Xiaowei Xu

CONTACT INFORMATION

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University of Notre Dame
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RESEARCH INTERESTS

Internet of Things, Embedded Systems, Deep Learning, Medical Image Processing, Hardware Acceleration.

EMPLOYMENT

University of Notre Dame, IN, USA

Post-doc Researcher, Department of Computer Science & Engineering, September 2016 - present

Huazhong University of Science and Technology, Wuhan, China

Research Assistant, September 2011 - June 2016

EDUCATION

Huazhong University of Science and Technology, Wuhan, China

Ph.D, Electrical Engineering, September 2011 - June 2016

University at Buffalo, SUNY, NY, USA

Visiting Scholar, March 2015 - March 2016

University of Alberta, Alberta, Canada

Visiting Scholar, May 2015 - August 2015

Huazhong University of Science and Technology, Wuhan, China

M.S., Electrical Science and Technology, September 2011 - March 2014

Huazhong University of Science and Technology, Wuhan, China

B.S., Electrical Science and Technology, September 2007 - June 2011

AWARDS AND HONORS

- DAC syetem design contest special service recognition reward, 2018
- Outstanding contribution in reviewing, Integration, the VLSI journal, 2017
- Outstanding Class Leader, 2012-2014
- National Motivational Scholarship, 2008-2010 (**2%**)
- Outstanding undergraduate thesis of Hubei Province, 2011 (**1%**)
- Intel Cup 2010 ***National*** Embedded Systems Undergraduate Electronic Design Contest Special, Invitational Contest, Third place, 2010
- Hubei Undergraduate Electronic Design Contest Special Contest ALTERA SOPC Cup, Third place, 2010
- UDC ***National*** University Design Competition, Third place, 2010

Journal Articles

J16. **Xiaowei Xu**, Xinyi Zhang, Bei Yu, Xiaobo Sharon Hu, Christopher Rowen, Jingtong Hu, Yiyu Shi, "DAC-SDC Low Power Object Detection Challenge for UAV Applications", IEEE Transactions on Pattern Analysis and Machine Intelligence (**TPAMI**), **Under review**. (**Top journal in AI, recommended A by CCF**)

J15. Dawei Li, **Xiaowei Xu**, Leibo Liu, Yiyu Shi, Cheng Zhuo, "Phase-Switching Modulator for Implantable Medical Applications", IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**), **Under review**. (**Top journal in CAD, recommended A by CCF**)

J14. **Xiaowei Xu**, Feng Lin, Wenyao Xu, Xinwei Yao and Yiyu Shi, Dewen Zeng, Yu Hu, "M-DA: A Reconfigurable Memristor-based Distance Accelerator for Time Series Mining on Data Centers", IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**) (in print). (**Top journal in CAD, recommended A by CCF**)

J13. **Xiaowei Xu**, Yukun Ding, Sharon Hu, Michael Niemier, Jason Cong, Yu Hu and Yiyu Shi, "Scaling of Deep Neural Networks for Edge Inference: A Race between Data Scientists and Hardware Architects", **Nature Electronics**, 2018, 1(4): 216. (**Top journal**)

J12. **Xiaowei Xu**, Feng Lin, Aosen Wang, Qing Lu, Wenyao Xu, Yiyu Shi and Yu Hu, "Accelerating Dynamic Time Warping with Memristor -based Customized Fabrics", IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**), 37(4), pp. 729-741, 2018. (**Top journal in CAD, recommended A by CCF**)

J11. **Xiaowei Xu**, Feng Lin, Aosen Wang, Yu Hu, Ming-chun Huang, and Wenyao Xu, "Body-Earth Mover's Distance: A Matching-Based Approach for Sleep Posture Recognition", IEEE Transactions on Biomedical Circuits and Systems (**TBioCAS**). 10(5), pp.1023-1035.(**SCI A**)

J10. **Xiaowei Xu**, "On the Quantization of Cellular Neural Networks for Cyber-Physical Systems", TC-CPS-letter, 1(5), February 01, 2018.

