

Tsung-Wei Huang's CV

Website: <https://twhuang.ece.illinois.edu/>

GitHub: <https://github.com/twhuang-uiuc/>

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POSITIONS

Assistant Professor – ECE Dept., University of Utah 2019-present
Research Assistant Professor – ECE Dept., University of Illinois at Urbana-Champaign 2018-2019

EDUCATION

PhD – ECE Dept., University of Illinois at Urbana-Champaign, IL, USA 2013-2017
BS/MS – CS Dept., Taiwan's National Cheng Kung University, Tainan, Taiwan 2006-2011

RESEARCH INTERESTS

- Software Systems
- Parallel/Distributed/Heterogeneous Computing
- Electronic Design Automation

SOFTWARE

| Project | GitHub |
|---|---|
| Cpp-Taskflow: Fast Parallel Programming with Task Dependencies using Modern C++ | https://github.com/cpp-taskflow/cpp-taskflow - Best Poster Award in 2018 C++ Conference (CppCon) |
| OpenTimer: A High-performance Timing Analysis Tool for VLSI Systems | https://github.com/OpenTimer/OpenTimer - ACM TAU Top-3 Winners in 2014-2016 - Golden Timers of ACM TAU Contests in 2014-2016 - Best EDA Software Tool in 2018 WOSET@ICCAD |
| DtCraft: A General-purpose Distributed Programming System using Data-parallel Streams | https://github.com/twhuang-uiuc/DtCraft - Best Open-source Software Award in 2018 ACM MM |

SELECTED AWARDS

- ACM SIGDA Outstanding PhD Dissertation Award ("Distributed Timing Analysis"), 2019
- Best Tool Award (OpenTimer), Workshop on Open-source EDA Technology, 2018
- Best Open-source Software Award (DtCraft), ACM Multimedia Conference, 2018
- Best Poster Award for Open-source Parallel Programming Library (Cpp-Taskflow), CPP Conference, 2018
- 2nd and 1st Place, ACM/SIGDA CADathlon International Programming Contest, 2014 and 2017
- 1st, 2nd, and 1st Place, ACM TAU Timing Analysis Contest, 2014 through 2016
- Yi-Min Wang and Pi-Yu Chung Endowed Research Award, ECE Dept. UIUC, 2016
- Rambus Computer Engineering Fellowship, ECE Dept. UIUC, 2015-2016
- Study Abroad Scholarship for Outstanding EECS Students, Ministry of Education, Taiwan, 2013-2014
- 2nd Place, ACM Student Research Competition Grand Final, ACM Annual Award Banquet, 2011
- Best Master's Thesis Award, Taiwan Institute of Electrical and Electronic Engineering, 2011

- Best Master's Thesis Award, IEEE Taiwan Tainan Section, 2011
- Best Master's Thesis Award, Taiwan Institute of Information and Computing Machinery, 2011
- 1st Place, Master's Thesis Contest, Chinese Institute of Electrical Engineering, Taiwan, 2011
- Outstanding Graduate Recruiting Fellowship, National Cheng Kung University, 2010
- Outstanding Student Scholarship, Garmin Corporation, Taiwan, 2010
- 1st Place, ACM/SIGDA Student Research Competition, Design Automation Conference, 2010
- 3rd Place, National Collegiate Cell-Based IC Design Contest, Ministry of Education, Taiwan, 2010
- Distinguished Engineering Student Fellowship, Chinese Institute of Engineers, Taiwan, 2009
- 1st Place, National Collegiate Nano Device CAD Contest, Nano Device Laboratories, Taiwan, 2009
- 3rd Place, National Collegiate Programming Contest, Ministry of Education, Taiwan, 2009
- 2nd Place, National Collegiate IC/CAD Programming Contest, Ministry of Education, Taiwan, 2009
- 2nd Place, Presidential Award in CS Department, National Cheng Kung University, Taiwan, 2009

