Dongning Ma **Ph.D.**

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Education and Employment

Mohamed bin Zayed University of Artificial Intelligence *Abu Dhabi, United Arab Emirates*
Postdoctoral Associate *2025.8 -*
- Working with: Prof. Abdulrahman Mahmoud

Villanova University *800 E. Lancaster Ave., PA 19085, United States*
Ph.D. in Computer Engineering *2019.1 - 2025.5*
- Advisor: Prof. Xun Jiao

University of Science and Technology Beijing *30 Xueyuan Road, Haidian District, Beijing, China*
B.Eng. in Automation *2014.8 - 2018.6*
- Advisor: Dr. Jiyuan Dong

Research Focus

- Hardware/Software Co-design for Efficient and Reliable Machine Learning Systems
- Emerging Computing Schemes such as Approximate Computing and Bio-inspired Computing
- Computer Architecture for AI/ML Enabled Brain Computer Interface

Academic Records

Journal

TNSRE **Dongning Ma**, Meltem Izzetoglu, Roee Holtzer, and Xun Jiao. Deep Learning Based Walking Tasks Classification in Older Adults using fNIRS. IEEE Transactions on Neural Systems and Rehabilitation Engineering, 2023.

TCAD **Dongning Ma**, Tajana Šimunić Rosing, and Xun Jiao. Testing and Enhancing Adversarial Robustness of Hyperdimensional Computing. IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, 2023.

ESL Ruixuan Wang, **Dongning Ma**, and Xun Jiao. EnHDC: Ensemble Learning for Brain-Inspired Hyperdimensional Computing. IEEE Embedded Systems Letters, 2022.

TCAD **Dongning Ma**, Xinqiao Zhang, Ke Huang, Yu Jiang, Wanli Chang, and Xun Jiao. DEVoT: Dynamic Delay Modeling of Functional Units under Voltage and Temperature Variations. IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, 2021.

TCAD Xun Jiao, **Dongning Ma**, Wanli Chang, and Yu Jiang. LEVAX: An Input-aware Learning-based Error Model of Voltage-Scaled Functional Units. IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, 2020.

ESL **Dongning Ma**, and Xun Jiao. WoMA: An Input-Based Learning Model to Predict Dynamic Workload of Embedded Applications. IEEE Embedded Systems Letters, 2019.

Conference

BioCAS'25	Jinghao Wen, **Dongning Ma**, Sizhe Zhang, Hasshi Sudler, Xun Jiao. Proof-of-Useful-Work Blockchain for Trustworthy Biomedical Hyperdimensional Computing. 21st IEEE Biomedical Circuits and Systems Conference. Abu Dhabi, United Arab Emirates.
ISSRE'25	**Dongning Ma**, Xun Jiao, Fred Lin, Daniel Moore and Sriram Sankar. Understanding Recommendation System Robustness Against Silent Data Corruption: An Empirical Study. 36th IEEE International Symposium on Software Reliability Engineering. São Paulo, Brazil. **(Best Paper Candidate)**
SIGIR'24	**Dongning Ma**, Xun Jiao. Memory-Efficient Deep Recommender Systems using Approximate Rotary Compositional Embedding. In Proceedings of the 47th International ACM SIGIR Conference on Research and Development in Information Retrieval. Washington D.C., USA.
ASPLOS'24	**Dongning Ma**, Fred Lin, Alban Desmaison, Joel Coburn, Daniel Moore, Sriram Sankar, Xun Jiao. Dr. DNA: Combating Silent Data Corruptions in Deep Learning using Distribution of Neuron Activations. In Proceedings of the ACM International Conference on Architectural Support for Programming Languages and Operating Systems. San Diego, California, USA.
ISQED'24	**Dongning Ma**, Cong Hao, Xun Jiao. Hyperdimensional Computing vs. Neural Networks: Comparing Architecture and Learning Process. In Proceedings of the 25th International Symposium on Quality Electronic Design. San Francisco, California, USA.
CVPRW-NAS'23	**Dongning Ma**, Pengfei Zhao, Xun Jiao. PerfHD: Efficient ViT Architecture Performance Ranking using Hyperdimensional Computing. In Proceedings of the Fourth Workshop on Neural Architecture Search, Third Lightweight NAS Challenge at the IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops. Vancouver, Canada.
IJCNN'23	Sizhe Zhang, **Dongning Ma**, Song Bian, Lei Yang, Xun Jiao. On Hyperdimensional Computing-Based Federated Learning: A Case Study. In Proceedings of the 2023 International Joint Conference on Neural Networks. Queensland, Australia.
ASP-DAC'23	**Dongning Ma**, Sizhe Zhang, Xun Jiao. Robust Hyperdimensional Computing Against Cyber Attacks and Hardware Errors: A Survey. In Proceedings of the 28th Asia and South Pacific Design Automation Conference. Tokyo, Japan.
BIBM'22	**Dongning Ma**, Rahul Thapa, Xun Jiao. MoleHD: Drug Discovery using Brain-Inspired Hyperdimensional Computing. In Proceedings of the IEEE International Conference on Bioinformatics and Biomedicine. Las Vegas, Nevada, USA.
CODES+ISSS'22	Hussam Amrouch, Mohsen Imani, Xun Jiao, Yiannis Aloimonos, Cornelia Fermuller, Dehao Yuan, **Dongning Ma**, Hamza Errahmouni, Paul R. Genssler, Peter Sutor. Brain-Inspired Hyperdimensional Computing for Ultra-Efficient Edge AI. In Proceedings of the International Conference on Hardware/Software Codesign and System Synthesis. Shanghai, China.
ISQED'22	**Dongning Ma**, Xue Qin, Xun Jiao. AxBy-ViT: Reconfigurable Approximate Computation Bypass for Vision Transformers. In Proceedings of the 23rd International Symposium on Quality Electronic Design. Virtual Conference, California, USA.
DATE'22	Sizhe Zhang, Ruixuan Wang, **Dongning Ma**, Jeff Jun Zhang, Xunzhao Yin, Xun Jiao. Energy-Efficient Brain-Inspired Hyperdimensional Computing Using Voltage Scaling. In Proceedings of the Design, Automation and Test in Europe Conference. Antwerp, Belgium. **(Best Paper Award Candidate)**

