

CONTACT
INFORMATION

Electrical & Computer Engineering Department
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RESEARCH
INTERESTS

- High Performance Mobile Computing System
- Deep Learning and Distributed Intelligent System
- Intelligent System Robustness and Security
- Graphic Computing Optimization for Virtual/Augmented Reality Technologies
- Hardware/Software Co-design for Mobile Display System (*esp.* OLED Technology)
- Embedded System Human-Computer Interaction

EDUCATION
BACKGROUND

University of Pittsburgh, Pittsburgh, PA, USA

- Degree: Ph.D. Major: Computer Engineering 2012~2016
- Degree: M.S. Major: Electrical Engineering 2010~2012
- Adviser: Prof. **Yiran Chen** (Duke University)

Northeastern University, Shenyang, China

- Degree: Bachelor Major: Automation 2006~2010

RESEARCH
GRANTS

- **Air Force Research Lab**: Xiang Chen (Co-PI), Yiran Chen (PI)
 "Out-of-Distribution Detection and Physical Adversarial Patch Investigation."
 \$195,000, 1/1/2021~12/31/2024.
- **National Science Foundation**: Xiang Chen (PI), Zhi Tian (Co-PI)
 "MLWiNS: Decentralized Heterogeneous Deep Learning for Efficient Wireless Spectrum Monitoring." \$499,999, 9/1/2020~8/31/2023.
- **National Science Foundation**: Xiang Chen (PI), Yiran Chen (Co-PI)
 "CSR: Small: Collaborative Research: EURECa: Enabling Untethered VR/AR System via Human-centric Graphic Computing and Distributed Data Processing."
 \$249,799, 9/1/2017~8/31/2021.
- **National Science Foundation**: Xiang Chen (PI), Zhi Tian (Former PI)
 "BIGDATA: F: Collaborative Research: Acquisition, Collection and Computation of Dynamic Big Sensory Data in Smart Cities." \$282,528, 1/1/2018~12/31/2021.
- **National Science Foundation**: Xiang Chen (PI), Zhi Tian (Former PI)
 "SaTC: CORE: Medium: Collaborative: Privacy Attacks and Defense Mechanisms in Online Social Networks." \$276,966, 9/1/2017~8/31/2021.
- **National Science Foundation**: Xiang Chen (PI), Zhi Tian (Former PI)
 "CIF: Small: Task-Cognizant Sparse Sensing for Inference."
 \$400,000, 8/1/2016~7/31/2020.
- **National Science Foundation**: Xiang Chen (PI), Zhi Tian (Former PI)
 "EARS: Collaborative Research: Spectrum Sensing for Coexistence of Active and Passive Radio Services." \$295,691, 1/1/2016~12/31/2019.

**RESEARCH
GRANTS
(SCHOOLTIME)**

- **Innovation Works TCC University Grant:**
“Invisible Shield: Device Security via Gesture Authentication.” \$25,000, 2014~2015.
- **University of Pittsburgh Innovation Institute Pitt Ventures:**
“The Invisible Shield: User Classification and Authentication for Mobile Device Based on Continuous Gesture Recognition.” \$16,000, 2014~2015.
- **Intel Cornell Cup USA 2013:**
“Koalakollar: Squad Tracking and Isolation Event Alert System.” \$3,000, 2013.

**HONOR &
AWARDS**

- **Best Paper Award Nomination:** DATE 2020
The 23rd International Conference on Design Automation and Test in Europe,
“Attention-based Dynamic Optimization for Neural Network Runtime Efficiency.”
- **Best Paper Award:** DATE 2017
The 17th Design Automation and Test in Europe,
“MoDNN: Local Distributed Mobile Computing System for Deep Neural Network.”
- **Best Paper Award Nomination:** ICCAD 2016
The 35th International Conference on Computer-Aided Design, “Scope: Quality Retaining Display Rendering Workload Scaling based on User-Smartphone Distance.”
- **Best Poster Award, ACM-SIGDA-SRF 2015**
ACM Special Interest Group on Design Automation (SIGDA),
Student Research Forum (SRF) Competition,
The 20th Asia and South Pacific Design Automation Conference (ASPDAC), 2015.
- **Microsoft Excellence Award:** Microsoft Research Asia 2015
Star of Tomorrow Internship Program (1% of 5000 interns).
- **Second Prize, Big-Idea 2014**
Randall Family Big Idea Start-up Competition, Pittsburgh PA, 2014.
- **Third Prize, ACM-SIGDA-SRF 2012**
ACM Special Interest Group on Design Automation (SIGDA),
Student Research Forum (SRF) Competition,
The 49th Design Automation Conference (DAC), 2012.

**WORK
EXPERIENCES**

- George Mason University, Assistant Professor.** Sep. 2016~Present
- Caritas Institute of Higher Education, Visiting Scholar. HK.** Jul. 2017~Aug. 2017
- Low-power mobile display system optimization.
- City University of Hong Kong, Visiting Scholar. Hong Kong.** Jun. 2015~Aug. 2015
- Power analysis and optimization for DDR RAM and GPU on Android platform.
- Microsoft Research Asia, Intern. Beijing, China.** Jun. 2014~Sep. 2014
- Mobile user finger-gaze behavior modeling and low-power smartphone UI design.
- Samsung Research and Development Lab, Intern. Dallas, TX.** Jul. 2013~Nov. 2013
- Samsung 5G FD-MEMO station project, FPGA & DSP development.
- Samsung Research and Development Lab, Intern. Dallas, TX.** Sep. 2012~Dec. 2012
- “Dynamic Tone Preference”, a low-power OLED UI system designed for Samsung Galaxy smartphone series. (You can still find this option in your Samsung smartphones!)

