

# Priyadarshini Panda

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## Research Interests

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My research interests lie in **Neuromorphic Computing**: Energy-efficient design methodologies for **Deep Learning**, Novel learning algorithms for **Spiking Neural Networks**, Explainability and Robustness for **Spiking Neural Networks**, Developing emerging non-volatile memory-/ CMOS-based neural architectures for new computing scenarios (such as **Adversarial Robustness**, **Lifelong/Continual Learning**, **Federated Learning**, **Stochastic Optimization** etc.).

## Education

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2014-2019 **Ph.D.**, Electrical and Computer Engineering  
*Purdue University, USA*

2008-2013 **M.Sc.**, Physics & **B.E.**, Electrical and Electronics Engineering  
*Birla Institute of Technology & Science, Pilani, India*

## Employment History

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**Aug 2019-Present** Electrical Engineering, **Yale University**, New Haven, CT, USA  
*Assistant Professor*

**Nov 2022-Present** Institute for Foundations of Data Science, **Yale University**, New Haven, CT, USA  
*Faculty Member*

**Aug 2021-Present** Wu Tsai Institute, **Yale University**, New Haven, CT, USA  
*Faculty Member of Neurocomputation and Machine Intelligence Center*

**May 2017-Aug 2017** Intel Labs, **Microelectronics Research Lab**, Hillsboro, Oregon, USA  
*Neuromorphic Model Development Intern*

**July 2013-July 2014** **Intel Technologies India Pvt. Ltd.**, Bangalore, India  
*Component Design Engineer*

**Jan 2013 - June 2013** **Nvidia Graphics Pvt. Ltd.**, Bangalore, India  
*Undergraduate Intern*

**March 2011 - July 2011** - CRIS, BITS Pilani /Institute of Automation Technology, **University of Bremen**, Germany  
*Undergraduate Intern*

**May 2010 - July 2010** - **Wipro Technologies**, Chennai, India  
*Undergraduate Intern*

## Grants

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- Jan 2023-28** Joint University Microelectronics Program 2.0 (co-sponsored by Defense Advanced Research Projects Agency (DARPA) and Semiconductor Research Corporation (SRC)) Center for the Co-Design of Cognitive Systems: "Distributed Intelligence", \$1,000,000 USD, Co-Principal Investigator, Task Lead
- Jan 2023-28** NSF CAREER: SHF: "Dynamic Distributed Learning in Spiking Neural Networks with Neural Architecture Search", \$504,806 USD, Principal Investigator
- Sep 2022-27** Department of Energy (DoE) Mathematical Multifaceted Integrated Capability Center (MMICC): "SEA-CROGS: Scalable, Efficient and Accelerated Causal Reasoning Operators, Graphs and Spikes for Earth and Embedded Systems", \$1,125,000 USD, Co-Principal Investigator, Task Lead
- April 2022** Google Research Scholar Award: "Private Explainable & Robust Distributed Learning With Spiking Neural Networks", \$60,000 USD, Principal Investigator (Allocated as Gift)
- Oct 2021-23** Defense Advanced Research Projects Agency (DARPA) Artificial Intelligence Exploration (AIE) Program on Shared Experience Lifelong Learning: "Communication and Computation Efficient Decentralized Learning", \$1,000,000 USD, Principal Investigator (Collaboration with UMass., Amherst and Purdue University) (DC: \$846,353, IDC: \$153,647, Yale Allocation: \$400,000, Summer: 0.75)
- Jan 2021-23** Joint University Microelectronics Program (co-sponsored by Defense Advanced Research Projects Agency (DARPA) and Semiconductor Research Corporation (SRC)) Center for Brain Inspired Computing enabling Autonomous Intelligence: "Robustness in Neural Networks", \$500,000 USD, Co-Principal Investigator, Task Lead (DC: \$8344,019 IDC: \$155,981, Summer: 1.00)
- Jun 2020-23** Technology Innovation Institute, Abu Dhabi: "Energy-based Probing for Robust and Explainable Spiking Neural Networks", \$850,000 USD, Principal Investigator (DC: \$602,653, IDC: \$247,347, Summer: 2.15)
- Apr 2020-22** NSF: SHF: "Efficiency-Aware Robust Implementation of Neural Networks with Algorithm-Hardware Co-design", \$175,000 USD, Principal Investigator (DC: \$114,005, IDC: \$60,995, Summer: 1.30)
- March 2020** Amazon Research Award: "Adversarial Robustness with Efficiency-Driven Optimization of Deep Neural Networks", \$70,000 USD & \$20,000 USD in AWS Promotional Credits, Principal Investigator (Allocated as Gift)

## Awards & Honors

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- 2023** Selected to participate in the German-American Frontiers of Engineering Symposium organized by the National Academy of Engineering and Alexander Humboldt Foundation in Julich, Germany.
- 2023** Awarded NSF CAREER Award for research on "Spiking Neural Networks".
- 2022** IEEE Brain Technical Community Best Paper Award for work on "Neural Computing With Magnetolectric Domain-Wall-Based Neurosynaptic Devices".
- 2022** Best Paper Award at the 2022 ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED) conference
- 2022** Awarded DARPA Riser Award recognizing research on "Neuromorphic Computing and Spiking Neural Networks"
- 2022** Awarded Google Research Scholar Award for research on "Spiking Neural Networks"
- 2022** Semi-finalist in MIT Technology Review's 2022 list of 35 Innovators Under 35
- 2021** Two articles published in Frontiers in Neuroscience selected for Neuromorphic Engineering Editor's Pick List Link
- 2021** Nominated for Microsoft Research Faculty Fellowship from Yale University EE/CS department

2020	Awarded Amazon Research Award for research on “Efficiency driven Adversarial Robustness Optimizations”
2020	Applied Physics Review (APR) article featured as Editor's Pick and on the cover of APR Link
2018	Outstanding Poster Award in Center for Brain-Inspired Computing Annual Review for research on “Opportunities and Challenges with Liquid State Machines”
2017	Awarded Certificate of Recognition for being among Top-3 in the Intel Labs Intern Showcase
2017	<i>‘Organismic learning’ mimics some aspects of human thought</i> featured on several SocialMedia/ScienceNews platforms based on the <i>Nature Comm.</i> article <i>Habituation based synaptic plasticity and organismic learning in a quantum perovskite</i> . For references see <a href="http://phys.org">phys.org</a> , <a href="http://ScienceDaily.com">ScienceDaily</a> , <a href="http://Neuroscience.com">Neuroscience</a> , <a href="http://BusinessInsider.com">BusinessInsider</a> , <a href="http://PurdueECE.com">PurdueECE</a> , <a href="http://ScienceNewsLine.com">ScienceNewsLine</a> among others.
2015	Awarded ECE Scholarship for Grace Hopper Conference sponsored by Apple Inc.
2012	Winner of Best Outgoing Student award from the Batch of 2008 for securing highest position in Physics & VLSI areas at B.I.T.S Pilani

## Peer Reviewed Journal Publication List ---

Below are the list of pre-prints and publications accepted/published after joining Yale University. + indicates Panda's current Ph.D. student.

