

CHEN TANG

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EDUCATION

University of California Berkeley

August 2016 - May 2022

PhD in Mechanical Engineering (Control)

Minors: Machine learning, Optimization

Advisor: Prof. Masayoshi Tomizuka

Hong Kong University of Science and Technology

August 2012 - June 2016

BEng in Mechanical Engineering

Minor: Mathematics

Georgia Institute of Technology

August 2014 - December 2014

Exchange Student in Mechanical Engineering

RESEARCH INTEREST

My research interest lies at the intersection of deep learning, reinforcement learning, control and optimization. The goal of my research is to develop trustworthy intelligent autonomous systems interacting with humans (e.g., autonomous vehicles). In particular, I am interested in improving the transparency and robustness of learning-based autonomous systems, leveraging the strength of knowledge-infused learning, interpretable machine learning, explainable AI, robust control, and causality. Applications of my research include multi-agent trajectory prediction, interaction modeling, motion planning, and vehicle control.

WORK EXPERIENCE

University of California Berkeley

June 2022 - Present

Postdoctoral Scholar (Supervisor: Prof. Masayoshi Tomizuka)

- Lead research projects on behavior of autonomous driving (e.g., trajectory prediction, motion planning, and control) at Mechanical Systems Control Lab.

Waymo Behavior Team

May 2021 - August 2021

Intern, Planner Prediction Router ML & Deep Learning (Host: Qiaojing Yan, Stephane Ross)

- Build a fast conditional prediction model with deep learning based on Multipath, which achieves the same prediction quality as the full model but significantly reduces inference time.

Honda Research Institute US

June 2019 - Dec 2019

Student Research Intern (Mentor: Sujitha Martin)

- Propose an explainable relational inference framework combining IRL and neural relational inference to incorporate domain knowledge into deep learning models in a principled manner, which enables semantically meaningful explanation of vehicle interaction in terms of their relations.

TEACHING EXPERIENCE

Department of Mechanical Engineering, UC Berkeley

Jan 2020 - May 2020

Graduate Student Instructor - ME 233 Advanced Control System II

- Instructor: Prof. Masayoshi Tomizuka

- Rating: 4.50, Department Average: 4.15

PUBLICATIONS

PhD Dissertation

Designing Explainable Autonomous Driving System for Trustworthy Interaction, 2022

Dissertation Committee: Masayoshi Tomizuka, Anil Aswani, Francesco Borrelli, Mark Mueller

Working Papers

1. **C. Tang**, N. Srishankar, S. Martin, and M. Tomizuka, “Grounded relational inference: Domain knowledge-driven explainable autonomous driving,” *IEEE Transactions on Intelligent Transportation Systems (T-ITS)*, under review
2. J. Chen, **C. Tang**, W. Zhan, and M. Tomizuka, “Interaction-and-uncertainty-aware joint decision making and trajectory planning for urban on-road autonomous driving,” in preparation for journal submission

Journal

1. J. Li, **C. Tang**, W. Zhan, and M. Tomizuka, “Hierarchical planning through goal-conditioned offline reinforcement learning,” *IEEE Robotics and Automation Letters (RA-L)* and *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2022
2. **C. Tang***, Z. Xu*, and M. Tomizuka, “Disturbance-observer-based tracking controller for neural network driving policy transfer,” *IEEE Transactions on Intelligent Transportation Systems*, vol. 21, no. 9, pp. 3961–3972, 2019
3. Á. Cuenca, W. Zhan, J. Salt, J. Alcaina, **C. Tang**, and M. Tomizuka, “A remote control strategy for an autonomous vehicle with slow sensor using kalman filtering and dual-rate control,” *Sensors*, vol. 19, no. 13, p. 2983, 2019
4. X. Liu, **C. Tang**, X. Du, S. Xiong, S. Xi, Y. Liu, X. Shen, Q. Zheng, Z. Wang, Y. Wu, *et al.*, “A highly sensitive graphene woven fabric strain sensor for wearable wireless musical instruments,” *Materials Horizons*, vol. 4, no. 3, pp. 477–486, 2017

Conference Proceedings

1. C. Xu*, T. Li*, **C. Tang**, L. Sun, K. Keutzer, M. Tomizuka, A. Fathi, and W. Zhan, “Pretram: Self-supervised pre-training via connecting trajectory and map,” *European Conference on Computer Vision (ECCV)*, 2022
2. **C. Tang**, W. Zhan, and M. Tomizuka, “Interventional behavior prediction: Avoiding overly confident anticipation in interactive prediction,” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2022
3. L. Sun*, **C. Tang***, Y. Niu, E. Sachdeva, C. Choi, T. Misu, M. Tomizuka, and W. Zhan, “Domain knowledge driven pseudo labels for interpretable goal-conditioned interactive trajectory prediction,” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2022
4. **C. Tang**, W. Zhan, and M. Tomizuka, “Exploring social posterior collapse in variational autoencoder for interaction modeling,” in *Advances in Neural Information Processing Systems*, vol. 34, pp. 8481–8494, 2021
5. J. Li, **C. Tang**, M. Tomizuka, and W. Zhan, “Dealing with the unknown: Pessimistic offline reinforcement learning,” in *5th Annual Conference on Robot Learning (CoRL)*, 2021
6. J. M. S. Ducaju, **C. Tang**, and M. Tomizuka, “Application specific system identification for model-based control in self-driving cars,” in *2020 IEEE Intelligent Vehicles Symposium (IV)*, IEEE, 2020
7. **C. Tang**, J. Chen, and M. Tomizuka, “Adaptive probabilistic vehicle trajectory prediction through physically feasible bayesian recurrent neural network,” in *2019 International Conference on Robotics and Automation (ICRA)*, pp. 3846–3852, IEEE, 2019