RESEARCH
EXPERIENCES

High-Performance Mobile System for Deep Learning

- Federated and Distributed Learning on Mobile Computing Systems
- Resource-aware Dynamic DNN Reconfiguration for High-performance Computing

Intelligence System Robustness, Security, and Authentication

- DNN Robustness Analysis and Interpretation
- Security Enhancement for Mobile Systems and Applications
(*e.g.*, Object Detection, Automatic Speech Recognition, *etc.*)
- Machine Learning based Real-time User Gesture Authentication

Low Power Mobile Computing Systems

- Comprehensive Power Consumption Analysis for Mobile Systems and Applications
- Real-time CPU/GPU Scheduling for High-performance Mobile Computing Systems

Mobile Graphic and Display Related Technologies

- Low Power OLED-based Mobile Display System Design and Optimization
- Circuit Design of OLED Pixel for Fine-grained Dynamic Voltage Scaling
- Sensing & Compensation Circuit Design for OLED Non-uniformity Degradation

Digital Circuit, CMOS VLSI, and other Related Works

- Circuit Modeling and Analysis for STT-RAM Crossbar Circuits
- Circuit Implementation and Analysis for Neuromorphic Circuits
- Chip Tape-out of a 4K STT-RAM Chip Set
— A Joint Project with SMIC and Chinese Academy of Science Physics Institute

CONFERENCE
PUBLICATIONS

C-54 [SEC '20] **X. Chen and Z. Qin. Exploring Decentralized Collaboration in Heterogeneous Edge Training**, in Proceedings of the 5th ACM/IEEE Symposium on Edge Computing, No. 18, Nov. 2020.

C-53 [ECCV '20] **X. Ma, W. Niu, T. Zhang, S. Liu, S. Lin, H. Li, X. Chen, J. Tang, K. Ma, B. Ren, and Y. Wang. An Image Enhancing Pattern-based Sparsity for Real-time Inference on Mobile Devices**, in Proc. of the 16th European Conf. on Computer Vision (ECCV), Aug. 2020.

C-52 [CVPR-V4AS '20] **F. Yu, D. Wang, Y. Chen, N. Karianakis, P. Yu, D. Lymberopoulos, and X. Chen. Unsupervised Domain Adaptation for Object Detection via Cross-Domain Semi-Supervised Learning**, the 33th IEEE Conference on Computer Vision and Pattern Recognition, Workshop on Vision for all Seasons: Adverse Weather and Lighting Conditions, Jun. 2020.

C-51 [DATE '20][Best Paper Award Nomination] **F. Yu, C. Liu, D. Wang, Y. Wang, and X. Chen. AntiDOte: Attention-based Dynamic Optimization for Neural Network Runtime Efficiency**, in Proceedings of the 23rd International Conference on Design Automation and Test in Europe, pp. 951~956, Mar. 2020.

C-50 [DATE '20] **F. Yu, Z. Qin, D. Wang, P. Xu, C. Liu, Z. Tian, and X. Chen. DCCNN: Computational Flow Redefinition for Efficient CNN Inference through Model Structural Decoupling**, in Proceedings of the 23rd International Conference on Design Automation and Test in Europe, pp. 1097~1102, Mar. 2020.

C-49 [ASPDAC '20] Z. Xu, F. Yu, C. Liu, and X. Chen. **LanCe: A Comprehensive and Lightweight CNN Defense Methodology against Physical Adversarial Attacks on Embedded Multimedia Applications**, in Proceedings of the 25th Asia and South Pacific Design Automation Conference, pp. 470~475, Jan. 2020.

This work was also presented as a Poster at the 2nd IBM/IEEE/CAS/EDS AI Compute Symposium, Oct. 2019, and presented as a Poser at the Student Research Forum of the 25th Asia and South Pacific Design Automation Conference, Jan. 2020.

C-48 [ASPDAC '20] X. Ma, G. Yuan, S. Lin, C. Ding, F. Yu, T. Liu, W. Wen, X. Chen, and Y. Wang. **Tiny but Accurate: A Pruned, Quantized and Optimized Memristor Crossbar Framework for Ultra Efficient DNN Implementation**, in Proceedings of the 25th Asia and South Pacific Design Automation Conference, pp. 470~475, Jan. 2020.

C-47 [SEC '19] Z. Qin, F. Yu, and X. Chen. **Task-Adaptive Incremental Learning for Intelligent Edge Devices**, in Proceedings of the 4th ACM/IEEE Symposium on Edge Computing, No. 22, Nov. 2019.

C-46 [CIKM '19] X. Guo, A. Alipour-Fanid, L. Wu, H. Purohit, X. Chen, K. Zeng, and Liang Zhao. **Multi-stage Deep Classifier Cascades for Open World Recognition**, in Proceedings of the 28th ACM International Conference on Information and Knowledge Management, pp. 179~188, Nov. 2019.

C-45 [BMVC '19] Z. Qin, F. Yu, C. Liu, and X. Chen. **Functionality-Oriented Convolutional Filter Pruning**, in Proceedings of the 30th British Machine Vision Conf., No. 92, Sep. 2019.

C-44 [IJCAI '19] F. Yu, Z. Qin, C. Liu, L. Zhao, Y. Wang, and X. Chen. **Interpreting and Evaluating Neural Network Robustness**, in Proceedings of the 28th International Joint Conference on Artificial Intelligence, pp. 4199~4205, Aug. 2019.

C-43 [KDD '19] J. Wang, F. Yu, X. Chen, and L. Zhao. **ADMM for Efficient Deep Learning with Global Convergence**, in Proceedings of the 25th ACM SigKDD Conference on Knowledge Discovery and Data Mining, pp. 111~119, Aug. 2019.

C-42 [KDD-AIoT '19] Z. Xu, F. Yu, and X. Chen. **DoPa: A Fast and Comprehensive CNN Defense Methodology against Physical Adversarial Attacks**, the 25th ACM SigKDD Conference on Knowledge Discovery and Data Mining, Workshop on Artificial Intelligence of Things, No. 3, Aug. 2019.

C-41 [DAC '19] Z. Xu, F. Yu, C. Liu, and X. Chen. **ReForm: Static and Dynamic Resource-Aware DNN Reconfiguration Framework for Mobile Devices**, in Proceedings of the 56th Design Automation Conference, pp. 183:1~183:6, Jun. 2019.

