

Vijay Sadashivaiah

443 · 447 · 3694 • sadasv2@rpi.edu • vjysd.github.io • Troy, NY

EDUCATION

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| Rensselaer Polytechnic Institute Doctor of Philosophy in Computer Science Master of Science in Computer Science | Troy, NY May 2025 (<i>Expected</i>) December 2022 |
| Johns Hopkins University Master of Science in Biomedical Engineering | Baltimore, MD May 2017 |
| PES Institute of Technology Bachelor of Engineering in Electrical Engineering · Visiting student at Massachusetts Institute of Technology | Bangalore, India May 2015 2014 |

WORK EXPERIENCE

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| Rensselaer Polytechnic Institute Research Assistant, Advisors: Profs. James A. Hendler & Pingkun Yan | Troy, NY January 2022 - Present |
| <ul style="list-style-type: none">· Developing methods to improve interpretability and performance of transfer learning (TL) methods<ul style="list-style-type: none">– Developing a framework for aligning intermediate representations of foundation models to background knowledge to improve model interpretability and finetuning performance– Developed a framework to provide natural language explanations to decisions made by medical image classifiers using multi-modal deep neural networks– Designed a novel approach to suppress the transfer of user-determined semantic concepts between two convolutional neural networks (CNN)· Collaborating with a multidisciplinary team of researchers in industry and academia<ul style="list-style-type: none">– Working with a group of clinicians and radiologists at Mass General Hospital– Led a joint collaboration between scientists at IBM Research and Rensselaer for two years | |
| Bosch Center for Artificial Intelligence Machine Learning Research Intern | Pittsburgh, PA May 2023 – September 2023 |
| <ul style="list-style-type: none">· Designed and implemented foundation models for multi-modal datasets that included radar point clouds, natural images, and text<ul style="list-style-type: none">– Benchmarked point-based and vision-based transformer models against CNN-based architectures– Improved downstream object retrieval scores by >20% in comparison to existing baselines· Extended Submitit python plugin to work in LSF-based high-performance computing clusters | |
| IBM Thomas J. Watson Research Center Research Scientist Intern | Remote May 2021 – September 2021 |
| <ul style="list-style-type: none">· Designed an adversarial multi-arm bandit-based routing strategy to improve transfer learning in CNN<ul style="list-style-type: none">– Proposed to combine knowledge from a teacher model to a student model instead of matching– Improved several image classification tasks with upwards of 10% accuracy gains· Demonstrated that the transferred knowledge is salient using saliency-based visual explanation techniques | |
| Johns Hopkins Medical Institute Staff Scientist, Lieber Institute for Brain Development | Baltimore, MD August 2017 - January 2021 |
| <ul style="list-style-type: none">· Explored novel data-driven methods on multi-modal datasets to identify the underlying biomarkers involved in neurodevelopmental disorders<ul style="list-style-type: none">– Applied three-way parallel ICA to learn patterns between structural MRI, functional MRI, and genetic data of Schizophrenic patients– Explored deep neural networks and transfer learning approaches to improve medical image classifiers· Developed software to aid experimental data acquisition and preliminary analysis<ul style="list-style-type: none">– Automated unmixing of spectral images– Detection and segmentation of different cell types in multi-spectral images | |

TECHNICAL SKILLS

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| Languages | Python, Java, C/C++, L ^A T _E X, Perl, MATLAB, HTML/CSS |
| Frameworks | Pytorch, Tensorflow, CUDA, MPI, SLURM, LSF |
| Developer Tools | Git, Docker, VS Code, Poetry, Conda, Google Cloud Platform |
| Libraries | Pandas, Numpy, Seaborn, Matplotlib |

FELLOWSHIPS & AWARDS

- RPI-IBM AI Research Collaboration Award 2022 - 2023
- Finalist with wait-list at Quad Fellowship 2022
- Best Poster at International Semantic Web Summer School 2022
- Distinguished Biomedical Engineering Fellowship at Johns Hopkins University 2015–2017
- Foundation Leenaards' Summer Research Fellowship at EPFL 2017
- University Merit Scholarship at PES Institute of Technology 2011–2015
- Code Something that Matters Scholarship by Vecna Robotics 2014

LEADERSHIP & COMMUNITY EXPERIENCE

Rensselaer Polytechnic Institute Troy, NY
Project Lead, Explainable Transfer Learning January 2022 – December 2023

- Spearheaded the end-to-end development of explainable AI solutions for transfer learning models
- Authored a successful two-year grant of \$400,000 funding for research and development with researchers at IBM

Johns Hopkins University Baltimore, MD
Volunteer, Bootup Baltimore November 2016 – September 2020

- Refurbishing and repairing old computer systems before donating them to local schools in Baltimore
- Teaching basic computer skills like programming and word processing to students in 3rd through 5th grade

Advocacy Chair, Graduate Representative Organization May 2016 – May 2017

- Organized town halls every quarter with university administration to advocate graduate student needs and issues
- Facilitated discussion of topics including student healthcare, maternity leave, and dining options on campus

SELECTED PRESENTATIONS

- (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

1. **Explaining chest x-ray pathology classifiers using textual concepts**
Vijay Sadashivaiah, Pingkun Yan & James A. Hendler, *in review*
2. **To Transfer or Not to Transfer: Suppressing concepts from source representations**
Vijay Sadashivaiah, Keerthiram Murugesan, Ronny Luss, Pin-Yu Chen, Chris R. Sims, James A. Hendler & Amit Dhurandhar, *TMLR 2024, Transactions on Machine Learning Research*
3. **SUFI: An automated approach to spectral unmixing of fluorescent biological images**
Vijay Sadashivaiah, Madhavi Tippiani, Stephanie C. Page, Sang Ho Kwon, Svitlana V. Bach, Rahul A. Bharadwaj, Thomas M. Hyde, Joel E. Kleinman, Andrew E. Jaffe & Kristen R. Maynard, *BMC Neuroscience 2023*
4. **Auto-transfer: Learning to route transferrable representations**
Keerthiram Murugesan*, Vijay Sadashivaiah*, Ronny Luss, Karthikeyan Shanmugam, Pin-Yu Chen & Amit Dhurandhar, *ICLR 2022, The 10th International Conference on Learning Representations (* equal contribution)*
5. **Improving language model predictions via prompts enriched with knowledge graphs**
Ryan Brate, Minh-Hoang Dang, Fabian Hoppe, Yuan He, Albert Meroño-Peñuela & Vijay Sadashivaiah, *ISWC DL4KG 2022, The 21st International Semantic Web Conference*