

# SHIH-HAO TSENG

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## EDUCATION

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| <b>Cornell University (CU)</b> , Ithaca, NY, U.S.A.<br><i>PhD in Electrical and Computer Engineering (Advisor: Dr. A. Tang)</i> <ul style="list-style-type: none"><li>Dissertation: Orchestrating Inter-Datacenter Bulk Transfers with CodedBulk</li></ul> | Aug. 2013 - Dec. 2018  |
| <b>National Taiwan University (NTU)</b> , Taipei, Taiwan<br><i>Bachelor of Science in Engineering (minor in Economics)</i> <ul style="list-style-type: none"><li>GPA: 92.20/100.00; ranking 2<sup>nd</sup> in a class of 226</li></ul>                     | Sept. 2008 - June 2012 |

## RESEARCH INTERESTS

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- Networked systems, in-network processing, edge computing, Internet of Things, scheduling algorithms.
  - Control theory, deployment architecture, controller synthesis, stability and optimization.
  - Network simulation and emulation, controller performance evaluation.

## EXPERIENCE

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| <b>Meta Platforms, Inc.</b> , Menlo Park, CA, U.S.A.<br><i>Research Scientist</i>  | Dec. 2021 - Present   |
| <b>California Institute of Technology</b> , Pasadena, CA, U.S.A.<br><i>Postdoctoral Scholar Research Associate</i> <ul style="list-style-type: none"><li>Led the project of freshness-driven network control.</li><li>Mentored graduate students on parallel model predictive control and formal test-case generation.</li><li>Derived realization-stability lemma that unifies existing controller synthesis methods.</li><li>Investigated the controller deployment architecture for cyber-physical systems.</li><li>Developed efficient computation technique via dynamic programming and flexible Python framework for system level synthesis.</li></ul> | Oct. 2018 - Oct. 2021 |
| <b>Cornell University</b> , Ithaca, NY, U.S.A.<br><i>Graduate Research Assistant/Teaching Assistant</i> <ul style="list-style-type: none"><li>Built CodedBulk to boost the throughput of inter-datacenter bulk transfers using network coding.</li><li>Studied time-aware network management under software-defined networking.</li><li>Helped teach Introduction to Probability and Inference for Random Signals and Systems.</li></ul>   | Aug. 2014 - Aug. 2018 |
| <b>The Chinese University of Hong Kong</b> , Shatin, NT, Hong Kong<br><i>Research Assistant</i> <ul style="list-style-type: none"><li>Developed efficient scheduling algorithms for hybrid packet/circuit networks.</li></ul>  | June 2017 - Aug. 2017 |
| <b>AT&amp;T</b> , Middletown, NJ, U.S.A.<br><i>Student Intern - Technical II</i> <ul style="list-style-type: none"><li>Developed routing algorithms to stabilize carrier-grade hybrid software-defined networks.</li></ul>   | June 2016 - Aug. 2016 |

## SKILLS

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**Programming Languages:** Proficient in C, C++, Python and Verilog; working knowledge of Basic, HTML, Java, JavaScript, MySQL, and PHP.

**Programming Skills:** Working knowledge of Linux based C++ socket, kernel scheduler, GPU parallelization, and multithreaded programming.

**Simulation Tools:** Proficient in control system (MATLAB) and network simulations (NS-3).

**Languages:** Fluent in English; native in Mandarin Chinese and Taiwanese Hokkien; basic understanding of Cantonese, French, German, Spanish, and Japanese.

## HONORS AND AWARDS

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| <b>Winner of the AT&amp;T SDN Network Design Challenge</b> <ul style="list-style-type: none"><li>Awarded to the top team providing the most efficient and cost effective routing solution to carrier-grade networks.</li></ul> | 2016                   |
| <b>Jacobs Fellowship (CU)</b>  | 2014                   |
| <b>Studying Abroad Scholarship (Ministry of Education, Taiwan(R.O.C.))</b>   | 2013                   |
| <b>Honorary Member of the Phi Tau Phi Scholastic Honor Society</b> <ul style="list-style-type: none"><li>Presented to seniors from each college in Taiwan ranking within top 1% of their department.</li></ul>                 | 2012                   |
| <b>President's Awards (NTU)</b>  | 2009, 2010, 2011, 2012 |

- Four-time recipient; awarded to students ranking within top 5% of their department.
- Outstanding Project Award** 2011
- Awarded to the top 10 teams of Cross-Strait Finals of 2011 Innovate Asia Competition (FPGA design).

## PATENT

- [p1] U.S. Patent 10,411,990 B2: "Routing Stability in Hybrid Software-Defined Networking Networks," September 10, 2019.

## BOOK

- [b1] A. Tang and **S.-H. Tseng**, *Traffic Management in Computer Networks: A Systems Approach*, in preparation.