C-40 [DAC '19] Z. Xu, F. Yu, C. Liu, and X. Chen. **MASKER: Adaptive Mobile Security Enhancement against Automatic Speech Recognition in Eavesdropping**, in Proceedings of the 56th Design Automation Conference, pp. 163:1~163:6, Jun. 2019.

C-39 [ASPDAC '19] Z. Xu, F. Yu, C. Liu, and X. Chen. **HAMPER: High-Performance Adaptive Mobile Security Enhancement against Malicious Speech and Image Recognition**, in Proceedings of the 24th Asia and South Pacific Design Automation Conference, pp. 512~517, Jan. 2019.

C-38 [ASPDAC '19] F. Yu, C. Liu, and X. Chen. **REIN: A Robust Training Method for Enhancing Generalization Ability of Neural Networks in Autonomous Driving Systems**, in Proceedings of the 24th Asia and South Pacific Design Automation Conf., pp. 456~461, Jan. 2019.

- C-37 [ASPDAC '19] Z. Qin, F. Yu, C. Liu, and X. Chen. **CAPTOR: A Class Adaptive Filter Pruning Framework for Convolutional Neural Networks in Mobile Applications**, in *Proceedings of the 24th Asia and South Pacific Design Automation Conf.*, pp. 444~449, Jan. 2019.
- C-36 [NIPS-CDNNIA '18] Z. Qin, F. Yu, C. Liu, and X. Chen. **Demystifying Neural Network Filter Pruning**, *the 32nd Conference on Neural Information Processing Systems, Workshop on Compact Deep Neural Networks with Industrial Applications*, No.24, Dec. 2018.
- C-35 [NIPS-CDNNIA '18] F. Yu, Z. Qin, and X. Chen. **Distilling Critical Paths in Convolutional Neural Networks**, *the 32nd Conference on Neural Information Processing Systems, Workshop on Compact Deep Neural Networks with Industrial Applications*, No.34, Dec. 2018.
- C-34 [SEC '18] Z. Qin, F. Yu, C. Liu, Y. Wang, and X. Chen. **Adge: An ADMM-Based Audio Adversarial Example Generation Method**, in *Proceedings of the 3th ACM/IEEE Symposium on Edge Computing*, Oct. 2018.
- C-33 [GlobalSIP '18] Z. Zhang, X. Chen, and Z. Tian. **A Hybrid Neural Network Framework and Application to Radar Automatic Target Recognition**, in *Proceedings of the 6th IEEE Global Conference on Signal and Information Processing*, pp. 246~250, Nov. 2018.
- C-32 [ISLPED '18] Z. Xu, Z. Qin, F. Yu, C. Liu, and X. Chen. **DiReCt: Resource-Aware Dynamic Model Reconfiguration for Convolutional Neural Network in Mobile Systems**, in *Proceedings of the 23rd ACM/IEEE International Symposium on Low Power Electronics and Design*, No. 37, pp. 1~6, Jul. 2018.
- C-31 [ISVLSI '18] C. Liu, Q. Dong, F. Liu, F. Yu, and X. Chen. **ReRise: An Adversarial Example Restoration System for Neuromorphic Computing Security**, in *Proceedings of the 17th IEEE Computer Society Annual Symposium on VLSI*, pp. 470~475, Jul. 2018.
- C-30 [DAC-WIP '18] F. Yu, Q. Dong, and X. Chen. **ASP: A Fast Adversarial Attack Example Generation Framework based on Adversarial Saliency Prediction**, *the 55th Design Automation Conference, Work-in-Progress Workshop*, Jun. 2018.
- C-29 [DAC-WIP '18] Z. Xu, F. Yu, and X. Chen. **DiReCt: Performance-Aware Dynamic Model Reconfiguration for Convolutional Neural Network in Mobile Systems**, *the 55th Design Automation Conference, Work-in-Progress Workshop*, Jun. 2018.
- C-28 [ICCAD '17] Z. Qin, Z. Xu, Q. Dong, Y. Chen, and X. Chen. **VoCaM: Visualization Oriented Convolutional Neural Network Acceleration on Mobile Systems**, in *Proceedings of the 36th International Conference on Computer-Aided Design*, pp. 835~840, Nov. 2017.
- C-27 [ICCAD '17] J. Mao, Z. Qin, Z. Xu, K. Nixon, X. Chen, H. Li, and Y. Chen. **AdaLearner: An Adaptive Distributed Mobile Learning System for Neural Networks**, in *Proceedings of the 36th International Conference on Computer-Aided Design*, pp. 291~296, Nov. 2017.
- C-26 [ICCAD '17] J. Mao, Z. Yang, W. Wen, C. Wu, L. Song, K. Nixon, X. Chen, H. Li, and Y. Chen. **MeDNN: A Distributed Mobile System with Enhanced Partition and Deployment for Large-Scale DNNs**, in *Proceedings of the 36th International Conference on Computer-Aided Design*, pp. 751~756, Nov. 2017.
- C-25 [SoCC '17] L. Broyde, K. Nixon, X. Chen, and H. Li. **MobiCore: An Adaptive Hybrid Approach for Power-Efficient CPU Management on Android Devices**, in *Proceedings of the 30th IEEE International System-on-Chip Conference*, pp. 221~226, Sep. 2017.

