

# SHIH-HAO TSENG

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## EDUCATION

Cornell University (CU), Ithaca, NY, U.S.A. PhD in Electrical and Computer Engineering (Advisor: Dr. A. Tang) <ul style="list-style-type: none"><li>Dissertation: Orchestrating Inter-Datacenter Bulk Transfers with CodedBulk</li></ul>	Aug. 2013 - Dec. 2018
National Taiwan University (NTU), Taipei, Taiwan Bachelor of Science in Engineering (minor in Economics) <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

- 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

Meta Platforms, Inc., Menlo Park, CA, U.S.A. Research Scientist	Dec. 2021 - Present
California Institute of Technology, Pasadena, CA, U.S.A. Postdoctoral Scholar Research Associate <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
Cornell University, Ithaca, NY, U.S.A. Graduate Research Assistant/Teaching Assistant <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
The Chinese University of Hong Kong, Shatin, NT, Hong Kong Research Assistant <ul style="list-style-type: none"><li>Developed efficient scheduling algorithms for hybrid packet/circuit networks.</li></ul>	June 2017 - Aug. 2017
AT&T, Middletown, NJ, U.S.A. Student Intern - Technical II <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

**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

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

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

2011

## 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, "Trading Throughput for Freshness: Freshness-Aware Traffic Engineering and In-Network Freshness Control," in ACM TOMPECS, 2022.  
[j3] S.-H. Tseng, A. Tang, G. Choudury, 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.