- [1] Yuhang Li<sup>+</sup>, Youngeun Kim<sup>+</sup>, Hyoungseob Park, and **Priyadarshini Panda**. Uncovering the Representation of Spiking Neural Networks Trained with Surrogate Gradient. *In Transactions on Machine Learning Research (TMLR)*, 2023.
- [2] Abhishek Moitra<sup>+</sup>, Abhiroop Bhattacharjee<sup>+</sup>, Runcong Cuang, Gokul Krishnan, Yu (Kevin) Cao, and **Priyadarshini Panda**. SpikeSim: An end-to-end Compute-in-Memory Hardware Evaluation Tool for Benchmarking Spiking Neural Networks. *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, 2023.
- [3] Abhiroop Bhattacharjee<sup>+</sup>, Abhishek Moitra<sup>+</sup>, and **Priyadarshini Panda**. XploreNAS: Explore Adversarially Robust & Hardware-efficient Neural Architectures for Non-ideal Xbars. *ACM Transactions on Embedded Computing Systems*, 2023.
- [4] Youngeun Kim<sup>+</sup>, Joshua Chough and **Priyadarshini Panda**. Beyond classification: Directly training spiking neural networks for semantic segmentation. *Neuromorphic Computing and Engineering 2*, no. 4: 044015, 2022.
- [5] Yeshwanth Venkatesha<sup>+</sup>, Youngeun Kim<sup>+</sup>, Hyoungseob Park, Yuhang Li<sup>+</sup>, and **Priyadarshini Panda**. Addressing Client Drift in Federated Continual Learning with Adaptive Optimization *arXiv preprint arXiv:2203.13321 (Under review in IEEE Transactions on Artificial Intelligence)*, 2022.
- [6] Ruokai Yin<sup>+</sup>, Abhishek Moitra<sup>+</sup>, Abhiroop Bhattacharjee<sup>+</sup>, Youngeun Kim<sup>+</sup>, and **Priyadarshini Panda**. SATA: Sparsity-Aware Training Accelerator for Spiking Neural Networks *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, 2022.
- [7] Youngeun Kim<sup>+</sup>, and **Priyadarshini Panda**. Visual explanations from spiking neural networks using inter-spike intervals. *Nature Scientific Reports 11*, 19037, doi:10.1038/s41598-021-98448-0, 2021.
- [8] Youngeun Kim<sup>+</sup>, and **Priyadarshini Panda**. Optimizing Deeper Spiking Neural Networks for Dynamic Vision Sensing. *Neural Networks 144*, 686-698, doi:10.1016/j.neunet.2021.09.022, 2021.
- [9] Abhishek Moitra<sup>+</sup>, and **Priyadarshini Panda**. DetectX-Adversarial Input Detection Using Current Signatures in Memristive XBar Arrays. *IEEE Transactions on Circuits and Systems I: Regular Papers*, doi: 10.1109/TCSI.2021.3110487, 2021.
- [10] Yeshwanth Venkatesha<sup>+</sup>, Youngeun Kim<sup>+</sup>, Leandros Tassioulas, and **Priyadarshini Panda**. Federated Learning with Spiking Neural Networks. *IEEE Transactions on Signal Processing*, doi: 10.1109/TSP.2021.3121632, 2021.

- [11] Abhiroop Bhattacharjee<sup>+</sup>, Lakshya Bhatnagar, Youngeun Kim<sup>+</sup>, and **Priyadarshini Panda**. NEAT: Non-linearity Aware Training for Accurate, Energy-Efficient and Robust Implementation of Neural Networks on 1T-1R Crossbars. *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, doi: 10.1109/TCAD.2021.3109857, 2021.
- [12] Rachel Sterneck, Abhishek Moitra<sup>+</sup>, and **Priyadarshini Panda**. Noise Sensitivity-Based Energy Efficient and Robust Adversary Detection in Neural Networks. *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, doi: 10.1109/TCAD.2021.3091436, 2021.
- [13] Youngeun Kim<sup>+</sup>, Donghyeon Cho, Kyeongtak Han, **Priyadarshini Panda**, and Sungeun Hong Domain Adaptation without Source Data. *IEEE Transactions on Artificial Intelligence*, doi: 10.1109/TAI.2021.3110179, 2021.
- [14] Abhiroop Bhattacharjee<sup>+</sup>, and **Priyadarshini Panda**. SwitchX-Gmin-Gmax Switching for Energy-Efficient and Robust Implementation of Binary Neural Networks on Memristive Xbars. *ACM Transactions on Design Automation of Electronic Systems*, 2021.
- [15] Youngeun Kim<sup>+</sup>, and **Priyadarshini Panda**. Revisiting Batch Normalization for Training Low-latency Deep Spiking Neural Networks from Scratch. *Frontiers in neuroscience*, doi: 10.3389/fnins.2021.773954, 2021.
- [16] Dennis V Christensen, Regina Dittmann, ... Youngeun Kim<sup>+</sup>, **Priyadarshini Panda** ... and others. 2022 Roadmap on Neuromorphic Computing and Engineering In *arXiv preprint arXiv:2105.05956*, 2021. Accepted for Publication in *IOPScience*.
- [17] **Priyadarshini Panda**, and Kaushik Roy. Implicit adversarial data augmentation and robustness with Noise-based Learning. *Neural Networks 141 (2021): 120-132.*, 2021.
- [18] **Priyadarshini Panda**, Sai Aparna Aketi and Kaushik Roy. Toward scalable, efficient, and accurate deep spiking neural networks with backward residual connections, stochastic softmax, and hybridization. *Frontiers in Neuroscience 14 (2020): 653*, doi:10.3389/fnins.2020.00653, 2020.
- [19] Hai-Tian Zhang, **Priyadarshini Panda**, Jerome Lin, and others. Organismic materials for beyond von Neumann machines. *Applied Physics Reviews 7, 011309*, doi:10.1063/1.5113574, 2020. Editor's pick and featured on the cover of *APR*.
- [20] Kaushik Roy, Akhilesh Jaiswal, and **Priyadarshini Panda**. Towards Spike-based Machine Intelligence with Neuromorphic Computing. *Nature 575, 607–617*, doi:10.1038/s41586-019-1677-2, 2019. An online tutorial on the paper encompassing the perspectives on neuromorphic computing field is available on <https://www.youtube.com/watch?v=HnxxkQvPcdXs>.

#### 2019 and Prior Publications published during Ph.D. at Purdue University

- [1] Fan Zuo\*, **Priyadarshini Panda**\*, Michele Kotiuga, Jiarui Li, Mingu Kang, Claudio Mazzoli, Hua Zhou, Andi Barbour, Stuart Wilkins, Badri Narayanan, and others (\***Equal author contribution** between P. Panda & F. Zuo). Habituation based synaptic plasticity and organismic learning in a quantum perovskite. *Nature Communications*, doi:10.1038/s41467-017-00248-6, 8:240, 2017.
- [2] **Priyadarshini Panda**, Swagath Venkataramani, Abronil Sengupta, Anand Raghunathan, and Kaushik Roy. Energy-efficient object detection using semantic decomposition. *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*, doi:10.1109/TVLSI.2017.2707077, 25(9):2673–2677, Sept 2017.
- [3] **Priyadarshini Panda**, Abhronil Sengupta, and Kaushik Roy. Energy-efficient and improved image recognition with conditional deep learning. *J. Emerg. Technol. Comput. Syst.*, doi: 10.1145/3007192, 13(3):33:1–33:21, February 2017.
- [4] **Priyadarshini Panda**, Aayush Ankit, Parami Wijesinghe, and Kaushik Roy. Falcon: Feature driven selective classification for energy-efficient image recognition. *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, doi: 10.1109/TCAD.2017.2681075, PP(99):1–1, 2017.
- [5] **Priyadarshini Panda** and Kaushik Roy. Learning to generate sequences with combination of hebbian and non-hebbian plasticity in recurrent spiking neural networks. *Frontiers in Neuroscience*, 11:693, 2017.