CONFERENCE
PUBLICATIONS
(CONT'D)

- C-24 [DATE '17][Best Paper Award] J. Mao, X. Chen, K. Nixon, C. Krieger, and Y. Chen. **MoDNN: Local Distributed Mobile Computing System for Deep Neural Network**, in Proceedings of the 20th International Conference on Design Automation and Test in Europe, pp. 1396~1401, Mar. 2017.
- C-23 [ICCAD '16][Best Paper Award Nomination] K. Nixon, X. Chen, and Y. Chen. **Scope: Quality Retaining Display Rendering Workload Scaling based on User-Smartphone Distance**, in Proceedings of the 35th Int'l Conf. on Computer-Aided Design, pp. 1~6, Nov. 2016.
- C-22 [RSP '16] X. Chen, J. Mao, K. Nixon, and Y. Chen. **MORPh: Mobile OLED Power Friendly Camera System**, in Proceedings of the 27th International Symposium on Rapid System Prototyping, pp. 7~11, Oct. 2016.
- C-21 [SoCC '16] X. Chen, K. Nixon, and Y. Chen. **Practical Power Consumption Analysis with Current Smartphones**, in Proceedings of the 29th IEEE International System-on-Chip Conference, pp. 333~337, Oct. 2016.
- C-20 [DAC '16] X. Chen, J. Mao, J. Gao, K. Nixon, and Y. Chen. **MORPh: Mobile OLED-friendly Recording and Playback System for Low Power Video Streaming**, in Proceedings of the 53rd Design Automation Conference, pp. 1~6, Jun. 2016.
- C-19 [ASPDAC '16] K. Nixon, X. Chen, and Y. Chen. **Footfall: GPS Polling Scheduler for Power Saving on Wearable Devices**, in Proceedings of the 21st Asia and South Pacific Design Automation Conference, pp. 563~568, Jan. 2016.
- C-18 [ASPDAC '16] K. Nixon, X. Chen, and Y. Chen. **SlowMo: Enhancing Mobile Gesture-based Authentication Schemes via Sampling Rate Optimization**, in Proceedings of the 21st Asia and South Pacific Design Automation Conference, pp. 462~467, Jan. 2016.
- C-17 [DAC '15] X. Chen, J. Xue, and Y. Chen. **DaTuM: Dynamic Tone Mapping Technique for OLED Display Power Saving based on Video Classification**, in Proceedings of 52nd Design Automation Conference, pp. 8~12, Jun. 2015.
- C-16 [USENIX HotPower '14] X. Chen, K. Nixon, H. Zhou, Y. Liu, and Y. Chen. **FingerShadow: An OLED Power Optimization based on Smartphone Touch Interactions**, in Proceedings of the 6th Int'l Workshop on Power-Aware Computing and System, No. 6, Oct. 2014.
- C-15 [USENIX HotPower '14] K. Nixon, X. Chen, H. Zhou, Y. Liu, and Y. Chen. **Mobile GPU Power Consumption Reduction via Dynamic Resolution and Frame Rate Scaling**, in Proceedings of the 6th Int'l Workshop on Power-Aware Computing and System, No. 5, Oct. 2014.
- C-14 [DAC '14] X. Chen, M. Dong, C. Zhang, and Y. Chen. **Demystify Smartphone Power Consumption: The Evolution of Smartphone Communication Modules**, in Proceedings of the 51st Design Automation Conference, Invited Paper, Jun. 2014.
- C-13 [CODES+ISSS '13] M. Zhao, X. Chen, Y. Chen, and J. Xue. **Online OLED Dynamic Voltage Scaling for Video Streaming Applications on Mobile Devices**, in Proceedings of the 8th Int'l Conf. on Hardware/Software Co-design and System Synthesis, pp. 1~10, Oct. 2013.
- C-12 [RTSS '13] M. Zhao, X. Chen, Y. Chen, and J. Xue. **Online OLED Dynamic Voltage Scaling for Video Streaming Applications on Mobile Devices**, in Proceedings of the 32nd IEEE Real-Time Systems Symposium, Vol. 10, Iss. 2, pp. 18, Jul. 2013.
- C-11 [DAC '13] X. Chen, Z. Ma, F. Fernandes, J. Xue, and Y. Chen. **Dynamic Tone Mapping on OLED Display based on Video Classification**, The 50th Design Automation Conference, WIP, Jun. 2013.

CONFERENCE
PUBLICATIONS
(CONT'D)

C-10 [DAC-WIP '13] **X. Chen, and H. Li. P-Spectrum: A Personalized Smartphone Power Management Technique based on Real-time Battery and User Behavior Monitoring**, *the 50th Design Automation Conference, Work-in-Progress Workshop*, Jun. 2013.

C-9 [DAC-WIP '13] **K. Nixon, X. Chen, Z. Mao, K. Li, and Y. Chen. The Invisible Shield: User Classification and Authentication for Mobile Device based on Gesture Recognition**, *the 50th Design Automation Conference, Work-in-Progress Workshop*, Jun. 2013.

C-8 [HotMobile '13] **X. Chen, Y. Chen, Z. Ma, and F. Fernandes. How is Energy Consumed in Smartphone Display Applications?** in *Proceedings of the 16th International Workshop on Mobile Computing Systems and Applications*, No. 3, Feb. 2013.

C-7 [ASPDAC '13] **K. Nixon, X. Chen, Z. H. Mao, Y. Chen, and K. Li. Mobile User Classification and Authorization based on Gesture Usage Recognition**, in *Proceedings of the 18th Asia and South Pacific Design Automation Conference*, pp. 384~389, Jan. 2013.

C-6 [ICCAD '12] **X. Chen, J. Xue, and Y. Chen. Mobile Devices User — The Subscriber and also the Publisher of Real-Time OLED Display Power Management Plan**, in *Proceedings of the 31st International Conference on Computer-Aided Design*, pp. 687~690, Nov. 2012.

C-5 [ICCAD '12] **X. Chen, B. Liu, M. Zhao, J. Xue, X. Guo, and Y. Chen. Active Compensation Technique for the Thin-Film Transistor Variations and OLED Aging of Mobile Device Displays**, in *Proceedings of the 31st International Conference on Computer-Aided Design*, pp. 516~522, Nov. 2012.

C-4 [DAC '12] **X. Chen, M. Zhao, J. Zeng, J. Xue, and Y. Chen. Quality-retaining OLED Dynamic Voltage Scaling for Video Streaming Applications on Mobile Devices**, in *Proceedings of the 49th Design Automation Conference*, pp. 1000~1005, Jun. 2012.

C-3 [ASPDAC '12] **X. Chen, J. Zeng, Y. Chen, and H. Li. Fine-grained Dynamic Voltage Scaling on OLED Display**, in *Proceedings of the 17th Asia and South Pacific Design Automation Conference*, pp. 807~812, Jan. 2012.

