

# Vijay Sadashivaiah

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## Summary

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PhD candidate in computer science with research experience in transfer learning and explainable AI. Demonstrated industry expertise in training and deploying large language models (LLM) and vision-language models (VLM). Seeking a Machine Learning Researcher role to leverage and expand my skills.

## Education

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### Rensselaer Polytechnic Institute

PhD in Computer Science

MS in Computer Science

Troy, NY

May 2025 (Expected)

December 2022

### Johns Hopkins University

MS in Biomedical Engineering

Baltimore, MD

May 2017

### PES Institute of Technology

BS in Electrical Engineering

Bangalore, India

May 2017

• Visiting student with Prof. Ramesh Raskar at Massachusetts Institute of Technology (4 mo.)

2014

## Research Experience

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### Rensselaer Polytechnic Institute

Graduate Research Assistant (Advisor: Prof. James A. Hendler)

Troy, NY

January 2022 - Present

- Created a framework for generating natural language explanations for decisions made by medical image classifiers, utilizing the joint-embedding space of CLIP-style models
- Built a novel method to quantify and suppress semantic concepts in latent representations, which has important implications for data privacy
- Developing a framework for aligning latent representation to background knowledge for improved model interpretability and finetuning performance
- Co-authored a successful two-year grant of \$400,000 for research and development with researchers at IBM
- Led a collaborative effort involving industry experts, academics, and clinicians

### Bosch Center for Artificial Intelligence

Research Intern (Hosts: Dr. Wan-Yi Lin, Dr. Semedo Joao)

Pittsburgh, PA

May 2024 – August 2024

- Instruction fine-tuned VLMs for autonomous driving agents (LLaVA-Llama3, LLaVA-Phi3)
- Developed automated pipelines to generate approximately 700k automotive image-text instruction data
- Enhanced VLMs to support multiple images, resulting in over 15% improvement in performance on several downstream benchmarks

Research Intern (Hosts: Dr. Wan-Yi Lin)

May 2023 – August 2023

- Extended CLIP models to incorporate RADAR and LIDAR data
- Designed and implemented transformer-based encoders for radar point clouds
- Achieved more than 20% improvement in downstream object retrieval scores compared to existing baselines

### IBM Research

Research Intern (Hosts: Dr. Keerthiram Murugesan & Dr. Amit Dhurandhar)

Remote (Troy, NY)

May 2021 – September 2021

- Developed a reinforcement learning-based approach to enhance transfer learning in convolutional networks (CNN)
- Achieved over 10% accuracy improvement on downstream image recognition tasks

### Johns Hopkins Medical Institute

Staff Scientist, Lieber Institute

Baltimore, MD

August 2017 - January 2021

- Built an open-source automated pipeline to unmix, segment and label multi-spectral smFISH images
- Developed multi-modal algorithms to integrate structural MRI, functional MRI, and genetic data for applications in schizophrenia drug discovery research

## Skills

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<b>Programming</b>	Python (numpy, pandas, scikit-learn), PyTorch, Tensorflow, C/C++
<b>DevOps</b>	Bash, Git, CI/CD, Unit/Integration Testing, Docker, Poetry
<b>BigData</b>	CUDA, MPI, Azure, High-Performance Computing
<b>Communication</b>	Experienced speaker at international conferences and workshops; adept at presenting project ideas and results to peers, leadership, and stakeholders
<b>Writing</b>	Proficient in scientific writing and experienced in drafting R&D proposals
<b>Collaboration</b>	Skilled in working with cross-functional teams

## Fellowships & Awards

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• Amazon TrustNLP award for NAACL	2024
• RPI-IBM AI research collaboration (AIRC) grant (\$400,000 over two years)	2022 - 2023
• Finalist with wait-list at Quad Fellowship	2022
• Best poster at International Semantic Web Summer School	2022
• Distinguished BME Fellowship at JHU (full tuition waiver + monthly stipend)	2015–2017
• Foundation Leenaards’ summer research fellowship at EPFL	2017
• MHRD scholarship at PESIT (full tuition waiver)	2011–2015
• Code something that matters scholarship by Vecna Robotics	2014

## Selected Presentations

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• (Invited Speaker) Bosch Center for Artificial Intelligence on “Explainable Transfer Learning”	August 2023
• (Poster) ICLR on “Auto Transfer: Learning to Route Transferable Representations”	2022
• (Poster) International Semantic Web Summer School on “Knowledge Enabled Transfer Learning”	2022
• (Oral) Society for Neuroscience on “Using ML to identify neuroimaging phenotypes in Schizophrenia”	2018
• (Poster) Society of Biological Psychiatry on “Exploring shared brain cognitive networks using parallel ICA”	2017
• (Oral) IEEE EMBC on “Mathematically Modelling Interactions in Mammalian Nerve Fiber”	2017, 2018

## Selected Publications

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1. **Sadashivaiah V**, Yan P, Hendler JA., Explaining chest x-ray pathology classifiers using textual concepts. *NeurIPS AIM-FM, 2024*
2. Mohbat F, **Sadashivaiah V**, Murugesan K, Dhurandhar A, Luss R, Chen PY., Beyond Visual Augmentation: Investigating Bias in Multi-Modal Text Generation. *NAACL TrustNLP 2024*
3. **Sadashivaiah V**, Murugesan K, Luss R, Chen PY, Sims CR, Hendler JA, Dhurandhar A., To Transfer or Not to Transfer: Suppressing concepts from source representations. *TMLR 2024*
4. **Sadashivaiah V**, Tippianni M, Page SC, Kwon SH, Bach SV, Bharadwaj RA, Hyde TM, Kleinman JE, Jaffe AE, Maynard KR., SUFI: An automated approach to spectral unmixing of fluorescent biological images. *BMC Neuroscience 2023*
5. Murugesan K\*, **Sadashivaiah V\***, Luss R, Shanmugam K, Chen PY, Dhurandhar A., Auto-transfer: Learning to route transferrable representations. *ICLR 2022 \**
6. Brate R, Dang MH, Hoppe F, He Y, Meroño-Peñuela A, **Sadashivaiah V.**, Improving language model predictions via prompts enriched with knowledge graphs. *ISWC DL4KG 2022*
7. **Sadashivaiah V**, Sacré P, Guan Y, Anderson WS, Sarma SV., Modeling the interactions between stimulation and physiologically induced APs in a mammalian nerve fiber: dependence on frequency and fiber diameter. *Journal of Computational Neuroscience 2018*
8. **Sadashivaiah V**, Sacré P, Guan Y, Anderson WS, Sarma SV., Studying the interactions in a mammalian nerve fiber: A functional modeling approach. *IEEE EMBC 2018*
9. **Sadashivaiah V**, Sacré P, Guan Y, Anderson WS, Sarma SV., Electrical neurostimulation of a mammalian nerve fibers: A probabilistic versus mechanistic approach. *IEEE EMBC 2017*

\*equal contribution