Chun-Feng Wu

Curriculum Vitae

PERSONAL DETAILS

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EDUCATION

Ph.D. Department of CSIE 2016-2021
GPA: 4.17/4.30
National Taiwan University, Taiwan
Advisor: Tei-Wei Kuo & Yuan-Hao Chang
Dissertation: Support to Huge Main-Memory Extension with Non-Volatile Memory

MSc. Department of Computer Science 2014-2016
GPA: 3.90/4.30
National Tsing Hua University, Taiwan
Advisor: Yeh-Ching Chung
Thesis: Hybrid Mechanisms to Improve Write Scenarios for Cloud Storage Services

BSc. Department of CSIE 2010-2014
GPA: 3.72/4.0
National Central University, Taiwan
Advisor: Li-Der Chou

RESEARCH INTERESTS

Hardware/Software Co-design, Memory/Storage Architectures, Operating Systems, In-Memory Computing, Next-Generation Non-Volatile Memory.

WORK EXPERIENCE

Assistant Professor in Department of Computer Science 2022-Now
National Yang Ming Chiao Tung University, Hsinchu, Taiwan

Postdoctoral Scholar in Department of Computer Science 2021-2022
Harvard University, Cambridge, MA, USA
Lab PI: David Brooks & Gu-Yeon Wei

Research Assistant in Institute of Information Science 2017-2021
Academia Sinica, Taipei, Taiwan
Lab PI: Yuan-Hao Chang

PUBLICATIONS

Journal Papers

1. Yin-Chiuan Chen, **Chun-Feng Wu**, Yuan-Hao Chang, and Tei-Wei Kuo, "Exploring Synchronous Page Fault Handling", IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD). (Integrated with ACM/IEEE CODES+ISSS'22).
2. Gaddisa Olani Ganfure, **Chun-Feng Wu**, Yuan-Hao Chang, and Wei-Kuan Shih, "DeepWare: Imaging Performance Counters with Deep Learning to Detect Ransomware", accepted and to appear in IEEE Transactions on Computers (TC).
3. Tse-Yuan Wang, **Chun-Feng Wu**, Che-Wei Tsao, Yuan-Hao Chang, Tei-Wei Kuo, and Xue Liu, "Rethinking the Interactivity of OS and Device Layers in Memory Management", accepted and to appear in ACM Transactions on Embedded Computing Systems (TECS).
4. **Chun-Feng Wu**, Martin Kuo, Ming-Chang Yang, and Yuan-Hao Chang, "Performance Enhancement of SMR-based Deduplication Systems", accepted and to appear in IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD).
5. Shuo-Han Chen, **Chun-Feng Wu**, Ming-Chang Yang, and Yuan-Hao Chang, "A File-Oriented Fast Secure Deletion Strategy for Shingled Magnetic Recording Drives", accepted and to appear in IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD).