ISVLSI'21	Rahul Thapa, **Dongning Ma**, Xun Jiao. HDXplore: Automated Differential Testing of Brain-Inspired Hyperdimensional Computing. In Proceedings of the IEEE Computer Society Annual Symposium on VLSI. Tampa, Florida, USA.
ISVLSI'21	Rahul Thapa, Bikal Lamichhane, **Dongning Ma**, Xun Jiao. SpamHD: Efficient Text Spam Detection Using Brain-Inspired Hyperdimensional Computing. In Proceedings of the IEEE Computer Society Annual Symposium on VLSI. Tampa, Florida, USA.
DAC'21	**Dongning Ma**, Jianmin Guo, Yu Jiang, Xun Jiao. HDTest: Differential Fuzz Testing of Brain-Inspired Hyperdimensional Computing. In Proceedings of the 58th ACM/EDAC/IEEE Design Automation Conference. San Francisco, California, USA.
DATE'21	**Dongning Ma**, Rahul Thapa, Xingjian Wang, Cong Hao, Xun Jiao. Workload-Aware Approximate Computing Configuration. In Proceedings of the Design, Automation and Test in Europe Conference. Grenoble, France.
DSN'20	**Dongning Ma**, Xun Jiao. A Machine Learning-based Error Model of Voltage-Scaled Circuits. In Proceedings of the 50th IEEE/IFIP International Conference on Dependable Systems and Networks. Valencia, Spain.
Euromicro DSD'20	**Dongning Ma**, Xun Jiao. AxBy: Approximate Computation Bypass for Data-Intensive Applications. In Proceedings of the Euromicro Conference on Digital System Design. Portorož, Slovenia. **(Outstanding Paper Award)**
GLSVLSI'20	**Dongning Ma**, Xunzhao Yin, Michael Niemier, X. Sharon Hu, Xun Jiao. AxR-NN: Approximate Computation Reuse for Energy-Efficient Convolutional Neural Networks. In Proceedings of the 30th ACM Great Lakes Symposium on VLSI. Beijing, China.
DAC'20	Xun Jiao, **Dongning Ma**, Wanli Chang, Yu Jiang. TEVoT: Timing Error Modeling of Functional Units under Dynamic Voltage and Temperature Variations. In Proceedings of the 57th ACM/EDAC/IEEE Design Automation Conference. San Francisco, California, USA.
SELSE'20	**Dongning Ma**, Xun Jiao. An Input-aware Learning-based Error Model of Voltage-Scaled Functional Units. In Proceedings of the 16th IEEE Workshop on Silicon Errors in Logic – System Effects. Stanford, California, USA. **(Best Paper Award)**
CODES+ISSS'19	**Dongning Ma**, Siyu Shen, Xun Jiao. Work-in-Progress: DeVos: A Learning-based Delay Model of Voltage-Scaled Circuits. In Proceedings of the International Conference on Hardware/Software Codesign and System Synthesis. New York, USA.
NANOARCH'19	**Dongning Ma**, Xun Jiao. Detecting and Bypassing Trivial Computations in Convolutional Neural Networks. In Proceedings of the IEEE/ACM International Symposium on Nanoscale Architectures.
ICESS'19	**Dongning Ma**, Xun Jiao. Energy Efficient GPU Applications Through Computation Skip. In Proceedings of the IEEE International Conference on Embedded Software and Systems. Las Vegas, Nevada, USA.