- [6] **Priyadarshini Panda**, Jason M. Allred, Shriram Ramanathan, and Kaushik Roy. Asp: Learning to forget with adaptive synaptic plasticity in spiking neural networks. *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, doi:10.1109/JETCAS.2017.2769684, 8(1):51–64, 2018.
- [7] **Priyadarshini Panda** and Narayan Srinivasa. Learning to recognize actions from limited training examples using a recurrent spiking neural model. *Frontiers in neuroscience*, 12:126, 2018.
- [8] **Priyadarshini Panda**, Indranil Chakraborty, and Kaushik Roy. Discretization based solutions for secure machine learning against adversarial attacks. *IEEE Access*, doi: 10.1109/ACCESS.2019.2919463, PP(99):1–1, 2019.
- [9] Abhronil Sengupta, **Priyadarshini Panda**, Parami Wijesinghe, Yusung Kim, and Kaushik Roy. Magnetic tunnel junction mimics stochastic cortical spiking neurons. *Scientific reports*, doi:10.1038/srep30039, 6:30039, 2016.
- [10] Chankyu Lee, **Priyadarshini Panda**, Gopalakrishnan Srinivasan, and Kaushik Roy. Training deep spiking convolutional neural networks with stdp-based unsupervised pre-training followed by supervised fine-tuning *Frontiers in Neuroscience*, 12:435, 2018.
- [11] Gopalakrishnan Srinivasan, **Priyadarshini Panda**, and Kaushik Roy. Spilinc: Spiking liquid-ensemble computing for unsupervised speech and image recognition. *Frontiers in Neuroscience*, 12:524, 2018.
- [12] Gopalakrishnan Srinivasan, **Priyadarshini Panda**, and Kaushik Roy. Stdp-based unsupervised feature learning using convolution-over-time in spiking neural networks for energy-efficient neuromorphic computing. *ACM Journal on Emerging Technologies in Computing Systems (JETC)*, 14(4):44, 2018.
- [13] Nitin Rathi, **Priyadarshini Panda**, and Kaushik Roy. Stdp based pruning of connections and weight quantization in spiking neural networks for energy-efficient recognition. *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, doi:10.1109/TCAD.2018.2819366, 38(4):668–677, 2019.
- [14] Baibhab Chatterjee, **Priyadarshini Panda**, Shovan Maity, Ayan Biswas, Kaushik Roy, and Shreyas Sen. Exploiting inherent error resiliency of deep neural networks to achieve extreme energy efficiency through mixed-signal neurons. *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*, doi:10.1109/TVLSI.2019.2896611, 27(6):1365–1377, 2019.
- [15] Deboleena Roy, **Priyadarshini Panda**, and Kaushik Roy. Tree-cnn: A hierarchical deep convolutional neural network for incremental learning. *Neural networks*, doi: 10.1016/j.neunet.2019.09.010, 121:148–160, 2019.
- [16] Deboleena Roy, **Priyadarshini Panda**, and Kaushik Roy. Synthesizing Images from Spatio-Temporal Representations using Spike-based Backpropagation. *Frontiers in Neuroscience*, doi: 10.3389/fnins, 13:621, 2019.
- [17] Isha Garg, **Priyadarshini Panda**, and Kaushik Roy. A low effort approach to structured cnn design using pca. *IEEE Access*, doi: 10.1109/ACCESS.2019.2961960, PP(8):1347–1360, 2020.
- [18] Parami Wijesinghe, Gopalakrishnan Srinivasan, **Priyadarshini Panda** and Kaushik Roy. Analysis of Liquid Ensembles for Enhancing the Performance and Accuracy of Liquid State Machines. *Frontiers in Neuroscience*, 13:504, 2019.
- [19] Yinghan Long, Gopalakrishnan Srinivasan, **Priyadarshini Panda**, and Kaushik Roy. Structured Learning for Action Recognition in Videos *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, doi: 10.1109/JETCAS.2019.2935004, 9(3):475–484, 2019.
- [20] Chankyu Lee, Gopalakrishnan Srinivasan, **Priyadarshini Panda**, and Kaushik Roy. Deep spiking convolutional neural network trained with unsupervised spike timing dependent plasticity. *IEEE Transactions on Cognitive and Developmental Systems*, doi:10.1109/TCDS.2018.2833071, 11(3):384–394, 2019.
- [21] Chankyu Lee, Syed Shakib Sarwar, **Priyadarshini Panda**, Gopalakrishnan Srinivasan, and Kaushik Roy. Enabling spike-based backpropagation for training deep neural network architectures. *Frontiers in Neuroscience*, doi:10.3389/fnins.2020.00119, 14:119, 2020.
- [22] Akhilesh Jaiswal, Amogh Agarwal, **Priyadarshini Panda**, and Kaushik Roy. Neural Computing With Magnetoelectric Domain-Wall-Based Neurosynaptic Devices. *IEEE Transactions on Magnetics*, vol. 57, no. 2, pp. 1-9, doi: 10.1109/TMAG.2020.3010712, 2021.

- [23] Kon Woo Kwon, Xuanyao Fong, Parami Wijesinghe, **Priyadarshini Panda**, and Kaushik Roy. High-density and robust stt-mram array through device/circuit/architecture interactions. *IEEE Transactions on Nanotechnology*, doi: 10.1109/TNANO.2015.2456510, 14(6):1024–1034, Nov 2015.
- [24] Syed Shakib Sarwar, Gopalakrishnan Srinivasan, Bing Han, Parami Wijesinghe, Akhilesh Jaiswal, **Priyadarshini Panda**, Anand Raghunathan, and Kaushik Roy. Energy efficient neural computing: A study of cross-layer approximations. *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, doi:10.1109/JETCAS.2018.2835809, 8(4):796–809 2018.

## Peer Reviewed Conference Publication List

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Below are the list of pre-prints and publications accepted/published after joining Yale University. + indicates Panda's current Ph.D. student.