6. Che-Wei Chang, **Chun-Feng Wu**, Yuan-Hao Chang, Ming-Chang Yang, and Chieh-Fu Chang, "Leveraging Write Heterogeneity of Phase Change Memory on Supporting Self-balancing Binary Tree", accepted and to appear in IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD).
7. Dharamjeet, Tseng-Yi Chen, Yuan-Hao Chang, **Chun-Feng Wu**, Chi-Heng Lee, Wei-Kuan Shih, "Beyond Write-reduction Consideration: A Wear-leveling-enabled B+-tree Indexing Scheme over an NVRAM-based Architecture", IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD), vol. 40, no. 12, pp. 2455-2466, Dec. 2021.
8. Wen Sheng Lim, Chia-Heng Tu, **Chun-Feng Wu**, and Yuan-Hao Chang, "iCheck: Progressive Checkpointing for Intermittent Systems", IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD), vol. 40, no. 11, pp. 2224-2236, Nov. 2021.
9. **Chun-Feng Wu**, Yuan-Hao Chang, Ming-Chang Yang, and Tei-Wei Kuo, "When Storage Response Time Catches Up with Overall Context Switch Overhead, What is Next?", IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD), vol. 39, no. 11, pp. 4266-4277, Nov. 2020. (Integrated with ACM/IEEE CODES+ISSS'20).
10. Yao-Wen Kang, **Chun-Feng Wu**, Yuan-Hao Chang, Tei-Wei Kuo and Shu-Yin Ho, "On Minimizing Analog Variation Errors to Resolve the Scalability Issue of ReRAM-based Crossbar Accelerator", IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD), vol. 39, no. 11, pp. 3856-3867, Nov. 2020. (Integrated with ACM/IEEE EMSOFT'20).
11. Gaddisa Olani Ganfure, **Chun-Feng Wu**, Yuan-Hao Chang, and Wei-Kuan Shih, "DeepPrefetcher: A Deep Learning Framework for Data Prefetching in Flash Storage Devices", IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD), vol. 39, no. 11, pp. 3311-3322, Nov. 2020. (Integrated with ACM/IEEE CASES'20).
12. Ming-Chang Yang, **Chun-Feng Wu**, Shuo-Han Chen, Yi-Ling Lin, Che-Wei Chang, and Yuan-Hao Chang, "On Minimizing Internal Data Migrations of Flash Devices via Lifetime-Retention Harmonization", IEEE Transactions on Computers (TC), vol. 70, no. 3, pp. 428-439, Mar. 2021.
13. Ming-Chang Yang, Yuan-Hao Chang, Tei-Wei Kuo, and **Chun-Feng Wu**, "Request Flow Coordination for Growing-Scale Solid-State Drives", IEEE Transactions on Computers (TC), vol. 69, no. 6, pp. 832-843, Jun. 2020.
14. **Chun-Feng Wu**, Yuan-Hao Chang, Ming-Chang Yang, and Tei-Wei Kuo, "Joint Management of CPU and NVDIMM for Breaking Down the Great Memory Wall", IEEE Transactions on Computers (TC), vol. 69, no. 5, pp. 722-733, May. 2020.