C-2 [CICC '11] **P. Wang, X. Chen, Y. Chen, H. Li, S. Kang, X. Zhu, and W. Wu. A 1.0V 45nm Nonvolatile Magnetic Latch Design and Its Robustness Analysis**, in *Proceedings of the 24th IEEE Custom Integrated Circuits Conference*, pp. 1~4, Sep. 2011.

C-1 [WCSE '09] **X. Chen, Z. Zhang, and R. Chen. A Real-Time Driving Fatigue Monitoring DSP Device based on Computing Complexity of Binarized Image**, in *Proceedings of IEEE International Workshop on Computer Science and Engineering*, pp. 84~89, Oct. 2009.

JOURNAL
PUBLICATIONS

J-7 [IEEE-TCAD '20] **X. Chen, W. Zhang, C. J. Xue, H. Li, and Y. Chen. DiViSi: Quality-retaining Dynamic Driver Voltage Scaling for Organic Light Emitting Diode Displays**, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, to appear.

J-6 [IEEE-TCAD '20] **Z. Qin, F. Yu, Z. Xu, C. Liu, and X. Chen. CaptorX: A Class-Adaptive Convolutional Neural Network Reconfiguration Framework**, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, to appear.

J-5 [IEEE-TCAD '20] **Z. Qin, F. Yu, Z. Xu, C. Liu, and X. Chen. LanCeX: A Universal and Lightweight Defense Solution against Adversarial Attacks in Embedded Recognition Applications**, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, to appear.

JOURNAL
PUBLICATIONS
(CONT'D)

- J-4 [IEEE-TCAD '20] *F. Yu, Z. Qin, C. Liu, D. Wang, and X. Chen.* **REIN the RobuTS: Robust DNN-based Image Recognition in Autonomous Driving Systems**, IEEE Transactions on *Computer-Aided Design of Integrated Circuits and Systems*, Oct. 2020.
- J-3 [IEEE-TCAD '20] *Z. Xu, F. Yu, C. Liu, and X. Chen.* **DiReCtX: Dynamic Resource-Aware CNN Reconfiguration Framework for Real-Time Mobile Application**, IEEE Transactions on *Computer-Aided Design of Integrated Circuits and Systems*, May 2020.
- J-2 [AMC-MFC '18] *Z. Qin, F. Yu, C. Liu, and X. Chen.* **How Convolutional Neural Networks See the World — A Survey of Convolutional Neural Network Visualization Methods**, Advances in Mathematics of Communications (AMC) Journal on *Mathematical Foundations of Computing*, Vol. 1, Iss. 2, No. 149, pp. 149~180, May, 2018.
- J-1 [ACM-ETCS '12] *Z. Sun, X. Chen, Y. Zhang, H. Li, and Y. Chen.* **Non-volatile Memories as the Data Storage System for Implantable ECG Recorder**, ACM Journal on *Emerging Technologies in Computing Systems*, Vol. 8, Iss. 2, No. 13, pp. 1~16, Jun. 2012.

ARXIV
PUBLICATIONS

- A-11 [arXiv:2011.03897] *F. Yu, Z. Xu, T. Shen, D. Stamoulis, L. Shangguan, D. Wang, R. Madhok, C. Zhao, X. Li, N. Karianakis, D. Lymberopoulos, A. Li, C. Liu, Y. Chen, X. Chen.* **Towards Latency-aware DNN Optimization with GPU Runtime Analysis and Tail Effect Elimination**, Nov. 2020.
- A-10 [arXiv:2008.06767] *F. Yu, W. Zhang, Z. Qin, Z. Xu, D. Wang, C. Liu, Z. Tian, X. Chen.* **Heterogeneous Federated Learning**, Aug. 2020.
- A-9 [arXiv:2001.10133] *P. Xu, Y. Wang, X. Chen, Z. Tian.* **COKE: Communication-Censored Kernel Learning for Decentralized Non-parametric Learning**, Jan. 2020.
- A-8 [arXiv:1910.03122] *Z. Qin, F. Yu, X. Chen.* **Task-Adaptive Incremental Learning for Intelligent Edge Devices**, Oct. 2019.
- A-7 [arXiv:1811.04187] *J. Wang, Y. Fu, X. Chen, L. Zhao.* **The Global Convergence of the Alternating Minimization Algorithm for Deep Neural Network Problems**, Nov. 2018.
- A-6 [arXiv:1810.07378] *S. Ye, T. Zhang, K. Zhang, J. Li, K. Xu, Y. Yang, F. Yu, J. Tang, M. Faradad, S. Liu, X. Chen, X. Lin, Y. Wang.* **Progressive Weight Pruning of Deep Neural Networks using ADMM**, Oct. 2018.
- A-5 [arXiv:1810.07322] *Q. Zhu, F. Yu, C. Liu, L. Zhao, and X. Chen.* **Functionality-Oriented Convolutional Filter Pruning**, Oct. 2018.
- A-4 [arXiv:1810.00144] *F. Yu, C. Liu, Y. Wang, L. Zhao, and X. Chen.* **Interpreting Adversarial Robustness: A View from Decision Surface in Input Space**, Oct. 2018.
- A-3 [arXiv:1809.10795] *Z. Zhang, X. Chen, Z. Tian.* **A Hybrid Neural Network Framework and Application to Radar Automatic Target Recognition**, Sep. 2018.
- A-2 [arXiv:1809.01697] *Z. Xu, F. Yu, C. Liu, and X. Chen.* **HASP: A High-Performance Adaptive Mobile Security Enhancement Against Malicious Speech Recognition**, Sep. '18.
- A-1 [arXiv:1805.09370] *F. Yu, Z. Xu, Y. Wang, C. Liu, and X. Chen.* **Towards Robust Training of Neural Networks by Regularizing Adversarial Gradients**, May 2018.

