Vijay Sadashivaiah

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EDUCATION

Rensselaer Polytechnic Institute Troy, NY
Doctor of Philosophy in Computer Science *May 2025 (Expected)*
Master of Science in Computer Science *December 2022*
· Research Interests: {Representation, Transfer, Multi-modal} Learning, & Model Interpretability
· Advisor: Prof. James A. Hendler
· GPA: 3.89/4.00

Johns Hopkins University Baltimore, MD
Master of Science in Biomedical Engineering *May 2017*
· Advisor: Prof. Sridevi V. Sarma
· GPA: 3.87/4.00

PES Institute of Technology Bangalore, India
Bachelor of Engineering in Electrical Engineering *May 2015*
· Visiting student at Massachusetts Institute of Technology *Summer 2014*
· GPA: 9.32/10.00

EXPERIENCE

Rensselaer Polytechnic Institute Troy, NY
Research Assistant, advised by Prof. James Hendler and Prof. Pingkun Yan *January 2022 - Present*

· Exploring research problems at the intersection of transfer learning, multi-modal learning, and model interpretability
  – Developed model interpretability methods to understand what contributes to positive and negative transfer between deep neural networks
  – Exploring information theoretic approaches to constrain knowledge transferred in deep transfer learning models
  – Developed conceptual counterfactual method to explain black box Chest X-ray classifiers
· Spearheaded a joint collaboration between scientists at IBM Research and Rensselaer (2021 - 2023)

Bosch Center for Artificial Intelligence Pittsburgh, PA
Research Intern, hosted by Dr. Semedo Joao and Dr. Wan-Yi Lin *May 2023 – September 2023*

· Implemented transformer based encoders for multi-modal datasets (i.e., radar, image, text)
  – Compared point-based and vision-based transformer models against CNN based architectures
  – Improved accuracy on several object retrieval tasks using novel point based transformer
· Developed a python plugin to automate submitting job arrays to LSF based clusters

IBM Thomas J. Watson Research Center Remote
Research Intern, hosted by Dr. Amit Dhurandhar *May 2021 – September 2021*

· Proposed a multi-arm bandit-based routing strategy to improve transfer learning in image classification tasks
  – Used adversarial bandit to route knowledge from a teacher model to student model
  – Improved several tasks with 10+% accuracy gains
· Explored visual explanation techniques to interpret transferred knowledge

Lieber Institute for Brain Development Baltimore, MD
Staff Scientist, advised by Dr. Qiang Chen and Dr. Kristen Maynard *August 2017 - January 2021*

· Explored novel data-driven methods on multi-modal datasets to identify the underlying biological pathways involved in Schizophrenia
  – Applied three-way parallel ICA to learn patterns between structural-MRI, functional-MRI and genetic data of Schizophrenic patients
  – Explored regression, SVM, neural networks and transfer learning approaches for further analysis
· Developed tools to aid experimental data acquisition and preliminary analysis
  – Automated unmixing pipeline for microscopic spectral images

Johns Hopkins University Baltimore, MD
Research Assistant, advised by Prof. Sridevi V. Sarma *September 2015 – May 2017*

· Neuromedical Control Systems Lab, Department of Biomedical Engineering

École Polytechnique Fédérale de Lausanne Lausanne, Switzerland
Summer Researcher, advised by Prof. Carl Petersen *June 2015 - August 2015*

· Laboratory of Sensory Processing, Department of Neuroscience

Massachusetts Institute of Technology Cambridge, MA
Visiting Student Researcher, advised by Prof. Achuta Kadambi *June 2014 - September 2014*

· Camera Culture Lab, MIT Media Lab

PES Institute of Technology Bangalore, India
Research Assistant, advised by Prof. Srinivas A *June 2012 - May 2014*

· Healthcare Innovation Lab, Department of Electronics and Communication Engineering

SKILLS

Programming	(Proficient) Python, Shell, LaTeX; (familiar) C, Java, Perl, MATLAB, R
Frameworks	Pytorch, TensorFlow, CUDA, MPI, Git, Docker, SLURM, LSF
Relevant courses	Learning Theory, Information Theory, Machine Learning (ML) from Data, ML and Optimization, Deep Learning, Parallel Computing

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 Tippani, 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

6. **Genome-wide meta-analyses reveal novel loci for verbal short-term memory and learning**
Jari Lathi, Samuli Tuominen, ... [et al, including Vijay Sadashivaiah]
Molecular Psychiatry 2022

7. **Single-nucleus transcriptome analysis reveals cell type-specific molecular signatures across reward circuitry in the human brain**
Matthew N. Tran, Kristen R. Maynard, Abby Spangler, Louise A. Huuki, Kelsey D. Montgomery, Vijay Sadashivaiah, Madhavi Tippani et al.
Neuron 2021