15. **Chun-Feng Wu**, Ming-Chang Yang, Yuan-Hao Chang, and Tei-Wei Kuo, "Hot-Spot Suppression for Resource-Constrained Image Recognition Devices with Non-Volatile Memory", IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD), vol. 37, no. 11, pp. 2567-2577, Nov. 2018. (Integrated with ACM/IEEE EMSOFT 2018)

Conference Papers

1. Wei Cheng, **Chun-Feng Wu**, Yuan-Hao Chang, and Ing-Chao Lin, "GraphRC: Accelerating Graph Processing on Dual-addressing Memory with Vertex Merging", ACM/IEEE International Conference on Computer-Aided Design (ICCAD), San Diego, California, USA, Oct. 30 - Nov. 3, 2022. (22.5% (132/586)) ***(Top Conference)***
2. Yin-Chiuan Chen, **Chun-Feng Wu**, Yuan-Hao Chang, and Tei-Wei Kuo, "Exploring Synchronous Page Fault Handling", ACM/IEEE International Conference on Hardware/Software Codesign and System Synthesis (CODES+ISSS), Hybrid-Shanghai, Oct. 7-14, 2022. (Journal Track, Integrated with IEEE TCAD). ***(Top Conference)***
3. **Chun-Feng Wu**, Carole-Jean Wu, Gu-Yeon Wei, and David Brooks, "A Joint Management Middleware to Improve Training Performance of Deep Recommendation Systems with SSDs", ACM/IEEE Design Automation Conference (DAC), San Francisco, CA, USA, Jul. 10-14, 2022. (Acceptance rate: 23%) ***(Top Conference)***
4. Tse-Yuan Wang, **Chun-Feng Wu**, Che-Wei Tsao, Yuan-Hao Chang, and Tei-Wei Kuo, "Scheduling-Aware Prefetching: Enabling the PCIe SSD to Extend the Global Memory of GPU Device", IEEE Nonvolatile Memory Systems and Applications Symposium (NVMSA), Virtual Conference, August 18-20, 2021.
5. Ting-Hsuan Lo, **Chun-Feng Wu**, Yuan-Hao Chang, Tei-Wei Kuo and Wei-Chen Wang, "Space-efficient Graph Data Placement to Save Energy of ReRAM Crossbar", ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED), Virtual, Jul. 26-28, 2021. ***(Top Conference)***
6. Yun-Chih Chen, **Chun-Feng Wu**, Yuan-Hao Chang, and Tei-Wei Kuo, "Reptail: Cutting Storage Tail Latency with Inherent Redundancy", ACM/IEEE Design Automation Conference (DAC), San Francisco, CA, USA, Dec. 5-9, 2021. (Acceptance rate: 23%) ***(Top Conference)***
7. Camelia Slimani, **Chun-Feng Wu**, Stephane Rubini, Yuan-Hao Chang, and Jalil Boukhobza, "RaFIO: A Random Forest I/O-Aware Algorithm", ACM Symposium on Applied Computing (SAC), Gwangju, South Korea, Mar. 22-26, 2020.
8. Hsiang-Yun Cheng, **Chun-Feng Wu**, Christian Hakert, Kuan-Hsun Chen, Yuan-Hao Chang, Jian-Jia Chen, Chia-Lin Yang and Tei-Wei Kuo, "Future Computing Platform Design: A Cross-Layer Design Approach", ACM/IEEE Design Automation and Test in Europe (DATE), Virtual Conference, Feb. 1-5, 2020.
9. Yi-Shen Chen, **Chun-Feng Wu**, Yuan-Hao Chang, and Tei-Wei Kuo, "A Write-friendly Arithmetic Coding Scheme for Achieving Energy-Efficient Non-Volatile Memory Systems", ACM/IEEE Asia and South Pacific Design Automation Conference (ASP-DAC), Tokyo, Japan, Jan. 18-21, 2021.
10. Gaddisa Olani Ganfure, **Chun-Feng Wu**, Yuan-Hao Chang, and Wei-Kuan Shih, "DeepGuard: Deep Generative User-behavior Analytics for Ransomware Detection", IEEE International Conference on Intelligence and Security Informatics (ISI), Nov. 9-10, 2020.
11. Yun-Sheng Chang, Yao Hsiao, Tzu-Chi Lin, Che-Wei Tsao, **Chun-Feng Wu**, Yuan-Hao Chang, Hsiang-Shang Ko, and Yu-Fang Chen, "Determinizing Crash Behavior with a Verified Snapshot-Consistent Flash Translation Layer", USENIX Symposium on Operating Systems Design and Implementation (OSDI), Banff, Alberta, Canada, Nov. 4-6, 2020. (Acceptance rate: 17.6% (70/398)) ***(Top Conference)***
12. **Chun-Feng Wu**, Yuan-Hao Chang, Ming-Chang Yang, and Tei-Wei Kuo, "When Storage Response Time Catches Up with Overall Context Switch Overhead, What is Next?", ACM/IEEE International Conference on Hardware/Software Codesign and System Synthesis

(CODES+ISSS), Germany, Sep. 20 - 25, 2020. (Journal Track, Integrated with IEEE TCAD). (Acceptance rate: 21.9%(28/128)) ***(Top Conference)***

