Hsu-Chieh Hu

Contact Information

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405 Wickford Dr., 404-307-2284
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Research Interests

Planning, machine learning, multi-agent systems and intelligent transportation.

Education

Carnegie Mellon University, Pittsburgh, PA

Ph.D in Electrical and Computer Engineering, Aug., 2013 - Apr., 2019

- Advisors: Prof. Stephen F. Smith of **The Robotics Institute**

M.S in **Machine Learning**, Aug., 2017 - Apr., 2019

National Taiwan University, Taiwan

M.S in Communication Engineering (4.0/4.0) , Aug., 2010

- Advisor: Prof. Ping-Cheng Yeh

B.S in Electrical Engineering (3.89/4.0) , Jun., 2008

Recent Research Experience

Scalable Urban Traffic Control (SURTRAC) Jan., 2015 to Apr., 2019

- Optimizing traffic flows in urban road networks combining real-time traffic data and online multi-agent planning.
- Collaboration and co-planning between autonomous vehicles and smart infrastructure.
- Applying both reinforcement learning and planning to solve traffic control problems.

The Spectrum Collaboration Challenge Oct., 2016 to Dec. 2017

- The DARPA Spectrum Collaboration Challenge (SC2) is the first collaborative machine-learning competition to overcome scarcity in the radio frequency (RF) spectrum.
- Applying multi-agent planning and learning to coordinate wireless devices.

Work Experience

Senior Research Scientist, Rapid Flow Technologies, PA Apr. 2019 to present

- Developed scheduling algorithms and V2I applications.
- Developed a reinforcement learning module to adjust scheduling constraints.
- Designed an online learning algorithm to estimate model parameters.

Robotics Engineering Intern, Fetch Robotics, CA Jun, 2018 to Aug., 2018

- Developed a decentralized framework for multi-robot coordination.
- Filed a patent for inter-robot communication that becomes a product feature.

Research Assistant, The Robotics Institute, CMU, May, 2015 to Apr., 2019

- Developed a pedestrian signal timing prediction algorithm for SURTRAC
- Designed and implemented a multi-agent collaboration protocol for SURTRAC.

Software Engineer, Mediatek inc., Taiwan May, 2010 to Aug., 2013

- Developed and maintained LTE/WCDMA protocol software in the 2nd largest mobile SoC provider worldwide.
- Designed and implemented a performance profiling platform to facilitate measurement of MIPS consumption.
- Built an User Equipment Simulator (UESIM) to accelerate product development.

Teaching Assistant, Department of ECE, CMU Sep., 2014 to Dec., 2015

- 18-751 Applied Stochastic Process
- 18-759 Wireless Networks

Selected Publications

1. **H.-C. Hu**, A. Hawkes and S. Smith, "Incorportating Queueing Dynamics into Schedule-Driven Traffic Control," *International Joint Conference on Artificial Intelligence (IJCAI)*, 2021.
2. **H.-C. Hu**, and S. Smith, "Learning Model Parameters for Decentralized Schedule-Driven Traffic Control," *International Conference on Automated Planning and Scheduling (ICAPS)*, 2020.
3. **H.-C. Hu**, S. Smith, and R. Goldstein, "Cooperative Schedule-Driven Intersection Control with Connected and Autonomous Vehicles," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2019.
4. **H.-C. Hu**, and S. Smith, "Using Bi-Directional Information Exchange to Improve Decentralized Schedule-Driven Traffic Control," *International Conference on Automated Planning and Scheduling (ICAPS)*, 2019.
5. **H.-C. Hu**, and S. Smith, "Bi-Directional Information Exchange in Decentralized Schedule-Driven Traffic Control," International Conference on Autonomous Agents and Multiagent Systems (AAMAS) 2018.
6. **H.-C. Hu**, and S. Smith, "Softpressure: A Schedule-Driven Backpressure Algorithm for Coping with Network Congestion," *International Joint Conference on Artificial Intelligence (IJCAI)*, 2017.
7. **H.-C. Hu**, and S. Smith, "Coping with Large Traffic Volumes in Schedule-Driven Traffic Signal Control," *International Conference on Automated Planning and Scheduling (ICAPS)*, 2017.

Patents

- **H.-C. Hu**, F. Bai, and O. Tonguz, "Methods and systems for managing network communications to and from a vehicle network", *US 14/796566*.
- S.-A. Chou, and **H.-C. Hu**, "Methods for determining whether to perform cell measurement on a predetermined neighbor cell and for ping-pong avoidance during cell reselection and communication apparatus utilizing the same", *US 20150056996A1*.
- S.-A. Chou, and **H.-C. Hu**, "Methods for efficient wireless communications and communication apparatus utilizing the same" *US 20160142953 A1*

Awards and Academic Activities

- Study Abroad Scholarship, Ministry of Education, Taiwan, 2015
- Dean's Tuition Fellowship, Carnegie Institute of Technology, Pittsburgh, PA, 2013
- vAward: Being top 1 performance in protocol team of MediaTek, 2012, 2013
- Reviewer: IEEE TVT, IEEE TMC, INFOCOM, ICAPS, TRB, COMCOM

Selected Courses

Planning:

- 16-782 Planning and Decision-making in Robotics
- 15-780 Graduate Artificial Intelligence
- 16-831 Statistical Techniques in Robotics

Machine learning and optimization:

- 10-703 Deep Reinforcement Learning and Control
- 15-701 Machine Learning
- 10-725 Convex Optimization
- 15-708 Probabilistic Graphical Model

Computer Skills

- Languages: Python, C, C++, Java, SQL
- Tools: TensorFlow, MATLAB, CPLEX, CVX, SUMO, Vissim, GNURadio