Akshay Paruchuri

akshay@cs.unc.edu | akshayparuchuri.com/ | yahskapar | akshayparuchuri

Summary

My research interests are at the intersection of computer graphics, computer vision, and machine learning. I'm interested in improving 3D, multi-modal (vision and language), and generative computer vision techniques for a variety of applications including, but not limited to, healthcare, augmented and virtual reality, and robotics. I also deeply care about and enjoy building systems in the aforementioned application areas, with a desire to make such systems as effective and accessible as possible in both academia and industry.

Education

University of North Carolina at Chapel Hill — *Chapel Hill, NC, USA*

Ph.D. in Computer Science — *Aug 2021 - Present*

- Research Areas: Computer Graphics, Computer Vision, Machine Learning
- Advisor: Henry Fuchs

North Carolina State University — *Raleigh, NC, USA*

B.S. in Electrical and Computer Engineering — *Aug 2014 - Dec 2019*

- Graduated with Honors
- Research Areas: Embedded Systems, Wearable Sensors

Experience

Google — *Seattle, WA*

Student Researcher (Advisors: Xin Liu and Daniel McDuff) — *Mar 2024 - Present*

- Research at the intersection of healthcare and large language models.

University of North Carolina at Chapel Hill — *Chapel Hill, NC*

Graduate Research Assistant (Advisor: Henry Fuchs) — *Aug 2021 - Present*

- Research at the intersection of computer graphics, computer vision, and machine learning with various application areas such as healthcare, augmented and virtual reality, and robotics.

Kitware — *Carrboro, NC*

Research and Development Intern (Advisor: Brian Clipp) — *Apr 2023 - Jul 2023*

- Various research projects involving person re-identification, object detection, segmentation, and tracking.

Nike — *Beaverton, OR*

Embedded Systems Engineer (Manager: Vikram Malhotra) — *Jan 2020 - Jul 2021*

- Developed hardware, algorithms, and software toward novel, wearable consumer devices for experiences involving physical fitness.

Nike — *Beaverton, OR*

Embedded Systems Engineering Intern (Manager: Vikram Malhotra) — *May 2019 - Aug 2019*

- Prototyped a feature-rich, non-form factor PCB to characterize power consumption in unique contexts and developed software toward meaningful gesture recognition using adaptive, self-lacing shoes

Publications

7 Mike A. Merrill, **Akshay Paruchuri**, Naghmeh Rezaei, Geza Kovacs, Javier Perez, Yun Liu, Erik Schenck, Nova Hammerquist, Jake Sunshine, Shyam Tailor, Kumar Ayush, Hao-Wei Su, Qian He, Cory McLean, Mark Malhotra, Shwetak Patel, Jiening Zhan, Tim Althoff, Daniel McDuff, and Xin Liu. Transforming Wearable Data into Health Insights using Large Language Model Agents. *arXiv preprint arXiv:2406.06464*, 2024. In submission.

6 Shuxian Wang, Zhaoxi Zhang, **Akshay Paruchuri**, Sarah McGill, Roni Sengupta. Structure-preserving Image Translation for Depth Estimation in Colonoscopy. 2024. Accepted to MICCAI 2024.

5 **Akshay Paruchuri**, Samuel Ehrenstein, Shuxian Wang, Inbar Fried, Stephen M. Pizer, Marc Niethammer, and Roni Sengupta. Leveraging Near-Field Lighting for Monocular Depth Estimation from Endoscopy Videos. *arXiv preprint arXiv:2403.17915*, 2024. In submission.

4 Xin Liu, **Akshay Paruchuri***, Girish Narayanswamy*, Xiaoyu Zhang, Jiankai Tang, Yuzhe Zhang, Roni Sengupta, Shwetak Patel, Yuntao Wang, and Daniel McDuff. rPPG-Toolbox: Deep Remote PPG Toolbox. *Advances in Neural Information Processing Systems*, vol. 36, 2024.

