

# DONGNING MA

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Department of Electrical and Computer Engineering, Villanova University  
800 E. Lancaster Ave, Villanova, PA 19085

## EDUCATION

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### **Villanova University, PA**

*January 2019 - December 2023 (Expected)*

Ph.D. Candidate in Computer Engineering  
Department of Electrical and Computer Engineering

### **University of Science and Technology Beijing, China**

*September 2014 - June 2018*

Bachelor of Engineering in Automation  
School of Advanced Engineering

## SHORT BIO

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**Dongning Ma** is currently a Ph.D. candidate in Computer Engineering (CpE) from Department of Electrical and Computer Engineering in Villanova University under the supervision of Prof. Xun Jiao. He obtained his Bachelor of Engineering degree in Automation from School of Advanced Engineering of University of Science and Technology Beijing (USTB). He has published more than 20 papers in top-tier venues such as DAC, DATE, TCAD, with best paper awards/candidates including DSD/SEAA, DATE, and SELSE. He is also an A. Richard Newton Young Student Fellow at DAC 2020 and a finalist (7th/2434 teams) at 2021 (China) National Artificial Intelligence Challenge.

## RESEARCH FOCUS

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- Computational intelligence such as brain-inspired Hyperdimensional Computing (HDC) and other non von Neumann computing schemes.
- Emerging artificial intelligence (AI) and machine learning (ML) applications such as bio-informatics, generative models and recommendation systems.
- Efficiency, robustness, resilience and reliability of AI and ML.

## ACADEMIC RECORDS

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### **Journals**

5. 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 (**TCAD**), 2023.
4. Ruixuan Wang, Dongning Ma, and Xun Jiao. "EnHDC: Ensemble Learning for Brain-Inspired Hyperdimensional Computing." IEEE Embedded Systems Letters (**ESL**), 2022.
3. 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 (**TCAD**), 2021.
2. 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 (**TCAD**), 2020.

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

## Conferences

18. Sizhe Zhang, Dongning Ma, Song Bian, Lei Yang, Xun Jiao, “On Hyperdimensional Computing-Based Federated Learning: A Case Study”, 2023 International Joint Conference on Neural Networks (**IJCNN**), Queensland, Australia, 2023
17. Dongning Ma, Sizhe Zhang, Xun Jiao, “Robust Hyperdimensional Computing Against Cyber Attacks and Hardware Errors: A Survey”, 28th Asia and South Pacific Design Automation Conference (**ASP-DAC**), Tokyo, Japan, 2023
16. Dongning Ma, Rahul Thapa, Xun Jiao, “MoleHD: Drug Discovery using Brain-Inspired Hyperdimensional Computing”, 2022 IEEE International Conference on Bioinformatics and Biomedicine (**BIBM**), Las Vegas, Nevada, 2022
15. 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”, International Conference on Hardware/Software Codesign and System Synthesis (**CODES+ISSS**), Shanghai, China, 2022
14. Dongning Ma, Xue Qin, Xun Jiao, “AxBy-ViT: Reconfigurable Approximate Computation Bypass for Vision Transformers”, 23rd International Symposium on Quality Electronic Design (**ISQED**), Virtual, California, 2022
13. Sizhe Zhang, Ruixuan Wang, Dongning Ma, Jeff Jun Zhang, Xunzhao Yin, Xun Jiao, “Energy-Efficient Brain-Inspired Hyperdimensional Computing Using Voltage Scaling”. 2022 Design, Automation and Test in Europe Conference (**DATE**), Antwerp, Belgium, 2022 (**Best Paper Award Candidate**)
12. Rahul Thapa, Dongning Ma, Xun Jiao, “HDXplore: Automated Differential Testing of Brain-Inspired Hyperdimensional Computing”. 2021 IEEE Computer Society Annual Symposium on VLSI (**ISVLSI**), Tampa, FL, 2021.
11. Rahul Thapa, Bikal Lamichhane, Dongning Ma, Xun Jiao, “SpamHD: Efficient Text Spam Detection Using Brain-Inspired Hyperdimensional Computing”. 2021 IEEE Computer Society Annual Symposium on VLSI (**ISVLSI**), Tampa, FL, 2021.
10. Dongning Ma, Jianmin Guo, Yu Jiang, Xun Jiao, “HDTest: Differential Fuzz Testing of Brain-Inspired Hyperdimensional Computing”. 58th 2021 ACM/EDAC/IEEE Design Automation Conference (**DAC**), San Francisco, CA, 2021.
9. Dongning Ma, Rahul Thapa, Xingjian Wang, Cong Hao and Xun Jiao, “Workload-Aware Approximate Computing Configuration”. 2021 Design, Automation & Test in Europe Conference & Exhibition (**DATE**), Grenoble, France, 2021.
8. Dongning Ma, Xun Jiao, “A Machine Learning-based Error Model of Voltage-Scaled Circuits”. 50th IEEE/IFIP International Conference on Dependable Systems and Networks (**DSN**), Valencia, Spain, 2020.
7. Dongning Ma, Xun Jiao, “AxBy: Approximate Computation Bypass for Data-Intensive Applications”. 2020 Euromicro Conference on Digital System Design (**Euromicro DSD**), Portoro, Slovenia, 2020. (**Outstanding Paper Award**)
6. Dongning Ma, Xunzhao Yin, Michael Niemier, X. Sharon Hu, Xun Jiao, “AxR-NN: Approximate Computation Reuse for Energy-Efficient Convolutional Neural Networks”. 30th ACM Great Lakes

Symposium on VLSI (**GLSVLSI**), Beijing, China, 2020.

