

Tsung-Wei Huang's CV

Website: <https://tsung-wei-huang.github.com>

GitHub: <https://github.com/tsung-wei-huang>

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POSITIONS

Assistant Professor – ECE Department, University of Utah

2019-present

Research Assistant Professor – ECE Department, University of Illinois at Urbana-Champaign

2018-2019

EDUCATION

PhD – ECE Department, University of Illinois at Urbana-Champaign, IL, USA

2013-2017

BS/MS – CS Department, National Cheng Kung University, Tainan, Taiwan





2006-2011

RESEARCH INTERESTS

“How can we make it easier for researchers and developers to easily write parallel and heterogeneous programs with high performance and simultaneous high productivity?”

SOFTWARE

My research and software are open source and being used by researchers and organizations.

Software	GitHub
 Taskflow: A General-purpose Parallel and Heterogeneous Task Programming System	https://github.com/taskflow/taskflow <ul style="list-style-type: none">- Champion of 2020 IEEE HPEC Neural Network Challenge- 2nd Place of Open Source Software Award in ACM MM19- Best Poster Award in 2018 C++ Conference (CppCon)
 Heteroflow: Concurrent CPU-GPU Task Programming using Modern C++	https://github.com/heteroflow/heteroflow
 OpenTimer: A High-performance Timing Analysis Tool for VLSI Systems	https://github.com/OpenTimer/OpenTimer <ul style="list-style-type: none">- Best EDA Software Tool in 2018 WOSET@ICCAD- ACM TAU Top-3 Winners in 2014-2016- Golden Timers of ACM TAU Contests in 2014-2016
 DtCraft: A General-purpose Distributed Programming System using Data-parallel Streams	https://github.com/twhuang-uiuc/DtCraft <ul style="list-style-type: none">- Best Open-source Software Award in ACM MM18

SELECTED AWARDS

- Champion of the IEEE/MIT/Amazon HPEC Large Sparse Neural Network Challenge, 2020
- 2nd Place (Taskflow), Open-source Software Competition, ACM Multimedia Conference, 2019
- ACM SIGDA Outstanding PhD Dissertation Award (thesis title: “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 (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 (with University of Illinois)

CONFERENCE

1. D.-L. Lin and T.-W. Huang, "A Novel A Novel Inference Algorithm for Large Sparse Neural Network using Task Graph Parallelism," *IEEE High-performance Extreme Computing (HPEC)*, Waltham, MA, 2020
2. Z. Guo, T.-W. Huang, and Y. Lin, "GPU-Accelerated Static Timing Analysis," *IEEE/ACM International Conference on Computer-aided Design (ICCAD)*, San Diego, 2020
3. G. Guo, T.-W. Huang, C.-X. Lin, and Martin D. F. Wong, "An Efficient Critical Path Generation Algorithm Considering Extensive Path Constraints," *IEEE/ACM Design Automation Conference (DAC)*, San Francisco, CA, 2020
4. 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
5. 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
6. 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
7. 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
8. 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
9. 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
10. 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
11. 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
12. 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
13. 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

14. 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
15. 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
16. 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
17. 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
18. 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
19. 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
20. 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
21. 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
22. 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
23. 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
24. 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
25. 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
26. 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
27. 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.
28. 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.
29. 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.
30. 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.
31. 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.
32. 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.
33. 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.

34. 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, G. Guo, C.-X. Lin, and Martin D. F. Wong, "OpenTimer v2: A New Parallel Incremental Timing Analysis Engine," *IEEE Transactions on Computer-aided Design of Integrated Circuits and Systems (TCAD)*, to appear, 2020
2. 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)*, vol. 38, no. 6, pp. 1070-1083, June 2018
3. 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
4. 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.
5. 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.
6. 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.
7. 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.
8. 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.
9. 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.
10. 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 (assignee: IBM)
2. T.-W. Huang, K. Kalafala, D. Sinha, and N. Venkateswaran, "Distributed Timing Analysis of a Partitioned Integrated Circuit Design", *USA Patent*, 9916405B2, 03/13/2018 (assignee: IBM)

INVITED TALK

1. "Programming Systems for Parallelizing VLSI CAD and Beyond," VLSI-DAT, April 2020
2. "A General-purpose Parallel and Heterogeneous Task Programming System at Scale," ORNL, March 2020
3. "Growing Your Open-Source Projects," WOSET at IEEE/ACM ICCAD, November 2019
4. "Essential Building Blocks for Creating an Open-source EDA Project," IEEE/ACM DAC, June 2019

5. "Task-based Parallel Programming using Modern C++", CSL Social Hour, Sep 2018
6. "Distributed Timing Analysis in 100 Lines Code," VSD webinar, May 2018
7. "DtCraft: A High-performance Distributed Execution Engine at Scale," CSLSC, UIUC, IL, 2018
8. "OpenTimer: An open-source high-performance timing analysis tool," ORCONF, Bologna, Italy, 2016
9. "Distributed Timing Analysis: Framework and Systems," Cadence, Austin, June 2016
10. "OpenTimer: A High-performance Timing Analysis Tool," Special Session, IEEE/ACM ICCAD, 2015
11. "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 – Advanced Programming, ECE 5960, Utah (SP20)
Instructor – Logic Synthesis, ECE 462, UIUC (SP19)
Instructor – Competitive Programming, CSIE 3001, NCKU (FA10, SP11)
Teaching Assistant – Computer System and Programming, ECE 220, UIUC (FA15, FA16, SP17)
Teaching Assistant – VLSI CAD: Logic to Layout, Coursera (SP16)

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

- Co-chair, CAD Contest in IEEE/ACM ICCAD, 2020
- Publicity Chair, International Workshop on Logic Synthesis (IWLS), 2020
- Chair/Co-chair, ACM SIGDA CADathlon International Programming Contest, 2018-2020
- Chair, VSDOpen Online EDA Conference, 2018
- Co-chair, ACM TAU Timing Analysis Contest, 2018

Program Committee

- ACM TAU Workshop, 2020
- IEEE/ACM International Conference on Computer-aided Design (ICCAD), 2019-2020
- IEEE/ACM Asia and South Pacific Design Automation Conference (ASPDAC), 2019-2020
- IEEE International Conference on Computer Design (ICCD), 2020
- The C++ Conference (CppCon), 2019