INVITED
TALKS

- I-27 **“MLWiNs: Decentralized Heterogeneous Deep Learning for Efficient Wireless Spectrum Monitoring”**
Intel/NSF Workshop on Machine Learning and Wireless Networking, Online Seminar, 10/19/2020.
- I-26 **“The Software and Hardware Approaches for Deep Learning Security Enhancement”** University of the District of Columbia, Washington D.C., 11/19/2019.
- I-25 **“High-Performance and Robust Computing for Artificial Intelligence Computing”**
IBM Thomas J. Watson Research Center, Yorktown Heights, NY, 10/9/2019.
- I-24 **“Interpretable Artificial Intelligence in High-Performance Computing”**
The EDA Workshop, in association with the TPC Meeting of the 25th Asia and South Pacific Design Automation Conference (ASPDAC), Taipei, Taiwan, 8/27/2019.
- I-23 **“High-Performance and Robust Computing for Artificial Intelligence on Edge.”**
Comcast Research Lab D.C., Washington D.C., 3/20/2019.
- I-22 **“The Software-Hardware Approaches for Deep Learning Security Enhancement”**
IEEE Workshop on SecArch: Built-in Security-Architecture, Chip and System, in association with the 25th IEEE International Symposium on High-Performance Computer Architecture (HPCA), Washington D.C., 2/17/2019.
- I-21 **“Interpretation, Evaluation, and Enhancement of Neural Network Robustness”**
National Science Foundation (NSF) Workshop on Internet-of-Things (IoT) Systems, San Diego, CA, 11/4/2018.
- I-20 **“Security of Machine Learning in Mobile Systems”**
National Science Foundation (NSF) Workshop on Cyber-Physical Systems (CPS), University of North Carolina at Charlotte (UNCC), Charlotte, NC, 7/27/2018.
- I-19 **“Challenges and Opportunities in Mobile Development”**
George Washington University, Washington D.C., 2/22/2018;
- I-18 **“Adversarial Attacks in Mobile Neural Network System”**
? Beijing Normal University, Beijing, China, 1/18/2018;
- I-15 Capital Normal University, Beijing, China, 1/16/2018;
Chinese University of Hong Kong, Hong Kong, 1/14/2018;
Northeastern University, Shenyang, China, 12/24/2017.
- I-14 **“Challenges and Opportunities in Next-gen VR/AR Development”**
? Huawei Beijing Research Center, Beijing, China, 1/09/2017;
- I-13 Lenovo Innovation Center, Beijing, China, 12/15/2016.
- I-12 **“Challenges and Opportunities in Mobile Development”**
? Northeastern University, Shenyang, China, 12/29/2016;
- I-7 Peking University, Beijing, China, 12/28/2016;
Beijing University of Post and Telecommunication, Beijing, China, 12/26/2016;
Shandong University, Jinan, China, 12/21/2016;
Beijing University of Technology, Beijing, China, 12/19/2016;
Beihang University, Beijing, China, 12/18/2016.
- I-6 **“From Pixels to People — Designing a Power Efficient, Smart, and Secure Mobile System”** George Mason University, Fairfax, VA, 3/28/2016.

INVITED
TALKS
(CONT'D)

- I-5 **"From Device to End-user: The Evolution in Smartphone Power Optimization"**
? Hong-Kong City University, Hong Kong, China, 8/19/2015;
- I-4 Peking University, Beijing, China, 7/24/2015.
- I-3 **"Smartphone and Display Power Consumption Analysis and Optimization"**
Tsinghua University, Beijing, China, 8/29/2014.
- I-2 **"OREO: Tri-layer Optimization for Power Efficient OLED Display"**
Microsoft Research Asia, Beijing, China, 6/4/2014.
- I-1 **"OLED Display Power Optimization in Android UI System"**
Samsung R&D Lab, Dallas, TX, 12/15/2012.

CONFERENCE
PRESENTATION

- P-14 **"Interpreting and Evaluating Neural Network Robustness"**
The 28th International Joint Conference on Artificial Intelligence (IJCAI),
Macao, China, 8/14/2019.
- P-13 **"ReForm: Static and Dynamic Resource-Aware DNN Reconfiguration Framework
for Mobile Device"**
The 56th Design Automation Conference (DAC), Las Vegas, NV, 6/6/2019.
- P-12 **"MASKER: Adaptive Mobile Security Enhancement against Automatic Speech
Recognition in Eavesdropping"**
The 56th Design Automation Conference (DAC), Las Vegas, NV, 6/6/2019.
- P-11 **"Adversarial Example Detection and Restoration for Neuromorphic Computing Security"**
The International Workshop on Hardware and Algorithms for Learning On-a-chip
(HALO), in association with the 37th IEEE International Conference on Computer-
Aided Design (ICCAD), San Diego, WA, 11/8/2018.
- P-10 **"Adversarial Examples, Threats or Promises: Mobile Application Case Studies"**
The International Workshop on Design Automation for Analog and Mixed-Signal
Circuit (AMS), in association with the 37th IEEE International Conference on
Computer-Aided Design (ICCAD), San Diego, WA, 11/8/2018.
- P-9 **"Adge: An ADMM-Based Audio Adversarial Example Generation Method"**
The 1st ACM/IEEE Workshop on Security and Privacy in Edge Computing (EdgeSP),
Seattle, WA, 10/28/2018.
- P-8 **"VoCaM: Visualization Oriented Convolutional Neural Network Acceleration on
Mobile System"** The 36th IEEE International Conference on Computer-Aided De-
sign (ICCAD), Irvine, CA, 11/13/2017.
- P-7 **"Practical Power Consumption Analysis with Current Smartphones"**
The 29th IEEE Int'l System-on-Chip Conference (SoCC), Seattle, WA, 9/9/2016.
- P-6 **"MORPh: Mobile OLED-friendly Recording and Playback System for Low Power
Video Streaming"**
The 53rd Design Automation Conference (DAC), Austin, TX, 6/9/2016.
- P-5 **"DaTuM: Dynamic Tone Mapping Technique for OLED Display Power Saving
based on Video Classification."**
The 52nd Design Automation Conference (DAC), San Francisco, CA, 6/10/2015.