13. Yao-Wen Kang, **Chun-Feng Wu**, Yuan-Hao Chang, Tei-Wei Kuo and Shu-Yin Ho, "On Minimizing Analog Variation Errors to Resolve the Scalability Issue of ReRAM-based Crossbar Accelerator", ACM/IEEE International Conference on Embedded Software (EMSOFT), Germany, Sep. 20 - 25, 2020. (Journal Track, Integrated with IEEE TCAD) ***(Top Conference)***
14. Gaddisa Olani Ganfure, **Chun-Feng Wu**, Yuan-Hao Chang, and Wei-Kuan Shih, "DeepPrefetcher: A Deep Learning Framework for Data Prefetching in Flash Storage Devices", ACM/IEEE International Conference on Compilers, Architecture, and Synthesis for Embedded Systems (CASES), Germany, Sep. 20 - 25, 2020. (Journal Track, Integrated with IEEE TCAD). ***(Top Conference)***
15. Shuo-Han Chen, Yu-Pei Liang, Yuan-Hao Chang, Yun-Fei Liu, **Chun-Feng Wu**, Hsin-Wen Wei, and Wei-Kuan Shih, "Reinforcing the Energy Efficiency of Cyber-Physical Systems via Direct and Split Cache Consolidation on MLC STT-RAM", ACM Symposium on Applied Computing (SAC), Brno, Czech Republic, Mar. 30 - Apr. 3, 2020.
16. Yu Ting Ho, **Chun-Feng Wu**, Ming-Chang Yang, and Yuan-Hao Chang, "Replanting Your Forest: NVM-friendly Bagging Strategy for Random Forest", IEEE Nonvolatile Memory Systems and Applications Symposium (NVMSA), Hangzhou, China, August 18-21, 2019 (Best Paper Award)
17. Shuo-Han Chen, Ming-Chang Yang, Yuan-Hao Chang, and **Chun-Feng Wu**, "Enabling File-Oriented Fast Secure Deletion on Shingled Magnetic Recording Drives", ACM/IEEE Design Automation Conference (DAC), Las Vegas, Nevada, USA, Jun. 2-6, 2019. (Acceptance rate: 24.8%(202/815) ***(Top Conference)***
18. **Chun-Feng Wu**, Ming-Chang Yang, Yuan-Hao Chang, and Tei-Wei Kuo, "Hot-Spot Suppression for Resource-Constrained Image Recognition Devices with Non-Volatile Memory", ACM/IEEE International Conference on Embedded Software (EMSOFT), Torino, Italy, Sep. 30 - Oct. 5, 2018. (Journal Track, Integrated with IEEE TCAD) ***(Top Conference)***
19. **Chun-Feng Wu**, Ming-Chang Yang, and Yuan-Hao Chang, "Improving Runtime Performance of Deduplication System with Host-Managed SMR Storage Drives", ACM/IEEE Design Automation Conference (DAC), San Francisco, USA, Jun. 24-28, 2018. (Acceptance rate: 24.3%(168/691)) ***(Top Conference)***
20. **Chun-Feng Wu**, Tse-Chuan Hsu, Hongji Yang, and Yeh-Ching Chung, "File Placement Mechanisms for Improving Write Throughputs of Cloud Storage Services Based on Ceph and HDFS", Proceedings of IEEE International Conference on Applied System Innovation (ICASI), Sapporo, Japan, May 2017. (The First Prize Paper Award)
21. Su-Shien Ho, **Chun-Feng Wu**, Jiazheng Zhou, Wenguang Chen, Ching-Hsien Hsu, Hung-Chang Hsiao, and Yeh-Ching Chung. "Distributed Metaserver Mechanism and Recovery Mechanism Support in Quantcast File System", IEEE Computer Software and Applications Conference (COMPSAC), pages 758 - 763, Taichung, Taiwan, July. 2015.

US Patents

1. Wei-Chen Wang, Ting-Hsuan Lo, **Chun-Feng Wu**, Yuan-Hao Chang, Tei-Wei Kuo, "Memory Device And Operation Method Thereof", Patent No.: US2022/0155959A1, Date of Patent: May 19, 2022.
2. Shu-Yin Ho, Hsiang-Pang Li, Yao-Wen Kang, **Chun-Feng Wu**, Yuan-Hao Chang, Tei-Wei Kuo, "Neural Network Computation Method And Apparatus Using Adaptive Data Representation", Patent No.: US 16,798,166, Date of Patent: Oct. 1, 2020.

