

Tong Bu

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 [Profile](#) |  [Google Scholar](#) (citations: 1311, h-index: 14) |  [GitHub](#)

RESEARCH PROFILE

PhD student at the Institute for Artificial Intelligence, Peking University. Research interests include spiking neural networks, neuromorphic computing, efficient models and real-time video generation, with a focus on efficient, low-latency, and robust brain-inspired learning systems.

EDUCATION

- **Computer Applications Technology, Peking University** September 2022 - June 2027 (expected)
PhD Student, supervised by Prof. Zhaofei Yu Beijing, China
- **Computer Science, Peking University** September 2018 - June 2022
Bachelor of Science Beijing, China

RESEARCH PUBLICATIONS (FIRST/CO-FIRST AUTHOR)

Peer-Reviewed Publications

1. **Tong Bu, et al. Activity Pruning for Efficient Spiking Neural Networks (First author).** In *Advances in Neural Information Processing Systems*, 2025.
Proposed an activity-based pruning method that suppresses spike activity to remove redundant computation while avoiding gradient vanishing under sparse activations. The method improves computational efficiency and reduces theoretical energy consumption without sacrificing performance.
2. **Tong Bu, et al. Inference-Scale Complexity in ANN-SNN Conversion for High-Performance and Low-Power Applications (First author).** In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, 2025.
Developed an inference-scale-complexity framework for efficiently converting pretrained artificial neural networks into spiking neural networks. It requires no retraining and only a small calibration dataset.
3. Zhongyu Liang, **Tong Bu**, Zijian Lyu, et al. **Ultrafast Probabilistic Neuron in an Artificial Spin Ice for Robust Deep Neural Networks (Co-first author).** *Advanced Functional Materials*, 2025.
Used artificial spin-ice devices as the physical computing substrate for artificial neurons, leveraging their intrinsic stochastic microscopic dynamics to produce probabilistic outputs. These neurons integrate with deep-learning frameworks to build more robust AI systems.
4. **Tong Bu, et al. Rate Gradient Approximation Attack Threats Deep Spiking Neural Networks (First author).** In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, 2023.
Investigated the vulnerability of deep spiking neural networks to adversarial attacks and proposed a rate-gradient-approximation attack. The attack is more effective and less sensitive to neuronal hyper-parameters than existing methods, showing that rate-coded spiking neural networks still require stronger defenses and training methods.
5. Zhaofei Yu, **Tong Bu***, et al. **Robust decoding of rich dynamical visual scenes with retinal spikes.** *IEEE Transactions on Neural Networks and Learning Systems*, 2024.
Reconstructed stimulus frames from experimentally recorded retinal spikes using an end-to-end deep neural decoder. The model was trained and evaluated on two continuous-movie datasets of different complexity and assessed with multiple image-quality metrics.
6. **Tong Bu, et al. Optimal ANN-SNN Conversion for High-accuracy and Ultra-low-latency Spiking Neural Networks (First author).** In *International Conference on Learning Representations*, 2022.
Proposed an efficient ANN-to-SNN conversion method based on a theoretical analysis of conversion error. An offset quantized activation replaces the conventional ReLU, enabling high accuracy and ultra-low latency with very few time steps and outperforming existing SNN learning methods on multiple image-classification datasets.

7. **Tong Bu**, et al. **Optimized Potential Initialization for Low-latency Spiking Neural Networks (First author)**. In *Proceedings of the AAAI Conference on Artificial Intelligence*, 2022.

Optimized the initial membrane potential to reduce inference latency after ANN-to-SNN conversion. Theoretical analysis shows that suitable initialization reduces layer-wise conversion error and achieves the minimum expected error under optimal conditions.

Manuscript Under Review

1. **Tong Bu**, et al. **PQS-PCFS: A Unified Framework for High-Performance ANN-to-SNN Conversion (First author)**. *Under Review, IEEE Transactions on Pattern Analysis and Machine Intelligence*.

A unified and theoretically grounded ANN-to-SNN conversion framework. It introduces a parameterized offset quantized activation and a progressive quantization sampling strategy that dynamically adjusts quantization precision, maintaining stable performance across different simulation time steps.

HONORS AND AWARDS

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| • President’s Scholarship
<i>Peking University</i> | 2023-2024 |
| • BYD Scholarship
<i>Peking University</i> | 2024-2025 |

RESEARCH EXPERIENCE

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|---|--------------------------------------|
| • Alibaba - Wan Video Generation Team
<i>Research Intern</i>
Contributing to an open-source real-time video generation project | Summer, 2026 |
| • SERI Summer Fellowship
<i>Stanford University & UC Berkeley</i>
Research Internship | Summer, 2022
Remote |
| • Visiting Scholar
<i>Mohamed bin Zayed University of Artificial Intelligence (MBZUAI)</i>
Research Internship | 2023-2024
Abu Dhabi, UAE / Remote |
| • Visiting Scholar
<i>Graz University of Technology (TU Graz)</i>
Research Internship | Summer, 2024
Graz, Austria |

ACADEMIC SERVICE

Reviewer: ICML, ICLR, NeurIPS, AAAI, CVPR, ECCV, and *IEEE Journals*

LEADERSHIP

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| • Head of the PKU Skiing and Snowboarding Association
<i>Peking University</i> | 2022-2024 |
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RESEARCH AND TECHNICAL SKILLS

Research Areas: Spiking neural networks, ANN-to-SNN conversion, neuromorphic computing, efficient deep learning, neural decoding, adversarial robustness, real-time video generation
Methods: Model pruning and quantization, low-latency inference, theoretical error analysis, robustness evaluation, end-to-end neural decoding
Programming Languages: C/C++, Python, Matlab; proficient in AI-assisted programming
Languages: English, Mandarin (native)