GUANGZHI TANG

guangzhi.tang@imec.nl

EDUCATION

Ph.D Computer Science Sep 2017 - July 2022
Rutgers, The State University of New Jersey, United States

M.Sc Computer Science Sep 2015 - May 2017
Rutgers, The State University of New Jersey, United States

B.Sc Computer Science Sep 2011 - May 2015
Nanjing University, China

RESEARCH EXPERIENCE

Hardware Efficient AI, IMEC Netherlands Sep 2022 - Present
Researcher

- Developing brain-inspired hardware-aware algorithms for efficient neural network processing.
- Core member of the SENECA neuromorphic architecture development team.
- Supervise Master's students on research projects focusing on hardware-aware algorithms.

Neuromorphic Computing Lab, Intel Labs, Intel May 2021 - Aug 2021
PhD Research Intern

- Proposed gradient-based training method for sigma-delta neurons in deep spiking convolutional networks for large-scale drone-based object detection on neuromorphic processors.
- Developed variational autoencoder with disentangled image feature extraction for brain-inspired continuous learning for detection of unknown objects.

Computational Brain Lab, Rutgers University Sep 2017 - July 2022
Graduate Research Assistant

- Proposed state-of-the-art deep reinforcement learning framework for training spiking neural networks to learn optimal policies for energy-efficient high-dimensional control.
- Developed an online and asynchronous gradient-based learning method for deep spiking neural networks, achieving competitive performance compared to backpropagation.
- Built deep convolutional and recurrent neural networks for spatial-temporal learning of brain EEG signals resulting in an energy-efficient brain-computer interface.
- Introduced brain-inspired SLAM solution for robot navigation on the neuromorphic processor with orders of magnitude of energy reduction.

RL Research Group, Nanjing University Sep 2014 - May 2015
Undergraduate Research Assistant

- Developed an online adaptive algorithm based on game theory to play Texas Hold'em poker against different types of players.

WORK EXPERIENCE

Mobile Search Ranking Team, Baidu Jul 2014 - Sep 2014
Research & Development Intern

- Proposed personalized search ranking recommendation algorithms for different searching habits.

- Developed methods to find search query correlations in daily search data using Hadoop clusters.

PUBLICATIONS

Thesis

- **Tang G** (2022), Biologically Inspired Spiking Neural Networks for Energy-Efficient Robot Learning and Control. *PhD Thesis*.

- **Tang G** (2017), Gridbot: Towards a Neuroinspired Navigation System For Robot Planning. *Master's Thesis*.

Journals

- **Tang G**, Vadivel K, Xu Y, Bilgic R, Shidqi K, Detterer P, Traferro S, Konijnenburg M, Sifalakis M, Schaik GJ, Yousefzadeh A. (2023). SENECA: Building a fully digital neuromorphic processor, design trade-offs and challenges. *Frontiers in Neuroscience*.

- Kumar N, **Tang G**, Yoo R, Michmizos K. (2022). Decoding EEG With Spiking Neural Networks on Neuromorphic Hardware. *Transactions on Machine Learning Research (TMLR)*.

- Polykretis I, **Tang G**, Balachandar P., Michmizos K. (2022). A Spiking Neural Network Mimics the Oculomotor System to Control a Biomimetic Robotic Head without Learning on a Neuromorphic Hardware. *IEEE Transactions on Medical Robotics and Bionics*.

Conferences

- **Tang G**, Safa A, Shidqi K, Detterer P, Traferro S, Konijnenburg M, Sifalakis M, Schaik GJ, Yousefzadeh A. (2023). Open the box of digital neuromorphic processor: Towards effective algorithm-hardware co-design. *IEEE International Symposium on Circuits and Systems (ISCAS)*.

- Patiño-Saucedo A, Yousefzadeh A, **Tang G**, Corradi F, Linares-Barranco B, Sifalakis M. (2023). Empirical study on the efficiency of Spiking Neural Networks with axonal delays, and algorithm-hardware benchmarking. *IEEE International Symposium on Circuits and Systems (ISCAS)*.

- **Tang G**, Kumar N, Yoo R, Michmizos K. (2020). Deep Reinforcement Learning with Population-Coded Spiking Neural Network for Continuous Control. *Conference on Robot Learning (CoRL)*, Cambridge, MA.

- **Tang G**, Kumar N, Michmizos K. (2020). Reinforcement co-Learning of Deep and Spiking Neural Networks for Energy-Efficient Mapless Navigation with Neuromorphic Hardware. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Las Vegas, NV.

- **Tang G**, Michmizos K. (2020). Real-time mapping on a neuromorphic processor. *Neuro Inspired Computational Elements Workshop (NICE)*, Heidelberg, Germany.

- Polykretis I, **Tang G**, Michmizos K. (2020). An Astrocyte-Modulated Neuromorphic Central Pattern Generator for Hexapod Robot Locomotion on Intel's Loihi. *International Conference on Neuromorphic Systems (ICONS)*, Oak Ridge, TN.

- **Tang G**, Shah A, Michmizos K. (2019). Spiking Neural Network on Neuromorphic Hardware for Energy-Efficient Unidimensional SLAM. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Macau, China.

- **Tang G**, Polykretis I, Ivanov V, Shah A, Michmizos K. (2019). Introducing the Astrocytic Processing Unit into Neuromorphic Hardware. *Neuro Inspired Computational Elements Workshop (NICE)*, Albany, NY.

- **Tang G**, Michmizos K. (2018). Gridbot: An autonomous robot controlled by a Spiking Neural Network mimicking the brain's navigational system. *International Conference on Neuromorphic Systems (ICONS)*, Knoxville, TN.

Preprints

- Joint authors, **Tang G**, et al. (2023). NeuroBench: Advancing neuromorphic computing through collaborative, fair and representative benchmarking. *arXiv preprint.*
- **Tang G**, Kumar N, Polykretis I, Michmizos K. (2021). BioGrad: Biologically Plausible Gradient-Based Learning for Spiking Neural Networks. *arXiv preprint.*

ACADEMIC SERVICES

Reviewer

International Conference on Machine Learning (ICML)	2023
Neural Information Processing Systems (NeurIPS)	2021-2023
International Conference on Learning Representations (ICLR)	2021, 2022
IEEE Engineering in Medicine and Biology Society Conference (EMBC)	2018-2021
International Conference on Biomedical Robotics and Biomechatronics (BioRob)	2020
Transactions on Machine Learning Research (TMLR)	Since 2022
IEEE Robotics and Automation Letters (RA-L)	Since 2022
ACM Journal on Emerging Technologies in Computing Systems (JETC)	Since 2021

HONORS & AWARDS

NeurIPS Outstanding Reviewer Award	NeurIPS, 2021
IROS Student Travel Award	IEEE, 2019
Microsoft & IEEE Young Fellow Scholarship Award	MSRA, 2014

TEACHING EXPERIENCE

Rutgers University Sep 2017 - Sep 2019
Teaching Assistant

- Courses - Introduction to Computational Robotics; Computer Architecture; Brain-inspired Computing; Introduction to Computer Science.
- Taught weekly recitation classes and advised students on their course assignments and projects.

SKILLS

Programming Language	Python, C, C++, Java
Machine Learning Framework	PyTorch, TensorFlow
Robotic Software	Robot Operating System (ROS), Gazebo
Robotic Platform	Turtlebot2, Phantomx Hexapod, Intel Realsense
Neuromorphic Computing	Intel Loihi, NxSDK, Lava