AWARDS & SCHOLARSHIP

1. **Award** for "Excellence Award of PhD Thesis Award " sponsored by Institute of Information & Computing Machinery (IICM) (中華民國資訊學會博士論文優等獎), 2022.
2. **Award** for "One of the Finalist of Open Innovation Contest for AXDIMM Technology " hosted by Samsung, 2021.
3. **Award** for "The 1st Prize of PhD Thesis Award " sponsored by Lam Research (科林論文獎博士論文頭等獎), 2021.
4. **Scholarship** for "CTCI Research Scholarship " sponsored by China Technical Consultants Inc (CTCI) Founation (中技社研究獎學金), 2021.
5. **Award** for "Ph.D. Thesis Award " sponsored by Taiwan Information Storage Association (TISA) (社團法人台灣資訊儲存技術協會), 2021.
6. **Award** for "TSIA Semiconductor Award " sponsored by Taiwan Semiconductor Industry Association (台灣半導體產業協會), 2021.
7. **Grant** for "Postdoctoral Research Study Abroad Program " sponsored by Ministry of Science and Technology (科技部博士後研究千里馬計畫), 2020.
8. **Scholarship** for "Pan Wen Yuan Scholarship" sponsored by Pan Wen Yuan Foundation (財團法人潘文淵文教基金會), 2020.
9. **Scholarship** for "Elite Scholarship" sponsored by Elite-Well Education Foundation (財團法人平安菁教育英基金會), 2020.
10. **Scholarship** for "Student Travel Grants" sponsored by Embedded Systems Week (ESWEEK), 2018.
11. **Scholarship** for "Outstanding Students Conference Travel Grant" sponsored by Foundation for the Advancement of Outstanding Scholarship (傑出人才發展基金會), 2018.
12. **Scholarship** for "The international conference scholarship for young researchers" sponsored by Academia Sinica (中央研究院), 2018.

TALKS & SERVICES

1. IEEE Taipei Section Webchair, 2019-2021.
2. Invited Talk Speaker of The 8th IEEE Non-Volatile Memory Systems and Applications Symposium (NVMSA), 2019.
3. PhD Forum Speaker of The 30th VLSI Design/CAD Symposium, 2019.
4. Forum Speaker of The CCF China Test Conference (CTC), 2020.
5. Tutorial Speaker of ACM/IEEE DATE, 2021.

PROJECTS

Facebook Recommendation System with SSDs 2021-Now

Harvard University, Lab PI: David Brooks & Gu-Yeon Wei

Researchers from Meta (or Facebook previously) point out that data preprocessing is becoming a critical performance bottleneck for training their recommendation systems. We observed that, one of the reasons of the bottleneck is that unused training data may still be read and filtered out during data preprocessing. Besides, these unused data movements is because of the access behavior gap between recommendation systems and SSDs. To avoid these unused data movements, We proposed a joint management middleware to bridge the access behavior gap and periodically re-organize the training data inside SSDs. With using our middleware, systems can save 24%-47% of the overall read time compared with the LSM-based strategy, which is now currently applied by Meta and Baidu.

Samsung AxDIMM 2022-Now

Harvard University, Lab PI: David Brooks & Gu-Yeon Wei

We come up with a proposal targeting on integrating the GNN-based recommendation system with AxDIMM. We are now working on the architecture analysis of AxDIMM and the behavior analysis of GNN-based recommendation system.

SHORT BIOGRAPHY

Chun-Feng Wu is now an assistant professor in Department of Computer Science, National Yang Ming Chiao Tung University. He was a postdoctoral scholar in Department of Computer Science, Harvard University from 2021 to 2022. He received his B.S. and M.S. degrees in department of Computer Science and Information Engineering from National Central University and in Department of Computer Science from National Tsing-Hua University in 2014 and 2016, respectively. He received his PhD degree in Department of Computer Science and Information Engineering from National Taiwan University in 2021. Previously, he served his R&D alternative service at Institute of Information Science, Academia Sinica, Taipei, Taiwan. He has published 1 US patent and 31 research papers, including papers from 15 IEEE/ACM Transactions (including IEEE TC, IEEE TCAD and ACM TECS) and 12 top conferences (including ACM/IEEE DAC, ACM/IEEE ICCAD, ACM/IEEE EMSOFT, ACM/IEEE CODES+ISSS, ACM/IEEE Cases, ACM/IEEE ISLPED and USENIX OSDI). His primary research interests include memory/storage systems and architectures, operating systems, next-generation non-volatile memory and processing-in-memory. He is a member in IEEE.