RESEARCH GRANT

1. PI, DARPA "OpenTimer and DtCraft," \$427K, 06/2018 – 07/2019

CONFERENCE

1. C.-X. Lin, T.-W. Huang, G. Guo, and Martin D. F. Wong, "A Modern C++ Parallel Task Programming Library," *ACM Multimedia Conference (MM)*, Nice, France, 2019
2. C.-X. Lin, T.-W. Huang, G. Guo, and Martin D. F. Wong, "An Efficient and Composable Parallel Programming Library," *IEEE High-performance Extreme Computing (HPEC)*, Waltham, MA, 2019
3. T.-W. Huang, C.-X. Lin, G. Guo, and Martin D. F. Wong, "Cpp-Taskflow: Fast Task-based Parallel Programming using Modern C++," *IEEE International Parallel and Distributed Processing Symposium (IPDPS)*, Rio De Janeiro, Brazil, 2019
4. K.-M. Lai, T.-W. Huang, and T.-Y. Ho, "A General Cache Framework for Efficient Generation of Timing Critical Paths," *ACM/IEEE Design Automation Conference (DAC)*, Las Vegas, NV, 2019
5. T.-W. Huang, C.-X. Lin, G. Guo, and Martin D. F. Wong, "Essential Building Blocks for Creating an Open-source EDA Project," *ACM/IEEE Design Automation Conference (DAC)*, Las Vegas, NV, 2019
6. T.-W. Huang, C.-X. Lin, and Martin D. F. Wong, "Distributed Timing Analysis at Scale," *ACM/IEEE Design Automation Conference (DAC)*, Las Vegas, NV, 2019
7. T.-W. Huang, C.-X. Lin, G. Guo, and Martin D. F. Wong, "A General-purpose Distributed Programming Systems using Data-parallel Streams," *ACM Multimedia Conference (MM)*, Seoul, Korea, 2018
8. C.-X. Lin, T.-W. Huang, G. Guo, and Martin D. F. Wong, "MtDetector: A High-performance Marine Traffic Detector at Stream Scale," *ACM Distributed Event-based System Conference (DEBS)*, Hamilton, New Zealand, 2018
9. C.-X. Lin, T.-W. Huang, T. Yu, and Martin D. F. Wong, "A Distributed Power Grid Analysis Framework from Sequential Stream Graph," *ACM Great Lakes Symposium (GLSVLSI)*, Chicago, IL, 2018
10. C.-X. Lin, T.-W. Huang, and Martin D. F. Wong, "Routing at Compile Time," *IEEE International Symposium on Quality Electronic Design (ISQED)*, Santa Clara, CA, 2018
11. T.-W. Huang, C.-X. Lin, and Martin D. F. Wong, "DtCraft: A Distributed Execution Engine for Compute-intensive Applications," *ACM/IEEE International Conference on Computer-aided Design (ICCAD)*, Irvine, CA, 2017
12. T.-Y. Lai, T.-W. Huang, and Martin D. F. Wong, "An Effective and Accurate Macro-modeling Algorithm for Large

- Hierarchical Designs,” *ACM/IEEE Design Automation Conference (DAC)*, Austin, TX, 2017
13. T.-W. Huang, Martin D. F. Wong, D. Sinha, K. Kalafala, and N. Venkateswaran, “A Distributed Timing Analysis Framework for Large Designs,” *ACM/IEEE Design Automation Conference (DAC)*, Austin, TX, 2016
 14. T.-W. Huang and Martin D. F. Wong, “OpenTimer: A High-performance Timing Analysis Tool,” *IEEE/ACM International Conference on Computer-aided Design (ICCAD)*, TX, 2015
 15. T.-W. Huang and Martin D. F. Wong, “On Fast Timing Closure: Speeding Up Incremental Path-Based Timing Analysis with MapReduce,” *IEEE/ACM International Workshop on System-level Interconnect Prediction (SLIP)*, CA, 2015
 16. T.-W. Huang and Martin D. F. Wong, “Accelerated Path-Based Timing Analysis with MapReduce,” *ACM International Symposium on Physical Design (ISPD)*, Monterey, CA, 2015
 17. T.-W. Huang, P.-C. Wu, and Martin D. F. Wong, “Fast Path-Based Timing Analysis for CPPR,” *IEEE/ACM ACM/IEEE International Conference on Computer-aided Design (ICCAD)*, San Jose, CA, 2014
 18. T.-W. Huang, P.-C. Wu, and Martin D. F. Wong, “UI-Timer: An Ultra-Fast Clock Network Pessimism Removal Algorithm,” *IEEE/ACM International Conference on Computer-aided Design (ICCAD)*, San Jose, CA, 2014
 19. T.-W. Huang, P.-C. Wu, and Martin D. F. Wong, “UI-Route: An Ultra-Fast Incremental Maze Routing Algorithm,” *IEEE/ACM International Workshop on System-level Interconnect Prediction (SLIP)*, San Francisco, CA, 2014
 20. S.-H. Yeh, J.-W. Chang, T.-W. Huang, and T.-Y. Ho, “Voltage-Aware Chip-Level Design for Reliability-Driven Pin-Constrained EWOD Chips,” *IEEE/ACM International Conference on Computer-aided Design (ICCAD)*, San Jose, CA, 2012
 21. T.-W. Huang, J.-W. Chang, and T.-Y. Ho, “Integrated Fluidic-Chip Co-Design Methodology for Digital Microfluidic Biochips,” *ACM International Symposium on Physical Design (ISPD)*, Napa, CA, 2012
 22. J.-W. Chang, T.-W. Huang, and T.-Y. Ho, “An ILP-based Obstacle-Avoiding Routing Algorithm for Pin-Constrained EWOD Chips,” *IEEE/ACM Asia and South Pacific Design Automation Conference (ASPDAC)*, Sydney, Australia, 2012
 23. T.-W. Huang, T.-Y. Ho, and K. Chakrabarty, “Reliability-Oriented Broadcast Electrode-Addressing for Pin-Constrained Digital Microfluidic Biochips,” *IEEE/ACM International Conference on Computer-aided Design (ICCAD)*, San Jose, CA, 2011
 24. T.-W. Huang, Y.-Y. Lin, J.-W. Chang, and T.-Y. Ho, “Recent Research and Emerging Challenges in the Designs and Optimizations for Digital Microfluidic Biochips,” invited paper, *IEEE System on Chip Conference (SOCC)*, 2011.
 25. T.-W. Huang, Y.-Y. Lin, J.-W. Chang, and T.-Y. Ho, “Chip-Level Design and Optimization for Digital Microfluidic Biochips,” invited paper, *IEEE International Midwest Symposium on Circuits and Systems (MWSCAS)*, 2011.
 26. P.-H. Yuh, C. C.-Y. Lin, T.-W. Huang, T.-Y. Ho, C.-L. Yang, and Y.-W. Chang, “A SAT-Based Routing Algorithm for Cross-Referencing Biochips,” *IEEE/ACM International Workshop on System-level Interconnect Prediction (SLIP)*, San Diego, CA, June 2011.
 27. T.-W. Huang, H.-Y. Su, and T.-Y. Ho, “Progressive Network-Flow Based Broadcast Addressing for Pin-Constrained Digital Microfluidic Biochips,” *ACM/IEEE Design Automation Conference (DAC)*, pp. 741-746, San Diego, CA, June 2011.
 28. T.-W. Huang, S.-Y. Yeh, and T.-Y. Ho, “A Network-Flow Based Pin-Count Aware Routing Algorithm for Broadcast Electrode-Addressing EWOD Chips,” *IEEE/ACM International Conference on Computer-aided Design (ICCAD)*, pp. 425-431, San Jose, CA, 2010.
 29. T.-W. Huang and T.-Y. Ho, “A Two-Stage Integer-Linear-Programming Based Droplet Routing Algorithm for Pin-Constrained Digital Microfluidic Biochips,” *ACM International Symposium on Physical Design (ISPD)*, pp. 201-