J9. **Xiaowei Xu**, Qing Lu, Tianchen Wang, Yu Hu, Chen Zhuo, Jinglan Liu, Yiyu Shi, "Efficient Hardware Implementation of Cellular Neural Networks with Incremental Quantization and Early Exit", Journal of Emerging Technologies in Computing Systems (**JETC**), Accepted. (**Top journal in CAD, recommended C by CCF**)

J8. Zhongyang Liu, Shanheng Luo, **Xiaowei Xu**, Yiyu Shi, Chen Zhuo, "A Multi-Level Optimization Framework for FPGA-Based Cellular Neural Network Implementation", Journal of Emerging Technologies in Computing Systems (**JETC**), Accepted. (**Top journal in CAD, recommended C by CCF**)

J7. Zhongyang Liu, Chen Zhuo, **Xiaowei Xu**, "An efficient segmentation method using quantized and non-linear CeNN for breast tumor classification", Electronics Letters, 2018. (SCI C)

J6. Feng Lin, Chen Song, **Xiaowei Xu**, Lora Cavuoto, Wenyao Xu, "Patient Handling Activity Recognition Through Pressure-Map Manifold Learning Using A Footwear Sensor", Elsevier Smart Health (SH), 1(2), June 2017, Pages 77-92.

J5. **Xiaowei Xu**, Lu Pu, Tao Jiang, Zhijun Qiu, and Yu Hu, "A Comparison Study of Connected Vehicle Systems between Named Data Networking and IP", Journal of Internet Technology, 16(2), pp.343-350, 2015. (SCI C)

J4. Li Zhang, **Xiaowei Xu**, Dawei Li, Xiaofei Chen, Xuecheng Zou, "A single phase modulation for pulse-based inductive-coupling connection in 3D stacked chip", IEICE Electronics Express, 2017, 14(20). (SCI C)

J3. Li Zhang, Dawei Li, Xuecheng Zou, Yu Hu, **Xiaowei Xu**, "Scalable and Parameterized Architecture for Efficient Stream Mining", IEICE transections on Fundamentals of Electronics, Communications and Computer Sciences, Vol.E101-A, No.1, pp.219-231, 2018. (SCI C)

J2. Lu Pu, **Xiaowei Xu**, Han He, Haning Zhou, Zhijun Qiu, and Yu Hu, "A flexible control study of variable speed limit in connected vehicle systems", International Journal of Embedded Systems, 7(2), 2015.

J1. Jiangchen Li, **Xiaowei Xu**, Junpei Han, Yu Hu, and Xuecheng Zou, "Synchronized pulsed LED algorithm for ambient infrared noise minimization in FTIR-based multitouch system", Infrared and Laser Engineering, 42(6), 2013.

Conference Papers

C23. Tianchen Wang, **Xiaowei Xu**, jingjun, Xiong, Yiyu Shi, "SCNN: A General Distribution based Statistical Convolutional Neural Networkwith Application to Video Object Detection", The Thirty-Third AAAI Conference on Artificial Intelligence (**AAAI'19**), Honolulu, 2019. Under Review (**Top conference in AI, recommended A by CCF**)

C22. **Xiaowei Xu**, Qing Lu, Lin Yang, Sharon Hu, Danny Chen, Yu Hu, Yiyu Shi, "Quantization of Fully Convolutional Networks for Accurate Biomedical Image Segmentation", IEEE Conference on Computer Vision and Pattern Recognition (**CVPR'18**), Salt lake city, 2018. (**Top conference in AI, recommended A by CCF**)

C21. **Xiaowei Xu**, Tianchen Wang, Qing Lu, Yiyu Shi, "Resource Constrained Cellular Neural Networks for Real-time Obstacle Detection using FPGAs", The 19th International Symposium on Quality Electronic Design (**ISQED'18**), Santa Clark, USA, 2018.

