Cheng Tan

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Experience

- **Compiler Engineer, Microsoft**   Dec 2021 - Present
  Work on Brainwave compiler toolchain targeting machine learning accelerators
- **Postdoctoral Associate, Pacific Northwest National Laboratory**   Jan 2020 - Dec 2021
  Word on HW/SW codesign and develop spatial reconfigurable accelerators
- **Postdoctoral Associate, Cornell University**   Dec 2018 - Jan 2020
  Work on network-on-chip generator
- **Research Assistant, National University of Singapore**   Jun 2017 - Nov 2018
  Work on many-core architecture

Technique Skills

Software: LLVM, TVM, MLIR, Linux, PyTorch, C, C++, C#, Python, JAVA, OpenMP, MPI
Hardware: RTL, Verilog, Assembly, Gem5, Gem5-GPU, Synopsys, Hardware/Software Co-design **Primary contributor and maintainer of:**

- CGRA-Flow, a unified CGRA framework that collects different repos/modules for CGRA development.
- CGRA-Mapper, an LLVM pass that generates CDFG and maps them onto a customizable CGRA.
- OpenCGRA, a unified CGRA framework.
- PyMTL3-net, a unified NoC framework.
- ARENA, an asynchronous data-centric programming model.

Education

- **National University of Singapore, Singapore**   Aug 2013 – Nov 2018
  Ph.D. in Computer Science
  Supervisor: Prof. Tulika Mitra and Prof. Li-Shiuan Peh
- **Shandong University, Shandong, China**   Aug 2009 – Jun 2013
  Bachelor of Computer Science

Selected Publications

- [**HPCA**] DRIPS: Dynamic Rebalancing of Pipelined Streaming Applications on CGRAs. Cheng Tan, Nicolas Bohm Agostini, Tong Geng, Chenhao Xie, Jiajia Li, Ang Li, Kevin Barker, Antonino Tumeo. The 28th IEEE International Symposium on High-Performance Computer Architecture, Seoul, South Korea, February 2022.
- [**MICRO**] I-GCN: A Graph Convolutional Network Accelerator with Runtime Locality Enhancement through Islandization. Tong Geng, Chunshu Wu, Yongan Zhang, Cheng Tan, Chenhao Xie, Haoran You, Martin Herbordt, Yingyan Lin, Ang Li. 54th IEEE/ACM International Symposium on Microarchitecture, Athens, Greece, Oct 16-20, 2021.
- [**ICCD – Best Paper Award**] DynPaC: Coarse-Grained, Dynamic, and Partially Reconfigurable Array for Streaming Applications. Cheng Tan, Tong Geng, Chenhao Xie, Nicolas Bohm Agostini, Jiajia Li, Ang Li, Kevin Barker, Antonino Tumeo. The 39th IEEE International Conference on Computer Design, October 2021.
- [**HPCA**] Ultra-Elastic CGRAs for Irregular Loop Specialization. Christopher Torng, Peitian Pan, Yanghui Ou, Cheng Tan, Christopher Batten. 27th IEEE International Symposium on High-Performance Computer Architecture, Seoul 2021.

- [**ICCD**] OpenCGRA: An Open-Source Unified Framework for Modeling, Testing, and Evaluating CGRAs. <u>Cheng Tan</u>, Chenhao Xie, Ang Li, Kevin Barker, Antonino Tumeo. The 38th IEEE International Conference on Computer Design, October 2020.
- [**ISCA**] Stitch: Fusible Heterogeneous Accelerators Enmeshed with Many-Core Architecture for Wearables. <u>Cheng Tan</u>, Manupa Karunaratne, Tulika Mitra, Li-Shiuan Peh. 45th ACM/IEEE International Symposium on Computer Architecture, June 2018.
- [**CASES – Best Paper Normination**] LOCUS: Low-Power Customizable Many-Core Architecture for Wearables. <u>Cheng Tan</u>, Aditi Kulkarni, Vanchinathan Venkataramani, Manupa Karunaratne, Tulika Mitra, Li-Shiuan Peh. ACM International Conference on Compilers, Architecture, and Synthesis for Embedded Systems, October 2016.

The list of full publications can be seen at google scholar.

Teaching

- **CS4223 Multi-Core Architectures**, Teaching Assistant, School of Computing, National University of Singapore, Fall'15

Academic Service

- **Program Committee**: MICRO'22, CODES+ISSS'22, CGRA4HPC'22, ICCAD'22/'21, ICCD'22/'21
- **External Review Committee**: ASPLOS'22, HPCA'22
- **Artifact Evaluation Committee**: PPOPP'21, MICRO'21
- **Session Chair**: ICCAD'22/'21, ICCD'21/'19
- **Journal Reviewer**: TECS'22, MicroSI'21, TSUSC'21, TCAD'21, TPDS'21/'20, TACO'21, TNNLS'21/'20, PARCO'21/'20, TVLSI'22/'21/'19, SUSCOM'22, Automatika'21
- **Conference Reviewer**: IPDPS'22, ICCAD'21, ICCD'21, SC'21, LCTES'21, ICS'20, FPT'18, ICPADS'18, DAC'17, ISCA'17, CASES'16, MICRO'16
- **Student Volunteer**: ASP-DAC'14

Selected Awards

- ***Outstanding Performance Award***, Pacific Northwest National Laboratory, 2022
- ***Best Paper Award***, The 39th IEEE International Conference on Computer Design (ICCD), 2021
- ***Outstanding Postdoc***, PNNL, 2020
- ***Best Paper Nomination***, ACM International Conference on Compilers, Architecture, and Synthesis for Embedded Systems (CASES), 2016
- ***NUS Research Scholarship***, National University of Singapore, 2013
- ***Excellent Undergraduate Thesis Award***, Shandong University, 2013
- ***National Scholarship***, China, 2012
- ***Google Scholarship***, Google, China, 2011
- ***The First Prize Scholarship***, Shandong University, 2010

Talks

- DynPaC: Coarse-Grained, Dynamic, and Partially Reconfigurable Array for Streaming Applications, ICCD'21
- Democratizing Coarse-Grained Reconfigurable Arrays, NUS'21
- OpenCGRA: Democratizing Coarse-Grained Reconfigurable Arrays, ASAP'21
- AURORA: Automated Refinement of Coarse-Grained Reconfigurable Accelerators, DATE'21
- OpenCGRA: An Open-Source Unified Framework for Modeling, Testing, and Evaluating CGRAs, CIRCT'20
- OpenCGRA: An Open-Source Unified Framework for Modeling, Testing, and Evaluating CGRAs, ICCD'20
- PyOCN: A Unified Framework for Modeling, Testing, and Evaluating On-Chip Networks, ICCD'19
- Low-Power Many-Core Architectures for the Next-Generation Wearables, Cornell'19
- Stitch: Fusible Heterogeneous Accelerators Enmeshed with Many-Core Architecture for Wearables, ISCA'18
- LOCUS: Low-Power Customizable Many-Core Architecture for Wearables, ESWEEK'16
- Approximation-Aware Scheduling on Heterogeneous Multi-core Architectures, ASP-DAC'15

Influence

- The research work **DynPaC** is feature in news: PNNL News
- Representative **outstanding postdoc** in PNNL: PNNL News
- The research work **OpenCGRA** is featured in news: HPC wire, CACM, MIRAGE, PNNL News
- The research work **Stitch** is featured in news: Inceptive Mind, NUS News