Shristi Das Biswas

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Education

Purdue University **2021 – Present**
Ph.D. in Electrical and Computer Engineering; Advisor: Dr. Kaushik Roy *GPA: 3.61/4.0*

Indian Institute of Engineering, Science and Technology **2017 – 2021**
B.Tech. in Electronics and Telecommunication Engineering *GPA: 9.39 /10.0; (Department Rank-2/61)*

Technical Skills

Languages: Python, MATLAB, C, Git, Bash. **Tools**: Cadence Virtuoso, LTspice. **Frameworks**: Pytorch, Tensorflow, LaTeX.

Relevant Coursework

- Deep Learning (DL)
- DSA
- Optimization for DL
- Intro to DL
- Advanced VLSI Design
- MOS VLSI Design
- Reinforcement Learning
- Linear Algebra

Research Experience

C-BRIC Lab, Purdue University (Ph.D. Advisor: Dr. Kaushik Roy) **West Lafayette, Indiana**
Designed RSFormer, an approach to Recurring the Spike Transformer for Object Tracking *2023 – Present*

- Proposed a **multi-scale feature extraction backbone** to generate compact feature representation from event frames for downstream processing. Designed a **hierarchical transformer encoder** with **recurrent networks of spiking attention blocks** to obtain temporally-guided coarse and fine features fused using a lightweight MLP decoder for prediction.
- Achieved comparable performance to SOTA on event datasets 1Mpx and Gen1 with **up to 2× higher** parameter efficiency.

C-BRIC Lab, Purdue University (Ph.D. Advisor: Dr. Kaushik Roy) **West Lafayette, Indiana**
Designed a Low-power Hybrid Approach to Learning Scene Segmentation using Event-Vision *2021 – 2022*

- Proposed HALSIE, a novel **SNN+ANN hybrid** spatio-temporal feature integration approach to learning segmentation by simultaneously leveraging image and event camera modalities, enabling **efficient multi-modal learning**.
- Outperformed SOTA semantic segmentation benchmarks on DDD-17, MVSEC and DSEC-Semantic datasets with **up to 33.23× higher** parameter efficiency and **20× lower** inference cost, suitable for resource-constrained edge applications.

Indian Institute of Engineering, Science and Technology (Project Internship) **Shibpur, India**
Designed Automated Predictive Models for ADHD and ASD Diagnosis *2019-2020*

- Proposed a deep convolutional neural network model developed on **Tensorflow** framework to analyse and classify large **resting state fMRI datasets** for **ADHD and ASD diagnosis.**
- Achieved **up to 6% improvement** in accuracy on SOTA benchmarks within only 30 epochs of training. Our work has has been communicated and is under review at the Journal of Neuroscience Methods, Elsevier

Indian Institute of Technology, Bombay (Research Internship) **Bombay, India**
Designing a PMO RRAM based Oscillatory Neural Network *2020 – 2020*

- Designed a PMO based RRAM device model. Investigated **DC and transient response** characterisations with a **VerilogA** model. Worked closely with the team in developing new strategies for using the device model in **array implementations**.
- Designed and analysed a novel **oscillatory neural network circuit** with the PMO RRAM device to achieve ultra-low power and high performance. Investigated effect of **C2C and D2D variability** on simulated oscillator circuit to improve its **signal-to-noise ratio** by **upto 2.43%**.

Publications

- **S. Das Biswas**, A. Kosta, K. Roy. HALSIE - Hybrid Approach to Learning Segmentation by Simultaneously Exploiting Image and Event Modalities. **Accepted at WACV 2024, WiCV@ICCV 2023.** [Paper]
- **S. Das Biswas**, R. Chakraborty, A. Pramanik. A Brief Survey on Various Prediction Models for Detection of ADHD from Brain MRI Images. International Conference on Distributed Computing and Networking (**ICDCN**), 2020. [Paper]
- **S. Das Biswas**, R. Chakraborty, A. Pramanik. On Prediction Models for the Detection of Autism Spectrum Disorder. International Conference on Computational Intelligence in Pattern Recognition (**CIPR**), 2020. [Paper]

Projects

- Deep spoken keyword spotting system.
- Partitioning and layer assignment algorithm for TSV-aware 3D-IC structural planning.
- Gesture controlled virtual mouse with canny edge detection.
- Light monitoring plant care system with cloud-based data logging.
- Web-based temperature data logger for pharmaceutical companies with automated SMS and e-mail alerts.

Achievements

- **Google CS Research Mentorship Program Scholar.** Recipient class of 2023b.
- **IEEE Women in Engineering Best Student/ Research Scholar Paper Award**: Presented at ICDCN 2020.
- **Indian Academy of Sciences Summer Research Fellowship Program 2020.**
- **Indian Youth Delegate to the People's Republic of China, 2019**. Organised by the Ministry of Youth Affairs and Sports, Government of India, and the Government of People's Republic of China.