- [1] Abhishek Moitra<sup>+</sup>, Abhiroop Bhattacharjee<sup>+</sup>, Youngeun Kim<sup>+</sup>, and **Priyadarshini Panda**. XPert: Peripheral Circuit & Neural Architecture Co-search for Area and Energy-efficient Xbar-based Computing. *In Design Automation Conference (DAC) (2023)*. **(Acceptance Rate 23%)**
- [2] Yuhang Li<sup>+</sup>, Tamar Geller, Abhishek Moitra<sup>+</sup>, and **Priyadarshini Panda**. Input-Aware Dynamic Timestep Spiking Neural Networks for Efficient In-Memory Computing. *In Design Automation Conference (DAC) (2023)*. **(Acceptance Rate 23%)**
- [3] Duy-Thanh Nguyen, Abhiroop Bhattacharjee<sup>+</sup>, Abhishek Moitra<sup>+</sup>, and **Priyadarshini Panda**. Deep-CAM: A fully CAM-based inference accelerator with variable hash lengths for energy-efficient deep neural networks. *In Design, Automation, and Test in Europe (DATE) Conference (2023)*. **(Acceptance Rate 25%)**
- [4] Yuhang Li<sup>+</sup>, Ruokai Yin<sup>+</sup>, Hyoungseob Park, Youngeun Kim<sup>+</sup>, and **Priyadarshini Panda**. Exploring Temporal Information Dynamics in Spiking Neural Networks. *In AAAI Conference on Artificial Intelligence (2023)*. **(Acceptance Rate 19.6%)**
- [5] Abhiroop Bhattacharjee<sup>+</sup>, Abhishek Moitra<sup>+</sup>, Youngeun Kim<sup>+</sup>, Yeshwanth Venkatesha<sup>+</sup>, and **Priyadarshini Panda**. Examining the Role and Limits of Batchnorm Optimization to Mitigate Diverse Hardware-noise in In-memory Computing. *In Great Lakes Symposium on VLSI (GLSVLSI) Conference (2023)*.
- [6] Abhishek Moitra<sup>+</sup>, Ruokai Yin<sup>+</sup>, and **Priyadarshini Panda**. Hardware Accelerators for Spiking Neural Networks for Energy-Efficient Edge Computing. *In Great Lakes Symposium on VLSI (GLSVLSI) Conference (2023)*.
- [7] Yuhang Li<sup>+</sup>, Ruokai Yin<sup>+</sup>, Hyoungseob Park, Youngeun Kim<sup>+</sup>, and **Priyadarshini Panda**. Wearable-based Human Activity Recognition with Spatio-Temporal Spiking Neural Networks *In NeurIPS 2022 Workshops (2022)*. *Spotlight*.
- [8] Youngeun Kim<sup>+</sup>, Yuhang Li<sup>+</sup>, Hyoungseob Park, Yeshwanth Venkatesha<sup>+</sup>, and **Priyadarshini Panda**. Neural architecture search for spiking neural networks. *In European Conference on Computer Vision (ECCV), 2022*. **(Acceptance Rate: 26%)**.
- [9] Yuhang Li<sup>+</sup>, Youngeun Kim<sup>+</sup>, Hyoungseob Park, Tamar Geller<sup>+</sup>, and **Priyadarshini Panda**. Neuromorphic Data Augmentation for Training Spiking Neural Networks. *In European Conference on Computer Vision (ECCV), 2022*. **(Acceptance Rate: 26%)**.
- [10] Youngeun Kim<sup>+</sup>, Yuhang Li<sup>+</sup>, Hyoungseob Park, Yeshwanth Venkatesha<sup>+</sup>, Ruokai Yin<sup>+</sup>, and **Priyadarshini Panda**. Lottery Ticket Hypothesis for Spiking Neural Networks. *In European Conference on Computer Vision (ECCV), 2022*. **(Acceptance Rate: 2.7%)**. **(Oral Presentation)**
- [11] Abhiroop Bhattacharjee<sup>+</sup>, Youngeun Kim<sup>+</sup>, Abhishek Moitra<sup>+</sup>, and **Priyadarshini Panda**. Examining the Robustness of Spiking Neural Networks on Non-ideal Memristive Crossbars. *In ACM/IEEE International Symposium on Low Power Electronics and Design, pp. 1-6. 2022*. **(Acceptance Rate: 22%)**. **(Best Paper Award)**

- [12] Abhiroop Bhattacharjee<sup>+</sup>, Abhishek Moitra<sup>+</sup>, Yeshwanth Venkatesha<sup>+</sup>, and **Priyadarshini Panda**. MIME: Adapting a Single Neural Network for Multi-task Inference with Memory-efficient Dynamic Pruning. In *ACM/IEEE Design Automation Conference (DAC) 2022* (**Acceptance Rate: 23%**).
- [13] Youngeun Kim<sup>+</sup>, Yeshwanth Venkatesha<sup>+</sup>, and **Priyadarshini Panda**. PrivateSNN: Fully Privacy-Preserving Spiking Neural Networks. In *Proceedings of the AAAI Conference on Artificial Intelligence, vol. 36, no. 1, pp. 1192-1200, 2022.* (**Acceptance Rate: 15%**).
- [14] Youngeun Kim<sup>+</sup>, Hyungseob Park, Abhishek Moitra<sup>+</sup>, Abhiroop Bhattacharjee<sup>+</sup>, Yeshwanth Venkatesha<sup>+</sup>, and **Priyadarshini Panda**. Rate Coding or Direct Coding: Which One is Better for Accurate, Robust, and Energy-efficient Spiking Neural Networks? In *ICASSP 2022-2022 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)* (pp. 71-75), IEEE, 2022.
- [15] Youngeun Kim<sup>+</sup>, and **Priyadarshini Panda**. Gradient-based Bit Encoding Optimization for Noise-Robust Binary Memristive Crossbar. In *2022 Design, Automation & Test in Europe Conference & Exhibition (DATE)*, pp. 1111-1114. IEEE, 2022. (**Acceptance Rate: 24%**)
- [16] Abhiroop Bhattacharjee<sup>+</sup>, Lakshya Bhatnagar, and **Priyadarshini Panda**. Examining and Mitigating the Impact of Crossbar Non-idealities for Accurate Implementation of Sparse Deep Neural Networks. In *2022 Design, Automation & Test in Europe Conference & Exhibition (DATE)*, pp. 1119-1122. IEEE, 2022. (**Acceptance Rate: 24%**)
- [17] Adarsh Kumar Kosta, Malik Aqeel Anwar, **Priyadarshini Panda**, Arijit Raychowdhury, and Kaushik Roy. RAPID-RL: A Reconfigurable Architecture with Preemptive-Exits for Efficient Deep-Reinforcement Learning. In *2022 International Conference on Robotics and Automation (ICRA)*, pp. 7492-7498. IEEE, 2022..
- [18] Karina Vasquez, Yeshwanth Venkatesha<sup>+</sup>, Abhiroop Bhattacharjee<sup>+</sup>, Abhishek Moitra<sup>+</sup> and **Priyadarshini Panda**. Activation Density based Mixed-Precision Quantization for Energy Efficient Neural Networks. *Design, Automation & Test in Europe Conference & Exhibition (DATE)*, pp. 1360-1365, doi: 10.23919/DATE51398.2021.9474031, 2021 (**Acceptance Rate: 22%**).
- [19] Abhiroop Bhattacharjee<sup>+</sup>, Abhishek Moitra<sup>+</sup>, and **Priyadarshini Panda**. Efficiency-driven Hardware Optimization for Adversarially Robust Neural Networks. *Design, Automation & Test in Europe Conference & Exhibition (DATE)*, pp. 884-889, doi: 10.23919/DATE51398.2021.9474001, 2021 (**Acceptance Rate: 22%**).
- [20] **Priyadarshini Panda**. QUANOS: Adversarial Noise Sensitivity driven Hybrid Quantization of Neural Networks. In *Proceedings of the ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED '20)*, pp. 187-192. doi:10.1145/3370748.3406585, 2020 (**Acceptance Rate: 23%**).
- [21] Aosong Feng and **Priyadarshini Panda**. Energy-efficient and Robust Cumulative Training with Net2Net Transformation. *International Joint Conference on Neural Networks (IJCNN)*, pp. 1-7, doi: 10.1109/IJCNN48605.2020.9207451, 2020.
- [22] Timothy Foldy-Porto, Yeshwanth Venkatesha<sup>+</sup>, and **Priyadarshini Panda**. Activation Density driven Energy-Efficient Pruning in Training. *25th International Conference on Pattern Recognition (ICPR)*, pp. 8929-8936, doi: 10.1109/ICPR48806.2021.9413182., 2020.
- [23] Nitin Rathi, Gopalakrishnan Srinivasan, **Priyadarshini Panda** and Kaushik Roy. Enabling Deep Spiking Neural Networks with Hybrid Conversion and Spike Timing Dependent Backpropagation. <https://openreview.net/forum?id=B1xSperKvH>, In *International Conference on Learning Representations (ICLR) 2020*. (**Acceptance Rate: 22%**)
- [24] Saima Sharmin, Nitin Rathi, **Priyadarshini Panda** and Kaushik Roy. Inherent adversarial robustness of deep spiking neural networks: Effects of discrete input encoding and non-linear activations. In *European Conference on Computer Vision*, pp. 399-414. Springer, Cham, 2020. (**Acceptance Rate: 21%**).
- [25] Gopalakrishnan Srinivasan, Chankyu Lee, Abhronil Sengupta, **Priyadarshini Panda**, Syed Shakib Sarwar, and Kaushik Roy. Training Deep Spiking Neural Networks for Energy-Efficient Neuromorphic Computing *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pp. 8549-8553, doi: 10.1109/ICASSP40776.2020.9053914, 2020.