3 **Akshay Paruchuri**, Xin Liu, Yulu Pan, Shwetak Patel, Daniel McDuff, and Soumyadip Sengupta. Motion Matters: Neural Motion Transfer for Better Camera Physiological Measurement. *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*, January 2024, pp. 5933-5942. **[Oral, Top 2.6%, 53 of 2042 submissions]**.

2 Qian Zhang, **Akshay Paruchuri**, Young-Woon Cha, Jia-Bin Huang, Jade Kandel, Howard Jiang, Adrian Ilie, Andrei State, Danielle Szafir, Daniel Szafir, and Henry Fuchs. Reconstruction of Human Body Pose and Appearance Using Body-Worn IMUs and a Nearby Camera View for Collaborative Egocentric Telepresence. *2023 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*, Shanghai, China, 2023, pp. 96-97, doi: 10.1109/VRW58643.2023.00025.

1 Angelos Angelopoulos, Austin Hale, Husam Shaik, **Akshay Paruchuri**, Ken Liu, Randal Tuggle, and Daniel Szafir. Drone Brush: Mixed Reality Drone Path Planning. *Late-Breaking Reports at the IEEE/ACM International Conference on Human-Robot Interaction (HRI 2022)*.

Skills

Design Hardware prototyping (PCB layout, circuit modeling), User interface design (hardware and software)

Programming Python (NumPy, PyTorch, PyTorch3D, and OpenCV), C , C++, MATLAB

Hardware MCUs, FPGAs, Soldering, Hardware debuggers (SEGGER J-Link, ST-LINK), Oscilloscope, Logic analyzer, Spectrum analyzer, 3D printing

Courses

Machine Learning, Deep Learning, Computer Vision in our 3D World, Neural Rendering, Visual Recognition with Transformers, Topics in Parallel Computing, Mobile Health Systems, Human-Robot Interaction, and Information Visualization

Awards

ASSIST Center Undergraduate REU (Summer 2018, sponsored by RTNN)
ASSIST Center Undergraduate Research Fellowship (Fall 2018)
NC State ECE Department Undergraduate REU (Fall 2018)
NC State Dean's List (4.0 GPA in Spring 2019 and Fall 2019)

Presentations

Motion Matters: Neural Motion Transfer for Better Camera Physiological Sensing
Poster Presentation, International Conference on Computational Photography (Summer 2023)
Poster Presentation, UNC Data Science Day (Fall 2023)
Oral + Poster Presentation, IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) (Winter 2024)
FORABOT: An Autonomous and Accessible System for Sorting Foraminifera
Poster Presentation, NC State Undergraduate Research and Creativity Symposium (Spring 2019)
Thermoelectric Properties of $CuBi_xSb_{1-x}Te_2$ Bulk Alloys
Technical Talk and Poster Presentation, National Nanotechnology Coordinated Infrastructure (NNCI) REU Convocation (Summer 2018)
Poster Presentation, NC State Undergraduate Research and Creativity Symposium (Summer 2018)
Poster Presentation, ASSIST Center Research Symposium (Summer 2018)

Mentoring

Mingxuan Li (UNC CS BS, Spring 2022)
Yulu Pan (UNC CS BS, Fall 2022-Spring 2023)
Bang Gong (UNC CS BS, Summer 2023-Spring 2024)
Peifeng (Hank) He (UNC CS BS, Fall 2023-Spring 2024)

Outreach & Academic Service

Outreach
UNC-CH Computer Science Student Association Officer, Summer 2023 - Spring 2024
UNC-CH Computer Science Student Association President, Fall 2022 - Summer 2023
UNC CS Fellowship Panel Organizer, Fall 2022
Decoding Graduate Programs in CS Panel Member, Fall 2022
UNC CS Middle School/High School Open House Volunteer, Spring 2023
UNC CS Vision Seminar Organizer, Spring 2023
Summer Geometry Initiative (SGI) Mentor, Summer 2024
Academic Service
IEEE VR 2023, Reviewer

Authorizations

U.S. Citizenship
Amateur Radio License (Granted by FCC, Call-sign: KN4IOS)