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Apurv Varshney

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Education

PhD in Computer Science, University of California Santa Barbara (UCSB), GPA: 3.93/4.00 **Sep 2023 — ***
Graduate student researcher in Bionic Vision Lab

M.S. in Computer Science, University of California Santa Barbara (UCSB), GPA: 3.93/4.00 **Jan 2021 — Aug 2023**
B.Tech in Computer Science and Engineering, Indian Institute of Technology (IIT) Goa **Aug 2016 — July 2020**

Publications

1. Varshney, A. *et al. Beyond Physical Reach: Comparing Head- and Cane-Mounted Cameras for Last-Mile Navigation by Blind Users* in *under review* (2025).
2. Varshney, A. *et al. Stress affects navigation strategies in immersive virtual reality* in *Sci Rep* (2024). https://doi.org/10.1038/s41598-024-56048-8.
3. Varshney, A. *et al. Flick Gesture Interaction in Augmented Reality: AR Carrom* in *UIST '21* (2021). https://doi.org/10.1145/3474349.3480229.

Published Posters

4. Turkstra, L., Varshney, A., *et al. Assessing the efficacy of visual augmentations for high-stress navigation* in *accepted at VSS 2025* (2025).
5. Skaza, J., Varshney, A., *et al. A Computational Virtual Patient Pipeline for Predicting Perceptual Capabilities with Visual Prostheses* in *accepted at VSS 2025* (2025).
6. Varshney, A. *et al. Visual Navigation Under High-Stress Conditions* in *Journal of Vision* (2023). https://doi.org/10.1167/jov.23.9.5184.

Relevant Experience

Graduate Student Mentor, Early Research Scholar Program (ERSP) **Fall 2023 — Spring 2024**
- mentored 4 undergraduate students on a year long research project.
- guided them on a research project to accelerate shadow removal models through pruning and quantization techniques. At the end they presented a poster to campus-wide CS community.

Graduate Student Mentor, Research Mentorship Program (RMP) **Summer 2023**
- mentored 2 high school students for 6 weeks.
- guided them on two research projects where they learnt how research is done, ran experiments, analyzed the data collected and at the end presented a poster on the project.

Teaching Assistant
- CS 181 (Introduction to Computer Vision), CS 64 (Computer Organization and Digital Logic Design), CS 16 (Problem Solving with Computers), CS 160 (Translation of Programming Languages), CS 8 (Introduction to Computer Science)

Data Science Intern, eClerx Services Mumbai **May 2019 — Jul 2019**
- Built a model to extract Trending Financial News from data collected by scraping news websites using Natural Language Processing & Topic Modelling techniques from spaCy
- Developed an OCR model for Passports Using TensorFlow to help the HR department get rid of doing manual entries
- Used SAS Enterprise Miner for Data Analysis
- Automated Dummy Test Data Generation for financial data of banks (generally private)

Undergraduate Leadership Experience, IIT Goa
- **Co-founder** – IIT Goa ACM Student Chapter
- **Co-founder** – IIT Goa Photography Club (Originals IIT Goa)

Relevant Projects

BioniVisionXR **Fall 2023 — ***

- An Open-Source Virtual Reality Toolbox for Bionic Vision
- Featured at Unite Conference 2024
- Uses Pytorch and Unity Sentis to create neurophysiologically inspired and psychophysically validated models to simulate the visual experiences that could be generated by future bionic eye implants.

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

- Problem: Analyze the neural dynamics and enhance decoding accuracies associated with a visual working memory task.
- Uses dimensionality reduction techniques like GPFA and tSNE to improve task decoding accuracy on the neural recordings.
- Findings suggest task-specific neural differences, and contributes to understanding neural underpinnings of working memory in visual prosthetic users

Graph Approaches for Adaptive AR **Spring 2022**

- Problem: Assigning objects from a virtual scene to new optimal positions in an arbitrary real-world location.
- Compared how purely geometrical algorithms and Graph ML techniques perform on this problem

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

- Aim: To evaluate the visual acuity that can be acheived by PRIMA prosthetic implant
- Built a gaze-contingent VR experiment to simulate PRIMA prosthesis
- Developed using HTC Vive Pro Headset, Unity and pulse2percept

Flick Gesture Interaction in Augmented Reality: AR Carrom **Spring 2021**

- Built an AR app with a flick gesture mechanic that utilizes hand gestures and doesn't rely on any external hardware
- Developed using Unity, ARCore and Manomotion

Performance Analysis and Optimization on Edge AI devices **Spring 2021**

- Aim: To study Optimization Techniques to increase inference performance on Edge devices
- Studied Nvidia's Nsight profiling tool and compared performance of basic AI models using TensorRT on Jetson Nano

Facial Emotion Recognition **Winter 2021**

- Aim: Given an image, identify the emotion expressed within the image
- Compared the performance of different classifiers (SVM, CNN, GAN) and dimensionality reduction techniques (PCA, AutoEncoders (AE), Convolutional AE) on FER 2013 dataset
- Implemented a Super Resolution model using AEs to study the effects of super resolution images on classification task

Cancer subtype detection using Human Gene Expression data **Jan 2020 — Jul 2020**

- Bachelor's Project, Advisor: Dr. Clint P. George
- Aim: Clustering and detection of different cancer types using the Gene Expression data through Unsupervised Clustering & dimensionality reduction techniques to help in diagnostic and to reveal possible previously unknown cancer subtypes.
- Optimized Autoencoder model for Breast Cancer Data using Keras API