C20. **Xiaowei Xu**, Dewen Zeng, Wenyao Xu, Yiyu Shi, Yu Hu, "An Efficient Memristor-Based Distance Accelerator for Time Series Data Mining on Data Centers", 54th Design Automation Conference (**DAC'17**), 2017. (**Top conference in CAD, recommended B by CCF**)

C19. **Xiaowei Xu**, Qing Lu, Tianchen Wang, Jinglan Liu, Chen Zhuo, Sharon Hu, Yiyu Shi, "Empowering Mobile Telemedicine with Compressed Cellular Neural Networks", in Proc. of IEEE/ACM 2017 International Conference On Computer-Aided Design (**ICCAD'17**), CA, 2017. (**Top conference in CAD, recommended B by CCF**)

C18. **Xiaowei Xu**, Qing Lu, Tianchen Wang, Jinglan Liu, Yu Hu and Yiyu Shi, "Efficient Hardware Implementation of Cellular Neural Networks with Powers-of-Two Based Incremental Quantization", Neuromorphic Computing Symposium, Knoxville, 2017.

C17. Zeyu Yan, **Xiaowei Xu**, Guangyu Yu, Hu Yu, "Empowering Edge Mining on Smartphones with Reconfigurable Fabrics", China Semiconductor Technology International Conference (**CSTIC**), Shanghai, China, 2018.

C16. Guangyu Yu, **Xiaowei Xu**, Zeyu Yan and Hu Yu, "Accelerating Earth Movers Distance with Instruction Set Extension for Image Retrieval", China Semiconductor Technology International Conference (**CSTIC**), Shanghai, China, 2018.

C15. Guanbing Deng, Hanqing Zhou, Guangyu Yu, Zeyu Yan, Yu Hu, **Xiaowei Xu**, "Scalable and parameterized dynamic time warping architecture for efficient vehicle re-identification", In Transportation Information and Safety (**ICTIS**), 4th International Conference on, 2017.

C14. Zhongyang Liu, Shaoheng Luo, **Xiaowei Xu**, Yiyu Shi and Chen Zhuo, "A Multi-Level Optimization Framework for Efficient FPGA-Based Cellular Neural Network Implementation", Neuromorphic Computing Symposium, Knoxville, July 2017.

C13. Kun Woo Cho, Feng Lin, Chen Song, **Xiaowei Xu**, Fuxing Gu, and Wenyao Xu, "Thermal Handprint Analysis for Forensic Identification using Heat-Earth Mover's Distance", 2016 IEEE International Conference on Identity, Security and Behavior Analysis (**ISBA'16**), Sendai, Japan, February, 2016.

C12. Feng Lin, Chen Song, **Xiaowei Xu**, Lora Cavuoto, Wenyao Xu, "Sensing from the Bottom: Smart Insole Enabled Patient Handling Activity Recognition Through Manifold Learning", IEEE International Conference on Connected Health: Applications, Systems and Engineering Technologies (**CHASE'16**), Washington D.C., June 2016.

C11. Feng Lin, **Xiaowei Xu**, Aosen Wang, Lora Cavuoto, Wenyao Xu, "Automated patient handling activity recognition for at-risk caregivers using an unobtrusive wearable sensor", IEEE International Conference on Biomedical and Health Informatics (**BHI'16**), Las Vegas, February 2016.

C10. Kun Woo Cho, Feng Lin, Chen Song, **Xiaowei Xu**, Michelle Hartley-McAndrew, Kathy Doody, Wenyao Xu, "Gaze-Wasserstein: A Quantitative Screening Approach to Autism Spectrum Disorder", IEEE Annual Wireless Health Conference (**WH'16**), Bethesda, MD, October 2016.

C9. **Xiaowei Xu**, Feng Lin, Aosen Wang, Chen Song, Yu Hu, and Wenyao Xu, "On-bed Sleep Posture Recognition Based on Body-Earth Movers Distance", IEEE Conference on Circuits and Systems (**BioCAS'15**), Atlanta, Georgia, October, 2015.

C8. Aosen Wang, Chen Song, **Xiaowei Xu**, Feng Lin, Zhanpeng Jin, and Wenyao Xu, "Selective and Compressed Sensing for Energy-Efficient Implantable Neural Encoding", IEEE Conference on Circuits and Systems (**BioCAS'15**), Atlanta, 2015.