**2019 and Prior Publications published during Ph.D. at Purdue University**

- [1] **Priyadarshini Panda**, Abhronil Sengupta, and Kaushik Roy. Conditional deep learning for energy-efficient and enhanced pattern recognition. In *2016 Design, Automation Test in Europe Conference Exhibition (DATE)*, pages 475–480, March 2016.
- [2] **Priyadarshini Panda** and Kaushik Roy. Unsupervised regenerative learning of hierarchical features in spiking deep networks for object recognition. In *2016 International Joint Conference on Neural Networks (IJCNN)*, doi:10.1109/IJCNN.2016.7727212, pages 299–306, July 2016.
- [3] **Priyadarshini Panda**, Abhronil Sengupta, Syed Shakib Sarwar, Gopalakrishnan Srinivasan, Swagath Venkataramani, Anand Raghunathan, and Kaushik Roy. Invited - cross-layer approximations for neuromorphic computing: From devices to circuits and systems. In *Proceedings of the 53rd Annual Design Automation Conference*, doi:10.1145/2897937.2905009, DAC '16, pages 98:1–98:6, New York, NY, USA, 2016. ACM.
- [4] **Priyadarshini Panda**, Gopalakrishnan Srinivasan, and Kaushik Roy. Ensemblesnn: Distributed assistive stdp learning for energy-efficient recognition in spiking neural networks. In *2017 International Joint Conference on Neural Networks (IJCNN)*, doi:10.1109/IJCNN.2017.7966177, pages 2629–2635, May 2017.
- [5] **Priyadarshini Panda** and Kaushik Roy. Semantic driven hierarchical learning for energy-efficient image classification. In *Design, Automation Test in Europe Conference Exhibition (DATE), 2017*, doi:10.23919/DATE.2017.7927242, pages 1582–1587, March 2017.
- [6] **Priyadarshini Panda** and Kaushik Roy. Implicit generative modeling of random noise during training for adversarial robustness. *arXiv preprint arXiv:1807.02188*, Accepted in *ICML 2019 - Workshop on Uncertainty and Robustness in Deep Learning* (<https://sites.google.com/view/udlworkshop2019/home>).
- [7] Saima Sharmin\*, **Priyadarshini Panda\***, Syed Shakib Sarwar, Chankyu Lee, Wachirawit Ponghiran, and Kaushik Roy. (\***Equal author contribution** between P. Panda & S. Sharmin). A Comprehensive Analysis on Adversarial Robustness of Spiking Neural Networks. Accepted in *2019 International Joint Conference on Neural Networks (IJCNN)*, 2019.
- [8] Abhronil Sengupta, **Priyadarshini Panda**, Anand Raghunathan, and Kaushik Roy. Neuromorphic computing enabled by spin-transfer torque devices. In *2016 29th International Conference on VLSI Design and 2016 15th International Conference on Embedded Systems (VLSID)*, doi:10.1109/VLSID.2016.117, pages 32–37, Jan 2016.
- [9] Syed Shakib Sarwar, **Priyadarshini Panda**, and Kaushik Roy. Gabor filter assisted energy efficient fast learning convolutional neural networks. In *2017 IEEE/ACM International Symposium on Low Power Electronics and Design (ISLPED)*, doi:10.1109/ISLPED.2017.8009202, pages 1–6, July 2017.
- [10] Maryam Parsa, **Priyadarshini Panda**, Shreyas Sen, and Kaushik Roy. Staged inference using conditional deep learning for energy efficient real-time smart diagnosis. In *2017 39th International Conference of IEEE Engineering in Medicine and Biology Society. IEEE, 2017. TECHCON 2018 Student Presentation Award*
- [11] Baibhab Chatterjee, **Priyadarshini Panda**, Shovan Maity, Kaushik Roy, and Shreyas Sen. An energy-efficient mixed-signal neuron for inherently error-resilient neuromorphic systems. In *Rebooting Computing (ICRC), 2017 IEEE International Conference on*, pages 1–2. IEEE, 2017.
- [12] Sourjya Roy, **Priyadarshini Panda**, Gopalakrishnan Srinivasan, and Anand Raghunathan. Pruning Filters while Training for Efficiently Optimizing Deep Learning Networks. *International Joint Conference on Neural Networks (IJCNN)*, pp. 1-7, doi: 10.1109/IJCNN48605.2020.9207588, 2020.
- [13] Aayush Ankit, Abhronil Sengupta, **Priyadarshini Panda**, and Kaushik Roy. Resparc: A reconfigurable and energy-efficient architecture with memristive crossbars for deep spiking neural networks. In *Proceedings of the 54th Annual Design Automation Conference 2017*, doi: 10.1145/3061639.3062311, DAC '17, pages 27:1–27:6, New York, NY, USA, 2017. ACM.
- [14] Sourav Dutta, Atanu Saha, **Priyadarshini Panda** and others. Biologically Plausible Ferroelectric Quasi-Leaky Integrate and Fire Neuron. In *2019 Symposium on VLSI Technology*, pages T140–T141. IEEE, 2019.



## Book Chapters

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+ indicates Panda's current Ph.D. student.

- [1] **Priyadarshini Panda**, Yeshwanth Venkatesha<sup>+</sup>, Youngeun Kim<sup>+</sup>, and Yuhang Li<sup>+</sup>. Overview of Recent Developments in DL and AI. *Advances in Electromagnetics Empowered by Artificial Intelligence and Deep Learning* edited by Sawyer D. Campbell and Douglas H. Werner. In print, 2022.
- [2] **Priyadarshini Panda**, Abhiroop Bhattacharjee<sup>+</sup>, and Abhishek Moitra<sup>+</sup>. Robustness for Embedded Machine Learning using In-Memory Computing *Embedded Machine Learning for Cyber-Physical, IoT, and Edge Computing* edited by Sudeep Pasricha and Muhammad Shafique. In print, 2022.