CONFERENCE
PRESENTATION
(CONT'D)

- P-4 **"FingerShadow: An OLED Power Optimization based on Smartphone Touch Interactions"** The 6th International Workshop on Power-Aware Computing and System (USENIX HotPower), Denver, CO, 10/5/2014.
- P-3 **"How is Energy Consumed in Smartphone Display Applications?"** The 16th International Workshop on Mobile Computing Systems and Applications (HotMobile), Jekyll Island, GA, 2/26/2013.
- P-2 **"Active Compensation Technique for the Thin-Film Transistor Variations and OLED Aging of Mobile Device Display."** The 31st Int'l Conf. Computer-Aided Design (ICCAD), Austin, TX, 12/7/2012.
- P-1 **"Quality-retaining OLED Dynamic Voltage Scaling for Video Streaming Applications on Mobile Device."** The 49th Design Automation Conference (DAC), San Francisco, CA, 6/19/2012.

PROFESSIONAL
SERVICE

Funding Agency Service

- 2019 National Science Foundation (NSF) Panelist ×2
- 2018 Department of Energy (DOE) Panelist ×1

Academic Event Organization

- Chair — NSF-PIM 2020
The 2021 NSF Workshop on Processing-in-Memory Technology, Dec. 2020.
- Chair — ArchEdge 2020
The 3rd ACM/IEEE Workshop on Computing Architecture for Edge Computing, in association of the 5th ACM/IEEE Symposium on Edge Computing, Nov. 2020.
- Chair — SEC 2019 The 4th ACM/IEEE Symposium on Edge Computing, Nov. 2019.
- Chair — ArchEdge 2019
The 2nd ACM/IEEE Workshop on Computing Architecture for Edge Computing, in association of the 4th ACM/IEEE Symposium on Edge Computing, Nov. 2019.
- Session Chair — DAC 2019 The 56th Design Automation Conference, Jun. 2019.
- Local Chair — GLSVLSI 2019 The 29th ACM Great Lakes Symp. on VLSI, May 2019.
- Chair — ArchEdge 2018
The 1st ACM/IEEE Workshop on Computing Architecture for Edge Computing, in association of the 3rd ACM/IEEE Symposium on Edge Computing, Oct. 2018.
- Session Chair — SoCC 2018
The 31rd IEEE International System-on-Chip Conference, Sep. 2018.
- Session Chair — GLVLSI 2018 The 28th ACM Great Lakes Symp. on VLSI, May 2018.
- Session Chair — DAC 2018 The 55th Design Automation Conference Jun. 2018.
- Session Chair — HALO 2017
The SIGDA Wksp. on Hardware & Algorithms for Learning On-a-chip, Nov. '17.
- Session Chair — ISVLSI 2017
IEEE Computer Society Annual Symposium on VLSI, Jul. 2017.
- Local Chair — NanoCom 2017
The 4th ACM International Conference on Nanoscale Computing and Communication, Jul. 2017.

PROFESSIONAL SERVICE (CONT'D) **Editorial Service**

- Chair Editor — IET-CPS 2020
Journal of the Institution of Engineering and Technology (IET)
Special Issue of Cyber-Physical Systems (CPS)
- Editor — ACM Special Interest Group Design Automation (SIGDA) E-Newsletter
- Editor — Frontiers in Big Data 2020, Topic: AI for Sustainability
- Editor — TC-CPS 2017 IEEE Technical Committee on Cyber-Physical Sys. Newsletter

Technical Program Committee Service

- [AAAI '21] The 35th AAAI Conference on Artificial Intelligence
- [DAC '21] The 57th Design Automation Conference
- [ASPDAC '21] The 26th Asia and South Pacific Design Automation Conference
- [ASPDAC SRF '21] The 26th Asia and South Pacific Design Automation Conference Student Research Forum (SRF) Competition
- [DAC '20] The 57th Design Automation Conference
- [KDD-AIoT '20] The 3rd International Workshop on Artificial Intelligence of Things in association with The 26th ACM SigKDD Conference on Knowledge Discovery and Data Mining
- [AAAI-AIoT '20] The 2nd International Workshop on Artificial Intelligence of Things in association with The 34th AAAI Conf. on Artificial Intelligence
- [ICONIP '20] The 27th Int'l Conference on Neural Information Processing
- [ASPDAC '20] The 25th Asia and South Pacific Design Automation Conference
- [ASPDAC SRF '20] The 25th Asia and South Pacific Design Automation Conference Student Research Forum (SRF) Competition
- [GLVLSI '20] The 30th ACM Great Lakes Symposium on VLSI
- [ASAP '20] The 31st Annual IEEE Int'l Conference on Architectures and Processors
- [EdgeSP '20] ACM/IEEE Workshop on Security and Privacy in Edge Computing
- [DAC '19] The 56th Design Automation Conference
- [DAC-PF '19] The 56th DAC — Ph.D. Student Research Forum Competition
- [KDD-AIoT '19] The 1st International Workshop on Artificial Intelligence of Things in association with The 25th ACM SigKDD Conference on Knowledge Discovery and Data Mining
- [ASPDAC '19] The 24th Asia and South Pacific Design Automation Conference
- [ASAP '19] The 30th Annual IEEE Int'l Conference on Architectures and Processors
- [GLVLSI '19] The 29th ACM Great Lakes Symposium on VLSI
- [COINS '19] The International Conference on Omni-Layer Intelligent Systems
- [EdgeSP '19] ACM/IEEE Workshop on Security and Privacy in Edge Computing
- [NanoArch '19] The 15th IEEE/ACM Int'l Symposium on Architectures and Processors
- [SoCC '19] The 32nd IEEE International System-on-Chip Conference

PROFESSIONAL SERVICE (CONT'D) Technical Program Committee Service (cont'd)