8. Z. Xu, H. Chang, **C. Tang**, C. Liu, and M. Tomizuka, “Toward modularization of neural network autonomous driving policy using parallel attribute networks,” in *2019 IEEE Intelligent Vehicles Symposium (IV)*, pp. 1400–1407, IEEE, 2019
9. Z. Xu*, **C. Tang***, and M. Tomizuka, “Zero-shot deep reinforcement learning driving policy transfer for autonomous vehicles based on robust control,” in *2018 21st International Conference on Intelligent Transportation Systems (ITSC)*, pp. 2865–2871, IEEE, 2018 (**Best Student Paper Runner-up**)
10. J. Chen, **C. Tang**, L. Xin, S. E. Li, and M. Tomizuka, “Continuous decision making for on-road autonomous driving under uncertain and interactive environments,” in *2018 IEEE Intelligent Vehicles Symposium (IV)*, pp. 1651–1658, IEEE, 2018
11. C. Zhao, R. Xu, K. Song, D. Liu, S. Ma, **Chen. Tang**, C. Liang, Y. Zohar, and Y.-K. Lee, “The capillary number effect on the capture efficiency of cancer cells on composite microfluidic filtration chips,” in *2015 28th IEEE International Conference on Micro Electro Mechanical Systems (MEMS)*, pp. 459–462, IEEE, 2015

Workshop

1. **C. Tang**, N. Srishankar, S. Martin, and M. Tomizuka, “Explainable autonomous driving with grounded relational inference,” in *NeurIPS Workshop on Machine Learning for Autonomous Driving*, 2020

(The superscript * indicates equal contribution.)

INVITED TALKS

Designing Explainable Autonomous Driving System for Trustworthy Interaction

- DSCD Rising Stars Invited Talks

Exploring Social Posterior Collapse in Variational Autoencoder for Interaction Modeling

- ASL Lab Seminar at Stanford University
 - ICL Lab Seminar at Carnegie Mellon University
 - AI TIME PhD Talk at Tsinghua University

Zero-shot Deep Reinforcement Learning Driving Policy Transfer for Autonomous Vehicles based on Robust Control

- Workshop on Reinforcement Learning for Transportation at ITSC 2018

AWARDS AND SCHOLARSHIPS

DSCD Rising Stars Invited Talks 2022

Graduate Division Block Grant Summer 2020

IEEE ITSC 2018 Best Student Paper Runner-up

HKUST Academic Achievement Medal (top 1%)

HKUST President’s Cup Silver Award (2016)

ROBOCON Hong Kong Contest First Runner-up (2013, 2014)

ABU ROBOCON Final Eight, Best Engineering Award (2013)

ACADEMIC SERVICES

Reviewers

- IEEE Transaction on Intelligent Transportation Systems
 - IEEE International Conference on Robotics and Automation
 - IEEE/RSJ International Conference on Intelligent Robots and Systems
 - IEEE Intelligent Vehicles Symposium
 - IEEE International Conference on Control, Automation, Robotics and Vision

- American Control Conference
- Conference on Robot Learning
- Modeling, Estimation and Control Conference

Program Committee

- Co-organizer of Workshop at IEEE Conference on Robotics and Systems (IROS), 2021
- Associate Editor at IEEE Intelligent Transportation Systems Conference (ITSC), 2021
- Associate Editor at IEEE Intelligent Transportation Systems Conference (ITSC), 2022

MENTORSHIP

Undergraduate Students

- Lu Wen (now PhD student at University of Michigan)
- Tianchen Ji (now PhD student at University of Illinois at Urbana-Champaign)
- Chen Liu (now PhD student at University of Cambridge)
- Yiping Dong (now Master student at Carnegie Mellon University)
- Chenran Li (now PhD student at UC Berkeley)
- Bhavesh Kalisetti (undergraduate student at UC Berkeley)
- Vade Shah (undergraduate student at UC Berkeley)

Master Students

- Junzhe Shi (now software engineer at Apple)
- Julin Salt Ducaju (now PhD student at Lund University)
- Eric Bergkvist (visiting scholar at UC Berkeley)
- Yaru Niu (incoming PhD student at Carnegie Mellon University)

PhD Students

- Ce Hao (PhD student at UC Berkeley)
- Catherine Weaver (PhD student at UC Berkeley)
- Jinning Li (PhD student at UC Berkeley)
- Lingfeng Sun (PhD student at UC Berkeley)
- Chenfeng Xu (PhD student at UC Berkeley)