## Selected Invited/Contributed Talks

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1. **Priyadarshini Panda**, "Contributed Talk- Examining the Role and Limits of Batchnorm Optimization to Mitigate Diverse Hardware-noise in In-memory Computing.", GLSVLSI, 2023
2. **Priyadarshini Panda**, "Contributed Talk- Hardware Accelerators for Spiking Neural Networks for Energy-Efficient Edge Computing", GLSVLSI, 2023
3. **Priyadarshini Panda**, "Keynote- Computational Needs for Lifelong Learning", DARPA ERI Summit, 2023
4. **Priyadarshini Panda**, "Invited Talk- Spiking Neural Networks: Opportunities and Challenges", ICERM Meeting on Mathematical and Scientific Machine Learning, 2023
5. **Priyadarshini Panda**, "Invited Talk- Bio-plausible Algorithm-Hardware Co-Design with Spiking Neural Networks", Princeton University, 2023
6. **Priyadarshini Panda**, "Invited Talk- Neuromorphic Computing: Opportunities and Challenges for Edge Intelligence", TU Eindhoven, Netherlands, 2023
7. **Priyadarshini Panda**, "Invited Talk- Bio-plausible Algorithm-Hardware Co-Design with Spiking Neural Networks", DOE MMICC center Sea-Crogs, Pacific Northwest National Laboratory (PNNL) Seminar, 2023
8. **Priyadarshini Panda**, "Invited Talk- Bio-plausible Algorithm-Hardware Co-Design with Spiking Neural Networks", Brown University, 2023
9. **Priyadarshini Panda**, "Invited Talk- Opportunities and Challenges of Neuromorphic Computing", German-American Frontiers of Engineering Symposium organized by the National Academy of Engineering and Alexander Humboldt Foundation in Julich, Germany, 2023
10. **Priyadarshini Panda**, "Invited Talk- Algorithm-Hardware Co-design with Neuromorphic Computing", RWTH, Aachen, Germany, 2023
11. **Priyadarshini Panda**, "Invited Talk- Spiking Neural Networks in the Wild", AAI 2023 Workshop on Practical Deep Learning In the Wild, 2023
12. **Priyadarshini Panda**, "Invited Talk- Spiking Neural Networks", TCS Thought Forum on Neuromorphic Computing, 2022
13. **Priyadarshini Panda**, "Invited Talk- Algorithm-Hardware Co-design for Efficient and Robust Spiking Neural Networks", Spiking Neural networks as Universal Function Approximators (SNUFA), 2022
14. **Priyadarshini Panda**, "Invited Talk- Spiking Neural Networks and their relevance to AI", Yale Foundations of Data Science Seminar, 2022
15. **Priyadarshini Panda**, "Invited Talk- Exploring Robustness and Efficiency in Neural Systems with Spike-based Machine Intelligence", ICCAD HALO Workshop, 2022
16. **Priyadarshini Panda**, "Invited Talk- Neuromorphic Computing", Yale Foundations of Data Science Launch Event, 2022

17. **Priyadarshini Panda**, *“Invited Talk- Exploring Robustness and Efficiency in Neural Systems with Spike-based Machine Intelligence”*, TinyML Neuromorphic Engineering Forum, 2022
18. **Priyadarshini Panda**, *“Invited Panel Speaker on Neuromorphic Computing”*, Neuromatch Conference (Virtual), 2022
19. **Priyadarshini Panda**, *“Invited Talk- Exploring Robustness and Efficiency in Neural Systems with Spike-based Machine Intelligence”*, Fuerberg Workshop on Hybrid AI- combining deep learning, symbolic and neuromorphic, 2022
20. **Priyadarshini Panda**, *“Invited Talk- Exploring Robustness and Efficiency in Neural Systems with Spike-based Machine Intelligence”*, Deepmind meeting on spiking networks, 2022
21. **Priyadarshini Panda**, *“Invited Talk- Exploring Robustness and Efficiency in Neural Systems with Spike-based Machine Intelligence”*, Jagiellonian University, Krakow, Poland (Webinar Meet), 2022
22. **Priyadarshini Panda**, *“Invited Talk- Spike based Machine Intelligence”*, Columbia University Tech Talk (Webinar Meet), 2022
23. **Priyadarshini Panda**, *“Invited Talk- Towards Energy Efficient and Robust Neuromorphic Computing—Algorithm and Hardware Perspective”*, MRS Symposium on Neuromorphic Computing, 2022
24. **Priyadarshini Panda**, *“Invited Talk- “Spiking Neural Networks: Learning at scale for Diverse Scenarios”*, Intel Labs INRC Spring 2022 Workshop on Offline Training, 2022
25. **Priyadarshini Panda**, *“Contributed Talk-“Rethinking the role of ANN-oriented techniques for Spiking Neural Networks”*, Cold Spring Harbor Labs meeting on “From Neuroscience to Artificial Intelligent Systems”, 2022
26. **Priyadarshini Panda**, *“Invited Talk- Exploring Robustness and Efficiency in Neural Systems with Spike-based Machine Intelligence”*, Google Talk on Spiking Networks, 2022
27. **Priyadarshini Panda**, *“Invited Talk- Exploring Robustness in Neural Systems with Spike-based Machine Intelligence”*, DoE Center for Physics Informed Machine Learning at Pacific Northwest National Labs, 2022
28. **Priyadarshini Panda**, *“Invited Talk- Exploring Robustness in Neural Systems with Hardware-aware and Spike-based Machine Intelligence”*, NIST Seminar Series on Artificial Intelligence and Machine Learning, 2022
29. **Priyadarshini Panda**, *“Invited Talk- Towards Energy-Efficient and Robust Neuromorphic Computing: Algorithm and Hardware Perspective”*, Wu Tsai Institute Integration Conference, 2022
30. **Priyadarshini Panda**, *“Tutorial on Spiking Neural Networks: An Algorithmic Perspective”*, Embedded Systems Week (ESWEEK), 2021
31. **Priyadarshini Panda**, *“Invited Talk- Towards Energy-Efficient and Robust Neuromorphic Computing: Algorithm and Hardware Perspective”*, Workshop on Neuromorphic Computing: from Material to Algorithm (NeuMA), 2021
32. **Priyadarshini Panda**, *“Invited Talk- Towards Energy Efficient, Interpretable and Robust Neuromorphic Computing: Algorithm and Hardware Perspective”*, Department of Electronics Engineering Seminar (Virtual), IIT Dhanbad (India), 2021
33. **Priyadarshini Panda**, *“Exploring Robustness in Neural Systems with Hardware-aware and Spike-based Machine Intelligence”*, Center for Brain-inspired Computing (C-BRIC)-Joint University Microelectronics Program (JUMP)/SRC e-workshop, 2021
34. **Priyadarshini Panda**, *“Invited Talk- Towards Energy Efficient and Robust Neuromorphic Computing: Algorithm and Hardware Perspective”*, EdukCircle International Convention on Engineering and Computer Technology (Virtual), 2021
35. **Priyadarshini Panda**, *“Invited Talk- Towards Deep, Interpretable, and Robust Spiking Neural Networks: Algorithmic Approaches”*, PennState Center for AI Foundations and Engineered Systems (CAFE) Fireside Chat, 2021