Other

NER'25	Juwayni Lucman, Chaimaa Abi, **Dongning Ma**, Raghavendra Pradyumna Pothukuchi, Luciano Dyballa, Abhishek Bhattacharjee, James E. Smith, Abdulrahman Mahmoud. Real-Time Spike Sorting with SpikeDashboard. IEEE EMBS 12th Annual International Conference on Neural Engineering. San Diego, California. (Poster)

Honors and Awards

2024 **Student Travel Award (NSF) and Volunteer**, SIGIR
2022 **Student Travel Award (NSF and TCCLS) and Volunteer**, BIBM
2021 **Finalist (7th / 2434 Teams)**, National Artificial Intelligence Challenge of China
2021 **Student Support Grant (NSF)**, IGSC
2021 **Young Fellow Program with Best 2-Minute Research Video Award**, DAC
2021 **Student Travel Grant (NSF)**, ISVLSI
2020 **A. Richard Newton Young Student Fellow**, DAC
2020 **Student Support Grant (NSF)**, IGSC
2020 **Student Activities Program (NSF)**, VTS
2019 **Poster Presentation and Student Travel Grant (NSF)**, IGSC
2019 **Student Research Competition and Travel Grant (Microsoft)**, ESWEEK

Teaching Experience

Villanova University

Spring 2025 **ECE 1205 - ECE Freshman Projects**, Teaching Assistant
Fall 2024 **ECE 5450 - Microcontrollers and Applications**, Teaching Assistant
Fall 2023 **ECE 5450 - Microcontrollers and Applications**, Teaching Assistant
Spring 2023 **ECE 5400 - Applied Machine Learning**, Teaching Assistant
Spring 2023 **EGR 1261 - Engineering Programming and Application**, Teaching Assistant
Fall 2021 **ECE 5450 - Microcontrollers and Applications**, Teaching Assistant
Spring 2021 **EGR 1620 - Engineering Programming and Application**, Teaching Assistant
Spring 2022 **ECE 1620 - Engineering Programming and Application**, Teaching Assistant
Spring 2022 **ECE 5400 - Applied Machine Learning**, Teaching Assistant
Spring 2021 **ECE 1620 - Engineering Programming and Application**, Teaching Assistant
Fall 2021 **EGR 1200 - Engineering Interdisciplinary Project I**, Teaching Assistant
Fall 2020 **ECE 5450 - Microcontrollers and Applications**, Teaching Assistant
Spring 2020 **ECE 1620 - Engineering Programming and Application**, Teaching Assistant
Spring 2020 **ECE 2045 - Fundamentals of Computer Engineering II Lab**, Teaching Assistant
Fall 2020 **EGR 1200 - Engineering Interdisciplinary Project I**, Teaching Assistant
Fall 2019 **ECE 5400 - Applied Machine Learning**, Teaching Assistant
Fall 2019 **ECE 5450 - Microcontrollers and Applications**, Teaching Assistant
Spring 2019 **ECE 2431 - Embedded Systems I Lab**, Teaching Assistant

Professional Service

Committee

Program Committee of the Euromicro Conference on Digital System Design (DSD) 2022 - Special Session on Design of Cyber-Physical Systems (DCPS)

Program Committee (Reviewer) of the 40th Annual AAAI Conference on Artificial Intelligence (AAAI 2026)

Reviewer

IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)
ACM Transactions on Knowledge Discovery from Data (TKDD)
The Journal of Supercomputing
IEEE Transactions on Very Large Scale Integration Systems (TVLSI)
IEEE Journal of the Electron Devices Society (J-EDS)
Discover Internet of Things
IEEE Open Journal of the Computer Society (OJ-COMS)
IEEE Access

Discover Applied Sciences
IEEE Transactions on Artificial Intelligence (TAI)
Results in Engineering

Professional Memberships

IEEE, ACM, AAAI