performance using **TensorRT** on Jetson Nano.

Facial Emotion Recognition Winter 2021

- Compared classifiers (SVM, CNN, GAN) and dimensionality reduction techniques (PCA, autoencoders, convolutional AE) on the FER 2013 dataset.
- Implemented a **super-resolution** model using AEs to study its effect on classification.

Cancer Subtype Detection using Human Gene Expression Data | *Bachelor's Project* Jan 2020 – Jul 2020

- Clustered and detected cancer types from gene expression data using **unsupervised clustering** & dimensionality reduction to aid diagnosis and reveal possible unknown subtypes. Advisor: Dr. Clint P. George.
- Optimized an autoencoder model for **breast cancer data** using the Keras API.

Academic Reviewing Service

Conferences: UIST'25, VRST'25, CHI'26, VRST'26, VR'27
Journals: Computer Methods and Programs in Biomedicine, Cognitive Research: Principles and Implications

Skills

Languages: Python, C#, C++, MATLAB, R
Frameworks and Libraries: PyTorch, TensorFlow, Keras, TensorRT, OpenCV, ONNX
XR Tools: Unity, ARCore, Meta Quest SDK, OpenXR, Unity Sentis, Pupil Labs SDK, Tobii SDK