36. **Priyadarshini Panda**, *"Panelist- Workshop on Parallel AI and Systems on Edge"*, PAISE Workshop (Virtual Meet), 2021
37. **Priyadarshini Panda**, *"Invited Talk- Energy-Efficient, Robust and Interpretable Neuromorphic Computing through Algorithm-Hardware Co-Design"*, Efficient AI Seminar at Rutgers University (Electrical & Computer Engineering Department), 2021
38. **Priyadarshini Panda**, *"Keynote- Towards Robust and Energy-Efficient Spike Based Machine Intelligence"*, BrainStorms Festival (Virtual Meet), 2021
39. **Priyadarshini Panda**, *"Panelist- Solving the Challenges of Deep Learning on Neuromorphic Hardware"*, INRC Winter Workshop (Virtual Meet), 2021
40. **Priyadarshini Panda**, *"Invited Talk- Towards Scalable Spike-based Learning with Backward Residual Connections"*, Cold Spring Harbor meeting: From Neuroscience to Artificially Intelligent Systems (Virtual Meet), 2020
41. **Priyadarshini Panda**, *"Invited Talk- On Adversarial Susceptibility & Defense of Neural Networks"*, European Test Symposium, Estonia (Virtual Meet), 2020
42. **Priyadarshini Panda**, *"Invited Talk- Toward Scalable, Efficient, and Accurate Deep Spiking Neural Networks"*, IEEE International System-on-Chip Conference (Virtual Meet), 2020
43. **Priyadarshini Panda**, *"Invited Talk- Toward Scalable, Efficient, and Accurate Deep Spiking Neural Networks"*, Workshop on Neuromorphic Computing, Design Automation Conference (Virtual Meet), 2020
44. **Priyadarshini Panda**, *"Invited Talk- Re-Engineering Computing with Spike-Based Learning: Algorithms & Hardware"*, Technology Innovation Institute (TII), Abu Dhabi, 2020
45. **Priyadarshini Panda**, *"Invited Talk- Enabling Ubiquitous Intelligence with Algorithm-Hardware Co-Design"*, NYU Abu Dhabi, 2020
46. **Priyadarshini Panda**, Kaushik Roy, *"Invited Talk- Re-Engineering Computing with Neuro-Inspired Learning: Devices, Circuits, and Systems"*, VLSID Design Conference, India, 2020
47. **Priyadarshini Panda**, *"On Adversarial Susceptibility and Defence Of Neural Networks"*, Review Meet for Center for Brain-inspired Computing (C-BRIC), Purdue University, 2019
48. **Priyadarshini Panda**, *"Algorithms for Emerging Hardware"*, SRC JUMP Review for Center for Brain-inspired Computing (C-BRIC), Intel, Oregon, 2019
49. **Priyadarshini Panda**, *"Spike-based Neuromorphic Computing"*, Numenta Research, 2019
50. **Priyadarshini Panda**, Kaushik Roy, *"Tutorial on Spiking Neural Networks"*, Online Presentation to all SRC member companies, 2019
51. **Priyadarshini Panda**, Gopalakrishnan Srinivasan, Parami Wijesinghe, Kaushik Roy, *"Spatio-Temporal Data Analysis with Recurrent Spiking Neural Models"*, Design Automation Conference Demo, 2019
52. **Priyadarshini Panda**, Gopalakrishnan Srinivasan, Kaushik Roy, *"Opportunities and Challenges with Liquid State Machines"*, Center for Brain-inspired Computing Enabling Autonomous Intelligence (CBRIC) Annual Review, 2018
53. **Priyadarshini Panda**, Soumendu Ghosh, Maryam Parsa, Kaushik Roy, Vijay Raghunathan, Anand Raghunathan *"Adaptive Partitioned Inference across Edge-Devices and the Cloud"*, Center for Brain-inspired Computing Enabling Autonomous Intelligence (CBRIC) Annual Review, 2018
54. **Priyadarshini Panda**, Kaushik Roy, *"Learning to Forget with Adaptive Synaptic Plasticity: An approach toward Lifelong Learning"*, Emerging Technology Symposium (IBM-IEEE-CAS), IBM T. J. Watson, 2018
55. **Priyadarshini Panda**, Kaushik Roy, *"Spiking Neural Networks: Implications on Lifelong Learning"*, The Distributed Analytics and Information Science International Technology Alliance (DAIS ITA) Workshop on Machine Learning, IBM Learning Center, 2018

56. **Priyadarshini Panda**, Kaushik Roy, “*Enabling on-chip intelligence with low-power neuromorphic computing*”, Neuromorphic Computing Workshop, Oakridge National Labs, 2016
57. **Priyadarshini Panda**, Abhronil Sengupta, Kaushik Roy, “*Re-Engineering Computing with Neuro-Inspired Learning: Devices, Circuits, and Systems*”, Intel Labs, Oregon, 2016
58. **Priyadarshini Panda**, Kaushik Roy, “*Unsupervised Regenerative Learning: Enabling On-chip Intelligence in Deep Spiking Networks*”, Workshop on Hardware and Algorithms for Learning On-a-chip (HALO), Austin, 2016
59. **Priyadarshini Panda**, Kaushik Roy, “*Conditional Deep Learning: Energy Efficient and Enhanced Pattern Recognition*”, Special Session on Implementation of Deep Neural Networks and Its Applications, Embedded Systems for Real-Time Multimedia (ESTIMedia), Pittsburgh, 2016

## Students

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### Post-doctoral Scholar

- Current: Duy-Thanh Nguyen

### Graduate (Ph.D.)

- Current: Youngeun Kim, Yeshwanth Venkatesha, Abhishek Moitra, Abhiroop Bhattacharjee, Yuhang Li, Ruokai Yin

### Undergraduate

- Current: Nicole Tian (YC 2026), John Wahlig (YC 2024)
- Past: Timothy Foldy-Porto (YC2020), Andy Wu (YC2023, STARS intern), Josh Chough (YC2022), Rachel Sterneck (YC2022), Tamar Geller (YC2023), Brianna Schuh (YC2023, S&DS Fianl Thesis), Sushant Kunwar (YC 2026, STARS intern)

### High School

- Past: Srivatsa Kundurthy (Junior, Academy of Math, Science and Engineering at Greater New York City Area)

### Visiting

- Past: Karina Vasquez (UTEC, Peru), Nishant Gupta (BITS Pilani, India), Lakshya Bhatnagar (IIT Delhi, India), Hyoungseob Park (KAIST, South Korea), Weizhi Zhang (UESTC, China/ Univ. of Glasgow, Scotland)

## Professional Society Membership

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Member for IEEE, ACM, Semiconductor Research Corporation (SRC).