C7. Hanqing Zhou, **Xiaowei Xu**, Yu Hu, Guangyu Yu, Zeyu Yan, Feng Lin, and Wenyao Xu, "An Energy-efficient Pipelined DTW Architecture on Hybrid Embedded Platform", IEEE Green and Sustainable Computing Conference (**IGSC'15**), Las Vegas, 2015.

C6. **Xiaowei Xu**, Lu Pu, Hanqing Zhou, Yu Hu, Aosen Wang, and Wenyao Xu, "Energy Characterization and Optimization of Embedded Data Mining Algorithms: a Case Study of the DTW-kNN Framework", International Workshop on Green Programming, Computing, and Data Processing (**GPCDP**), Dallas, Texas, 2014.

C5. Lu Pu, **Xiaowei Xu**, Han He, Haning Zhou, Zhijun Qiu, and Yu Hu, "A flexible control study of variable speed limit in connected vehicle systems", International Workshop on Mobile Internet Big Data (**IWMBD'14**), Wuhan, China, May, 2014.

C4. Jiangchen Li, **Xiaowei Xu**, Hongpeng Zhao, Yu Hu, and Tony Z. Qiu, "An Energy Efficient Sub-Nyquist Sampling Method Based on Compressed Sensing in a Wireless Sensor Network for Vehicle Detection", The 2nd International Conference on Connected Vehicles and Expo (**ICCVE'13**), Las Vegas, Nevada, 2013.

C3. Tao Jiang, **Xiaowei Xu**, Lu Pu, Yu Hu, and Zhijun Qiu, "A simulation study of connected vehicle systems using named data network", 4th International Conference on Cloud Computing (**ICCC'14**), Wuhan, China, 2013.

C2. **Xiaowei Xu**, Tao Jiang, Pengfei Li, Tony Qiu, and Yu Hu, "A High-Level-Architect SimIVC for Simulating Traffic Network", The 2nd International Conference on Transportation Information and Safety (**ICTIS'13**), Wuhan, 2013.

C1. **Xiaowei Xu**, Wanghui Zou, Jinran Du, Xiaofei Chen, and Xuecheng Zou, "Predictive calculation of coupling coefficient between on-chip small-area multilayer inductors", Solid-State and Integrated Circuit Technology", 2012 IEEE 11th International Conference on (**ICSICT'12**), Xian, 2012.

Invited Talks

T2. "*Efficient Machine Learning for IoT Applications*", Shandong University, Qingdao, China, July 2018

T1. "*Hardware Acceleration for Deep Learning*", Zhejiang University of Technology, Hangzhou, China, June 2017

Grants

- National Science Foundation of China, 61272070, (Xiaowei Xu, Ranked the second), **800K**, 2012/10/01 - 2017/12/30
  Project Title: "*FPGA Acceleration of Graph-based Data Mining*"

Selected Public Media Reports

- "*DAC 2018 system design contest*", jiqizhixin, July 19, 2018
- "*Quantization can improve the accuracy of medical image segmentation*", AI Tech Talk, March 8, 2018

Teaching

- *Computer Architecture*, Fall 2012
- *Advanced Computer Architecture*, Fall 2013
- *Deep Learning on Embedded Systems*, Summer 2018

Activities

- **Technical Program Committee**:
  IEEE Computer Society Annual Symposium on VLSI (**ISVLSI**), 2018
  IEEE International Conference on Computer Design (**ICCD**), 2018
  International Symposium on Quality Electronic Design (**ISQED**) 2019

- **Reviewer for Journals**:
  IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**)
  IEEE Transactions on Very Large Scale Integration (**TVLSI**)
  Integration the VLSI Journal (**Integration**)

- **Reviewer for Conferences**:
  IEEE International Conference on Computer Aid Design (**ICCAD**) 2018
  IEEE Design Automation Conference (**DAC**) 2017
  IEEE Computer Society Annual Symposium on VLSI (**ISVLSI**), 2018
  IEEE International Conference on Computer Design (**ICCD**), 2018
  International Symposium on Quality Electronic Design (**ISQED**) 2019