## JOURNAL ARTICLES

- [j1] **S.-H. Tseng** and J. Anderson, "Synthesis to Deployment: Cyber-Physical Control Architectures," in submission, [Online] arXiv:2012.05211.  
[j2] **S.-H. Tseng**, S. Han, and A. Wierman, "In-Network Freshness Control: Trading Throughput for Freshness," in submission, [Online] arXiv:2106.02156.  
[j3] **S.-H. Tseng**, A. Tang, G. Choudhury, and S. Tse, "Routing Stability in Hybrid Software-Defined Networks," in *IEEE/ACM Trans. Netw.*, 2019.

## CONFERENCE PAPERS

- [c1] C. Amo Alonso and **S.-H. Tseng**, "Effective GPU Parallelization of Distributed and Localized Model Predictive Control," in *Proc. IEEE ICCA*, 2022.  
[c2] L. E. Conger and **S.-H. Tseng**, "Output-Feedback System Level Synthesis via Dynamic Programming," in *Proc. IEEE ACC*, 2022.  
[c3] **S.-H. Tseng**, "Realization-Stability Lemma for Controller Synthesis," in *arXiv:2112.02005*, 2021.  
[c4] **S.-H. Tseng**, "A General Approach to Robust Controller Analysis and Synthesis," in *Proc. IEEE CDC*, 2021.  
[c5] **S.-H. Tseng**, "Realization, Internal Stability, and Controller Synthesis," in *Proc. IEEE ACC*, 2021.  
[c6] **S.-H. Tseng**, S. Agarwal, R. Agarwal, H. Ballani, and A. Tang, "CodedBulk: Inter-Datacenter Bulk Transfers using Network Coding," in *Proc. USENIX NSDI*, 2021.  
[c7] **S.-H. Tseng**, C. Amo Alonso, and S. Han, "System Level Synthesis via Dynamic Programming," in *Proc. IEEE CDC*, 2020.  
[c8] J. S. L. Li and **S.-H. Tseng**, "SLS-MATLAB Toolbox: Do-It-Yourself System Level Synthesis [Poster]," in *Proc. IEEE ACC*, 2020.  
[c9] **S.-H. Tseng** and J. Anderson, "Deployment Architectures for Cyber-Physical Control Systems," in *Proc. IEEE ACC*, 2020.  
[c10] **S.-H. Tseng**, "A Generic Solver for Unconstrained Control Problems with Integral Functional Objectives," in *Proc. IEEE ACC*, 2020.  
[c11] **S.-H. Tseng**, "Perseverance-Aware Traffic Engineering in Rate-Adaptive Networks with Reconfiguration Delay," in *Proc. IEEE ICNP*, 2019.  
[c12] J. Cheng, **S.-H. Tseng**, and A. Tang, "Worst-Case Latency Performance of Load Balancing Through Distributed Waterfilling Algorithm," in *Proc. CISS*, 2019.  
[c13] N. Wu, **S.-H. Tseng**, and A. Tang, "Accurate Rate-Aware Flow-Level Traffic Splitting," in *Proc. Allerton*, 2018.  
[c14] **S.-H. Tseng** and A. Tang, "Coflow Deadline Scheduling via Network-Aware Optimization," in *Proc. Allerton*, 2018.  
[c15] **S.-H. Tseng**, B. Bai, and J. C. S. Lui, "Hybrid Circuit/Packet Network Scheduling with Multiple Composite Paths," in *Proc. IEEE INFOCOM*, 2018.  
[c16] **S.-H. Tseng** and A. Tang, "A Local Search Algorithm for the Witsenhausen's Counterexample," in *Proc. IEEE CDC*, 2017.  
[c17] **S.-H. Tseng**, E. Bitar, and A. Tang, "Random Convex Approximations of Ambiguous Chance Constrained Programs," in *Proc. IEEE CDC*, 2016.  
[c18] A. Gushchin, **S.-H. Tseng**, and A. Tang, "Optimization-Based Network Flow Deadline Scheduling," in *Proc. IEEE ICNP*, 2016.  
[c19] **S.-H. Tseng**, C. L. Lim, N. Wu, and A. Tang, "Time-Aware Congestion-Free Routing Reconfiguration," in *Proc. IFIP Networking*, 2016.  
[c20] **S.-H. Tseng** and J. S. Li, "SLSpy: Python-Based System-Level Controller Synthesis Framework," in preparation, [Online] arXiv:2004.12565.  
[c21] **S.-H. Tseng**, "Part-Time Emulation of Network Applications via Simulated Links," in preparation.  
[c22] **S.-H. Tseng**, "Network-Calculus-Based Upper Bounds on Age of Information," in preparation.