8. **KCNH2-3.1 mediates aberrant complement activation and impaired hippocampal-medial prefrontal circuitry associated with working memory deficits**
Ming Ren, Zhonghua Hu, Qiang Chen, Andrew Jaffe, Yingbo Li, Vijay Sadashivaiah, Shujuan Zhu et al.
Molecular Psychiatry 2020

9. **Modeling the interactions between stimulation and physiologically induced APs in a mammalian nerve fiber: dependence on frequency and fiber diameter**
Vijay Sadashivaiah, Pierre Sacré, Yun Guan, William S. Anderson & Sridevi V. Sarma
Journal of Computational Neuroscience 2018

10. **Studying the interactions in a mammalian nerve fiber: A functional modeling approach**
Vijay Sadashivaiah, Pierre Sacré, Yun Guan, William S. Anderson & Sridevi V. Sarma
EMBC 2018, The 40th International Engineering in Medicine and Biology Conference

11. **Selective relay of afferent sensory induced action potentials from peripheral nerve to brain and the effects of electrical stimulation**
Vijay Sadashivaiah, Pierre Sacré, Yun Guan, William S. Anderson & Sridevi V. Sarma
EMBC 2018, The 40th International Engineering in Medicine and Biology Conference

12. **Electrical neurostimulation of a mammalian nerve fibers: A probabilistic versus mechanistic approach**
Vijay Sadashivaiah, Pierre Sacré, Yun Guan, William S. Anderson & Sridevi V. Sarma
EMBC 2017, The 39th International Engineering in Medicine and Biology Conference

13. **Using demographic and time series physiological features to classify sepsis in the intensive care unit**
Kristin Gunnarsdottir, Vijay Sadashivaiah, Matthew Kerr, Sabato Santaniello, and Sridevi V. Sarma
EMBC 2016, The 38th International Engineering in Medicine and Biology Conference

14. **Voltage-sensitive dye imaging of mouse neocortex during a whisker detection task**
Alexandros Kyriakatos, Vijay Sadashivaiah, Yifei Zhang, Alessandro Motta, Matthieu Auffret & Carl CH Petersen
Neurophotonics 2017

CONFERENCE ABSTRACTS

1. **Using machine learning to identify novel neuroimaging phenotypes associated with cognitive dysfunction in Schizophrenia**
Vijay Sadashivaiah, Aaron Goldman, Bill Ulrich, Eugenia Radulescu, Venkata S. Mattay, Daniel R Weinberger & Qiang Chen
SfN 2018 (Oral), The 48th Annual Meeting of Society for Neuroscience

2. **Exploring shared brain cognitive networks and the related genetic components using three-way parallel ICA**
   Vijay Sadashivaiah, Aaron Goldman, Bill Ulrich, Richard E Straub, Venkata S. Mattay, Daniel R Weinberger & Qiang Chen
   SoBP 2017 (Poster), The 73rd Annual Meeting of Society of Biological Psychiatry

AWARDS AND HONORS

Fellowships and Scholarships

- RPI-IBM AI Research Collaboration Award ($400,000) 2022 - 2023
- Finalist with wait-list at Quad Fellowship 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

Conferences

- Best Poster at International Semantic Web Summer School 2022
- Best Poster at IEEE International Conference on Impact of E-Technology 2014

Competitions

- Semi-Finalist at the Data Incubator Challenge at The Data Incubator 2017
- Global-Finalist at Vertech City Challenge at Vertech Symphosium 2014
- Global-Finalist at Intel Golbal Challenge at UC Berkeley 2013
- Winner at Biotechnology Entrepreneurship Student Teams by Government of India 2013
- Global Semi-Finalist at Go Green In the City Challenge at Schneider Electric 2013

SERVICE & LEADERSHIP

Organization Leadership

- Volunteer at the Center For Social Concern at JHU November 2015 – September 2020
- Advocacy Chair of Graduate Representative Organization at JHU May 2016 – May 2017
- Core Group of IEEE Student Branch at PESIT May 2013 – May 2015

Reviewer

- International Conference on Machine Learning (ICML) 2024
- Medical Image Computing and Computer Assisted Interventions (MICCAI) 2024

Teaching

- Teaching Assistant for Parallel Computing at RPI Spring 2024
- Teaching Assistant for Computer Organization at RPI Spring 2021
- Teaching Assistant for Foundations of Computing at RPI Fall 2021
- Teaching Assistant for Mathematical Foundations for BME at JHU Fall 2015 & 2016
- Teaching Assistant for Biomedical Control Systems at JHU Spring 2016 & 2017
- Teaching Assistant for Logic Design at PESIT Fall 2014