5. Xun Jiao, Dongning Ma, Wanli Chang, Yu Jiang, “TEVoT: Timing Error Modeling of Functional Units under Dynamic Voltage and Temperature Variations”. 57th 2019 ACM/EDAC/IEEE Design Automation Conference (**DAC**), San Francisco, CA, 2020.
4. Dongning Ma, Xun Jiao, “An Input-aware Learning-based Error Model of Voltage-Scaled Functional Units”. The 16th IEEE Workshop on Silicon Errors in Logic - System Effects (**SELSE**), Stanford, CA, 2020. (**Best Paper Award**)
3. Dongning Ma, Siyu Shen, Xun Jiao, “Work-in-Progress: DeVos: A Learning-based Delay Model of Voltage-Scaled Circuits”. International Conference on Hardware/Software Codesign and System Synthesis (**CODES+ISSS**), New York, USA, 2019.
2. Dongning Ma, Xun Jiao, “Detecting and Bypassing Trivial Computations in Convolutional Neural Networks”, IEEE/ACM International Symposium on Nanoscale Architectures (**NANOARCH**), 2019
1. Dongning Ma, Xun Jiao, “Energy Efficient GPU Applications Through Computation Skip”. in Proc. IEEE International Conference on Embedded Software and Systems (**ICESS**), Las Vegas, USA, 2019.

## Honors

- 2022 IEEE International Conference on Bioinformatics and Biomedicine (BIBM) Student Travel Award (NSF and TCCLS) and Volunteer
- **2021 (China) National Artificial Intelligence Challenge Finalist (7th / 2434 Teams)**
- 2021 International Green and Sustainable Computing Conference (IGSC 2021) - Student Support Grant (NSF)
- 2021 ACM/EDAC/IEEE Design Automation Conference (DAC 2021) Young Fellow Program with the **Best 2-Minute Research Video Award!**
- IEEE Computer Society Annual Symposium on VLSI (ISVLSI 2021) - Student Travel Grant (NSF)
- 2020 ACM/EDAC/IEEE Design Automation Conference (DAC 2020) A. Richard Newton Young Student Fellow
- International Green and Sustainable Computing Conference (IGSC 2020) - Student Support Grant (NSF)
- IEEE VLSI Test Symposium 2020 (VTS’20) - Student Activities Program (NSF)
- International Green and Sustainable Computing Conference (IGSC 2019) - Poster Presentation - Student Travel Grant (NSF)
- Embedded System Week 2019 (ESWEEK’19) ACM SIGBED Student Research Competition - Student Travel Grant (Microsoft)

## OTHER SERVICES

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### Teaching

- Teaching Assistant for ECE 5400 - Applied Machine Learning (Spring 2022)
- Teaching Assistant for EGR 1620 - Engineering Programming and Application (Spring 2022)
- Teaching Assistant for EGR 1200 - Engineering Interdisciplinary Project I (Fall 2021)

- Teaching Assistant for ECE 5450 - Microcontrollers & Applications (Fall 2021)
- Teaching Assistant for EGR 1620 - Engineering Programming and Application (Spring 2021)
- Teaching Assistant for EGR 1200 - Engineering Interdisciplinary Project I (Fall 2020)
- Teaching Assistant for ECE 5450 - Microcontrollers & Applications (Fall 2020)
- Teaching Assistant for ECE 1620 - Engineering Programming and Application (Spring 2020)
- Teaching Assistant for ECE 2045 - Fundamentals of Computer Engineering II Lab (Spring 2020)
- Teaching Assistant for ECE 5400 - Applied Machine Learning (Fall 2019)
- Teaching Assistant for ECE 5450 - Microcontrollers & Applications (Fall 2019)
- Teaching Assistant for ECE 2431 - Embedded Systems I Lab (Spring 2019)

### **Professional Services**

- Reviewer for IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD) (2020, 2021, 2022) ([Publons](#))
- [Program Committee](#) of the Euromicro Conference on Digital System Design (DSD) 2022 - Special Session on Design of Cyber-Physical Systems (DCPS)

### **Memberships**

- Institute of Electrical and Electronics Engineers (IEEE), Student Member, 2019 - Present
- Institute of Electrical and Electronics Engineers (IEEE), Computational Intelligence Society, Graduate Student Member, 2022 - Present
- Association for Computing Machinery (ACM), Student Member, 2019 - Present
- Association for the Advancement of Artificial Intelligence, Member, 2022 - Present

Last Update: 04/07/2023