208, San Francisco, CA, 2010.

30. T.-W. Huang, C.-H. Lin, and T.-Y. Ho, "A Contamination-Aware Droplet Routing Algorithm for Digital Microfluidic Biochips," *IEEE/ACM International Conference on Computer-aided Design (ICCAD)*, pp. 151-156, San Jose, CA, 2009.
31. T.-W. Huang and T.-Y. Ho, "A Fast Routability- and Performance-Driven Droplet Routing Algorithm for Digital Microfluidic Biochips," *IEEE International Conference on Computer Design (ICCD)*, pp. 445-450, Lake Tahoe, CA, 2009

JOURNAL

1. T.-W. Huang, C.-X. Lin, and Martin D. F. Wong, "DtCraft: A High-performance Distributed Execution Engine at Scale," *IEEE Transactions on Computer-aided Design of Integrated Circuits and Systems (TCAD)*, 2018
2. T.-W. Huang and Martin D. F. Wong, "UI-Timer 1.0: An Ultra-Fast Path-Based Timing Analysis Algorithm for CPPR," *IEEE Transactions on Computer-aided Design of Integrated Circuits and Systems (TCAD)*, vol. 35, no. 11, pp. 1862-1875, Nov. 2016
3. S.-H. Yeh, J.-W. Chang, T.-W. Huang, S.-T. Yu, and T.-Y. Ho, "Voltage-Aware Chip-Level Design for Reliability-Driven Pin-Constrained EWOD Chips," *IEEE Transactions on Computer-aided Design of Integrated Circuits and Systems (TCAD)*, vol. 33, no.9, pp. 1302-1315, Sep. 2014.
4. J.-W. Chen, C.-L. Hsu, L.-C. Tsai, T.-W. Huang, and T.-Y. Ho, "An ILP-Based Routing Algorithm for Pin-Constrained EWOD Chips with Obstacle Avoidance," *IEEE Transactions on Computer-aided Design of Integrated Circuits and Systems (TCAD)*, vol. 32, no.11, pp. 1655-1667, Nov. 2013.
5. Y.-H. Chen, C.-L. Hus, T.-W. Huang, and T.-Y. Ho, "A Reliability-Oriented Placement Algorithm for Reconfigurable Digital Microfluidic Biochips using 3D Deferred Decision-Making Technique," *IEEE Transactions on Computer-aided Design of Integrated Circuits and Systems (TCAD)*, vol. 32, no. 8, pp. 1151-1162, Aug. 2013.
6. J.-W. Chang, S.-H. Yeh, T.-W. Huang, and T.-Y. Ho, "Integrated Fluidic-Chip Co-Design Methodology for Digital Microfluidic Biochips," *IEEE Transactions on Computer-aided Design of Integrated Circuits and Systems (TCAD)*, vol. 32, no 2, pp. 216-227, Feb. 2013.
7. T.-W. Huang, S.-Y. Yeh, and T.-Y. Ho, "A Network-Flow Based Pin-Count Aware Routing Algorithm for Broadcast-Addressing EWOD Chips," *IEEE Transactions on Computer-aided Design of Integrated Circuits and Systems (TCAD)*, vol. 30, no. 12, pp. 1786-1799, Dec. 2011.
8. T.-W. Huang and T.-Y. Ho, "A Two-Stage Integer-Linear-Programming Based Droplet Routing Algorithm for Pin-Constrained Digital Microfluidic Biochips," *IEEE Transactions on Computer-aided Design of Integrated Circuits and Systems (TCAD)*, vol. 30, no. 2, pp. 215-228, Feb. 2011.
9. T.-W. Huang, C.-H. Lin, and T.-Y. Ho, "A Contamination-Aware Droplet Routing Algorithm for the Synthesis of Digital Microfluidic Biochips," *IEEE Transactions on Computer-aided Design of Integrated Circuits and Systems (TCAD)*, vol. 29, no. 11, pp. 1682-1695, Nov. 2010.