## Teaching Activities

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|----------------------------|--|
| <b>Fall<br/>2019-22</b>    | Neural Networks and Learning Systems (EENG 439/ ENAS 940)<br><i>Course Overview</i><br>This course was introduced by Dr. Panda. It aims to provide a thorough overview on deep learning/neuromorphic computing techniques, while highlighting the key trends and advances toward efficient processing of deep learning and spike-based computing in hardware systems, considering algorithm-hardware co-design techniques. <b>Enrollment: 12, 35, 31, 40</b> |
| <b>Spring<br/>2021,'22</b> | Introduction to Computer Engineering (EENG 201)<br><i>Course Overview</i><br>The purpose of this course is to introduce freshmen and sophomore EE or CS students to logic design, digital system design, and computer design. The course provides a fundamental understanding of how computers work. <b>Enrollment: 29, 25</b>   |

**Spring  
2023**

Special Topics in Computer Systems: Memory Devices, Circuits and Applications (ENAS 925)  
*Course Overview*  
This course was introduced by Dr. Panda. It aims to provide a thorough overview on semiconductor memory technologies spanning both established and emerging options, and explores their impact on computer system design and performance. **Enrollment: 7**

## Service Activities

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### Reviewer

- **Journals:** Ad Hoc reviewer for Nature Scientific Reports (SREP), Nature Communications, IEEE Transactions on VLSI Systems (TVLSI), IEEE Transactions on Circuits and Systems (TCAS), IEEE Transactions on Artificial Intelligence, IEEE Transactions on Neural Networks and Learning Systems (TNNLS), IEEE Journal on Emerging and Selected Topics in Circuits and Systems (JETCAS), IEEE Transactions on Cognitive and Developmental Systems (TCDS), IEEE Access, ACM Journal on Emerging Technologies in Computing (JETC), Frontiers in Neuroscience (Neuromorphic Engineering), Pattern Recognition, ACM Transactions on Design Automation of Electronic Systems (TODAES), IEEE Signal Processing Letters
- **Conferences:** Ad Hoc reviewer for VLSI Design Conference (VLSID), International Conference On Computer Aided Design (ICCAD), International Conference on Pattern Recognition (ICPR), International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Design Automation Conference (DAC), International Conference on Learning Representations (ICLR), Computer Vision and Pattern Recognition (CVPR), AAAI Conference on Artificial Intelligence (AAAI), International Conference on Computer Vision (ICCV), International Conference on Artificial Intelligence Circuits and Systems (AICAS), Neural Information Processing Systems (NeurIPS), Computer Vision and Pattern Recognition (CVPR), European Conference on Computer Vision (ECCV)
- **Proposals:** Ad Hoc reviewer for NSF, DoE

### Editorial Committee

- Editor, IEEE JETCAS Special Issue on Dynamical Neuromorphic Computing
- Associate Editor, IEEE Transactions on Cognitive and Developmental Systems (TCDS)
- Editor, Frontiers in Neuroscience, Section: Neuromorphic Engineering
- Review Editor, Frontiers in Electronics
- Editorial Board Member, IEEE Embedded System Letters
- Guest Editor, Focus Issue on Algorithms for Neuromorphic Computing, IOPScience (Neuromorphic Computing and Engineering)

### Program Committee

- Design Automation Conference (DAC 2020, 2021, 2022)
- International Conference on VLSI Design (VLSID 2020, 2022)
- Great Lakes Symposium on VLSI (GLSVLSI 2022)
- International Symposium on Low Power Electronics and Design (ISLPED) 2022, 2023)
- International Parallel and Distributed Computing Symposium (IPDPS) 2022)
- International Conference on Computer-Aided Design (ICCAD) 2022, 2023)
- Design, Automation and Test In Europe (DATE) 2022, 2023)
- TinyML Neuromorphic Engineering 2022

### Panelist

- Panelist on DAC Early Career Workshop, 2023

- NSF CISE/CCF Core Program Panel on FET (Small), 2023
- NSF SHF Panel on Design & Automation (Small), 2022
- NSF CRCNS Panel on Computation & Neuroscience, 2022
- NSF EPCN Panel on Intelligent systems and Learning, 2021
- NSF CRCNS Panel on Computation & Neuroscience, 2021
- Scribe on a panel on Enabling Technologies at the NSF workshop on Machine Learning Hardware, 2020

### **Session Chair/ Organizer**

- Session Organizer on SPIKES at ICERM Mathematical and Scientific Machine Learning, 2023
- Session Chair on Bio-inspired Computing and Models, DAC 2023
- Track Co-chair on 3.1: Bio-inspired and Neuromorphic Computing in International Conference on Computer-aided Design (ICCAD) 2023
- Track Co-chair on E4: Design Methodologies for Machine Learning Architectures, DATE 2023
- Tutorial Organizer on Hardware & Software Co-Design for Edge AI, DAC 2023
- Session Chair for Neuromorphic Hardware in Asilomar Conference on Signals, Systems, and Computers 2023
- Track Co-Chair for AI/ML Hardware Track in International Symposium on Low Power Electronics and Design (ISLPED) 2023
- Track Leader for Neuromorphic Device Technology, Circuits and Systems Track in International Conference on Emerging Electronics (ICEE) 2022
- Special Session Chair in International Symposium on Nanoscale Architectures (NANOARCH) 2022
- Session on Beyond Supervised Learning: Approaches for Efficient and Reliable Intelligence, DAC 2021
- Special Session on Algorithm-Hardware Co-design Approaches for Low-Power, Real-Time, and Robust Artificial Intelligence (AI), DATE 2021
- Workshop on Systems and Architecture for Robust, Safe, and Resilient Software 2.0, ASPLOS 2021, 2022
- Tutorial Co-Chair, IEEE International Conference on Artificial Intelligence Circuits and Systems, 2021
- Workshop on Neuromorphic Computing, DAC 2020
- Workshop on Bridging the Gap between Natural and Artificial Intelligence, DAC 2019
- Symposium on Materials and algorithms for neuromorphic computing and adaptive bio-interfacing, sensing and actuation, MRS Fall 2021 Meeting

### **Ph.D. Committee**

- Thomas Jagielski (Advisor: Rajit Manohar)
- Karthi Srinivasan (Advisor: Rajit Manohar)
- Kasey Hancock (Advisor: Rajit Manohar)
- Congyang Li (Advisor: Rajit Manohar)
- Kailong Peng (Advisor: Nick Turk-Browne)
- Aosong Feng (Advisor: Leandros Tassioulas)

### **Academic/Administration at Yale University**

- (2022-Present) Faculty Search Committee Member for Junior Computer Engineering/Microelectronics Joint Search of Electrical Engineering Department at Yale
- (2022-Present) Yale SEAS DEIB Committee Member for graduate student hiring
- (2021-Present) Faculty Search Committee Member for Senior Computer Engineering Search of Electrical Engineering Department at Yale
- (2021-Present) Curriculum Committee Member of Electrical Engineering Department at Yale
- (2021-Present) DEI Representative of Electrical Engineering Department at Yale
- (2021- Present) Member of Wu Tsai Institute's (WTI) Steering Committee, New Faculty Hiring Committee, and the WTI Faculty Recruitment Committee for Cluster C on Computational Intelligence
- (2020-Present) DEI Action Plan Committee Member of Electrical Engineering Department at Yale
- (March 2022) Organizing Life@EE Seminar for EE, EECS majors at Yale to hear from seniors and juniors about research opportunities, career paths, and life on campus.
- (Nov. 2021) Yale SEAS Outreach to prospective graduate students (from diverse institutions like, Howard, Tuskegee, North Carolina A&T among others)