- [ASPDAC SRF '18] The 24th Asia and South Pacific Design Automation Conference Student Research Forum (SRF) Competition
- [EdgeSP '18] ACM/IEEE Workshop on Security and Privacy in Edge Computing
- [CCNCPS-ICC '18] IEEE International Workshop on Communication, Computing, and Networking Conference in Cyber Physical Systems (CCNCPS) in association with IEEE International Conference on Communications (ICC)
- [Euro-Par '18] The 23rd International Conference on Parallel and Distributed Computing Workshops, Advanced Parallel Processing Technology for Artificial Intelligence
- [SoCC '18] The 31st IEEE International System-on-Chip Conference
- [ASPDAC SRF '17] The 23rd Asia and South Pacific Design Automation Conference Student Research Forum (SRF) Competition
- [GLVLSI '17] The 28th ACM Great Lakes Symposium on VLSI
- [CCNCPS-IPCCC '16] IEEE International Workshop on Communication, Computing, and Networking Conference in Cyber Physical Systems (CCNCPS) in association with IEEE International Performance Computing and Communications Conference (IPCCC)
- [DC '16] IEEE International Workshop on Energy-Aware Data Centers: Design, Analysis, and Implementation

Other Paper Review Service

- [CEM] IEEE Consumer Electronics Magazine
- [COMCOM] Elsevier Journal on Computer and Telecommunications
- [DSN] The International Journal of Distributed Sensor Network
- [DSTI] IEEE Journal of Design & Test
- [ESL] IEEE Embedded Systems Letters
- [FGCS] Elsevier Journal of Future Generation Computer Systems
- [IA] IEEE Access
- [IJIP] The International Journal of Image Processing
- [ISCAS] IEEE International Symposium on Circuits & Systems
- [JEDS] IEEE Journal of the Electron Devices Society
- [JETC] ACM Journal on Emerging Technologies in Computing Systems
- [JETCAS] IEEE Journal on Emerging and Selected Topics in Circuits and Systems
- [JSA] Elsevier Journal of Journal of Systems Architecture
- [JVCI] Elsevier Journal of Visual Communication and Image Representation
- [NAS] IEEE International Conference on Networking Architecture, and Storage
- [NCAA] The International Journal of Neural Computing and Applications
- [NEUCOM] Elsevier Journal of Neurocomputing
- [PATMOS] IEEE International Symposium on Power and Timing Modeling, Optimization and Simulation

PROFESSIONAL Paper Review (cont'd)**SERVICE
(CONT'D)**

- [SUSCOM] Elsevier Journal of Sustainable Computing Informatics and Systems
- [SUSTDE] The MDPI Journal of Sustainability
- [TC] IEEE Transactions on Computers
- [TCPS] ACM Transactions on Cyber Physical Systems
- [TCAD] IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems
- [TECS] ACM Transactions on Embedded Computing Systems
- [THMS] IEEE Transactions on Human-Machine Systems
- [THPC] The CCF Transactions on High Performance Computing
- [TIOT] ACM Transactions on Internet of Things
- [TNNLS] IEEE Transactions on Neural Networks and Learning Systems
- [TPDS] IEEE Transactions on Parallel and Distributed Systems
- [TSC] IEEE Transactions on Services Computing
- [TSMC] IEEE Transactions on Systems, Man and Cybernetics: Systems
- [TVLSI] IEEE Transactions on Very Large Scale Integration Systems
- [TWC] IEEE Transactions on Wireless Communications
- [UIST] ACM Symposium on User Interface Software and Technology

**TRAVEL
GRANTS**

- 2018 NSF IoT Workshop, Invited Speaker Travel Grant
National Science Foundation Workshop on Internet-of-Things (IoT) Systems, Princeton University, Nov. 2018.
- 2018 NSF CSR PI Meeting, PI Travel Grant
National Science Foundation, Computer-System-Research Program, Principle Investigator Annual Meeting, Wayne University, Nov. 2018.
- 2018 NSF CPS Workshop, Invited Speaker Travel Grant
National Science Foundation Workshop on Cyber-Physical-Systems, University of North Carolina at Charlotte, Jul. 2018.
- 2017 NEU-IYF, Invited Speaker Travel Grant
International Young Scholar Forum, Northeastern University (China), Dec. 2018.
- 2015 ICCAD, ACM Student Travel Grant
The 36th International Conference on Computer-Aided Design, Nov. 2015.
- 2015 ICCAD, Student Research Competition (SRC) Travel Grant
The 36th International Conference on Computer-Aided Design, Nov. 2015.
- 2015 ASPDAC, Student Research Competition (SRC) Travel Grant
The 20th Asia and South Pacific Design Automation Conference, Jan. 2015.
- 2012 DAC, ACM Student Research Competition (SRC) Travel Grant
The 49th Design Automation Conference, Jun. 2012.
- 2012 DAC SIGDA, Young Student Support Program
ACM Special Interest Group on Design Automation, The 49th Design Automation Conference, Jun. 2012.
- 2012 NVMW, Student Travel Grant
The 3rd Non-Volatile Memories Workshop, Mar. 2012.

TEACHING
EXPERIENCE

- Advanced Mobile Systems and Applications** **George Mason University** **ECE-616**
Graduate-Level Course *FL'17, FL'19, FL'20*
- Advanced study of mobile systems and applications, with the focus on system architecture, computing paradigms, and optimization methods.
 - Most lectures are dedicated to case studies based on the most influential research publications and best-known industry products.
 - Special topics include the most cutting-edge applications, such as virtual and augmented reality, machine learning, and cloud computing.
- Mobile Systems and Applications** **George Mason University** **ECE-516**
Graduate-Level Course *SP'17, SP'18, SP'19, SP'20*
- A comprehensive study of modern mobile devices, with the special focus on smartphones and wearable devices.
 - Topics include mobile operating systems, mobile device components, application development, human-computer interaction, data management, network systems, mobile intelligence, and mobile security.
- Computer Organization** **George Mason University** **ECE-445**
Undergraduate-Level Course *textitSP'20*
- General overview of operating a digital computer.
 - Topics include computer arithmetic, arithmetic unit, hardwired and micro-programmed control, memory, register-to-register, input-output operations, and behavioral modeling of computer organization using VHDL.
- Digital Electronics** **George Mason University** **ECE-301**
Undergraduate-Level Course *FL'18, SP'19, FL'20*
- General overview of digital systems, circuits, and computers.
 - Topics include binary systems and codes, digital logic gates and circuits, microelectronics and integrated circuits, coding and multiplexing, shift registers, counters, A/D converters, and elementary computer architecture.