PATENT

1. T.-W. Huang, K. Kalafala, D. Sinha, and N. Venkateswaran, "Incremental Common Path Pessimism Analysis," *USA Patent*, 14/946043, 2015
2. T.-W. Huang, K. Kalafala, D. Sinha, and N. Venkateswaran, "Distributed Timing Analysis of a Partitioned Integrated Circuit Design", US9916405B2, 03/13/2018

INVITED TALK

1. “Essential Building Blocks for Creating an Open-source EDA Project,” IEEE/ACM DAC, June 2019
2. “Task-based Parallel Programming using Modern C++”, CSL Social Hour, Sep 2018
3. “Distributed Timing Analysis in 100 Lines Code,” VSD webinar, May 2018
4. “DtCraft: A High-performance Distributed Execution Engine at Scale,” CSLSC, UIUC, IL, 2018
5. “OpenTimer: An open-source high-performance timing analysis tool,” ORCONF, Bologna, Italy, 2016
6. “Distributed Timing Analysis: Framework and Systems,” Cadence, Austin, June 2016
7. “OpenTimer: A High-performance Timing Analysis Tool,” Special Session, IEEE/ACM ICCAD, 2015
8. “Fast Path-based Timing Analysis,” Special Session, IEEE/ACM ICCAD, 2014

INDUSTRY EXPERIENCE

| | |
|---|-----------------|
| Software Engineer – High-performance computing Group, Citadel, Chicago, IL | 2017/06–2017/08 |
| Software Engineer – Timing Group, IBM, Fishkill, NY | 2015/05–2015/08 |
| Software Engineer – Timing Group, Mentor Graphics, Fremont, CA | 2014/05–2014/08 |

TEACHING EXPERIENCE

Instructor – Logic Synthesis, ECE 462, UIUC (SP19)

Teaching Assistant – Computer System and Programming, ECE 220, UIUC (FA15, FA16, SP17)

Teaching Assistant – VLSI CAD: Logic to Layout, Coursera (SP16)

Instructor – Competitive Programming, CSIE 3001, NCKU (FA10, SP11)

SERVICE

Journal Reviewer

- IEEE Transaction on Computer-aided Design for Integrated Circuits and Systems (TCAD)
- IEEE Transaction on Very Large Scale Integration (TVLSI)
- IEEE Transaction on Big Data (TBD)
- ACM Transaction on Design Automation of Electronic Systems (TODAES)
- VLSI Integration Journal

Conference Reviewer

- ACM International Symposium on Physical Design (ISPD)
- IEEE/ACM International Conference on Computer-aided Design (ICCAD)
- IEEE/ACM Design Automation Conference (DAC)
- IEEE/ACM Asia and South Pacific Design Automation Conference (ASPDAC)

Organizer

- Chair, VSDOpen Online EDA Conference, 2018
- Co-chair, ACM SIGDA CADathlon International Programming Contest, 2018
- Co-chair, ACM TAU Timing Analysis Contest, 2018

Program Committee

- IEEE/ACM International Conference on Computer-aided Design (ICCAD), 2019
- IEEE/ACM Asia and South Pacific Design Automation Conference (ASPDAC), 2019

- The C++ Conference (CppCon), 2019