

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 control, robotics, and learning. My research aims to develop trustworthy and safe autonomous agents interacting with humans (e.g., autonomous vehicles). I am interested in improving the transparency and robustness of learning-based autonomous systems, leveraging the strength of deep learning, reinforcement learning, imitation learning, explainable AI, 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

July 2022 - Present

Postdoctoral Scholar (Supervisor: Prof. Masayoshi Tomizuka)

- Leading behavior-related research activities for 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: 4.50/5.00, Department Average: 4.15/5.00

PUBLICATIONS

(The superscript * indicates equal contribution.)

PhD Dissertation

Designing Explainable Autonomous Driving System for Trustworthy Interaction, 2022

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

Under Review

1. W. Chang*, **C. Tang***, C. Li, Y. Hu, M. Tomizuka, and W. Zhan, “Editing driver character: Socially-controllable behavior generation for interactive traffic simulation,” *IEEE Robotics and Automation Letters (RA-L)*, submitted
2. **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 revision
3. C. Hao, **C. Tang**, E. Bergkvist, C. Weaver, L. Sun, W. Zhan, and M. Tomizuka, “Outracing human racers with model-based autonomous racing,” *IEEE Transactions on Intelligent Vehicles (T-IV)*, under revision

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. S. Su, C. Hao, C. Weaver, **C. Tang**, W. Zhan, and M. Tomizuka, “Double-iterative gaussian process regression for modeling error compensation in autonomous racing,” *22nd IFAC World Congress (IFAC)*, 2023
2. 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 (**acceptance rate: 28%**)
3. **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
4. 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

5. **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 (**acceptance rate: 26%**)
6. 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 (**acceptance rate: 38.25%**)
7. 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
8. **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
9. 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
10. 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**)
11. 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
12. 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 (ML4AD)*, 2020

INVITED TALKS

Designing Explainable Autonomous Driving System for Trustworthy Interaction

- ASME 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

ASME DSCD Rising Stars 2022 Award
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

Journal Reviewer

- IEEE Transaction on Intelligent Transportation Systems (T-ITS)
- IEEE Transaction on Intelligent Vehicles (T-IV)
- IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI)
- MDPI Actuators

Conference and Workshop Reviewer

- AAAI Conference on Artificial Intelligence (AAAI)
- American Control Conference (ACC)
- Conference on Robot Learning (CoRL)
- IEEE International Conference on Control, Automation, Robotics, and Vision (ICARV)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE Intelligent Vehicles Symposium (IV)
- IFAC World Congress (IFAC)
- Learning for Dynamics and Control (L4DC)
- Modeling, Estimation, and Control Conference (MECC)
- North American Manufacturing Research Conference (NAMRC)
- Robotics: Science and Systems (RSS)

Program Committee

- Co-organizer of Workshop at IEEE Intelligent Vehicle Symposium (IV), 2023
Title: Development of Socially-Compliant Driving Behaviour for Automated Vehicles to Enhance Safety and Efficiency in Mixed Traffic
- Leading Organizer of Workshop on at NeurIPS, 2022
Title: Progress and Challenges in Trustworthy Embodied AI
- Program Committee of NeurIPS Workshop on Machine Learning for Autonomous Driving, 2022
- Co-organizer of Workshop at IEEE Conference on Robotics and Systems (IROS), 2021
Title: Multi-Agent Interaction and Relational Reasoning
- Associate Editor at IEEE Intelligent Transportation Systems Conference (ITSC), 2021-2023

MENTORSHIP

Undergraduate Students

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

Master Students

- Junzhe Shi (now Ph.D. student at UC Berkeley)
- Julin Salt Ducaju (now Ph.D. student at Lund University)
- Eric Bergkvist (now application engineer at Embotech)
- Yaru Niu (now Ph.D. student at Carnegie Mellon University)
- Shaoshu Su (visiting master student)

PhD Students

- Jinning Li (Ph.D. student at UC Berkeley)
- Ce Hao (Ph.D. student at UC Berkeley)
- Catherine Weaver (Ph.D. student at UC Berkeley)
- Lingfeng Sun (Ph.D. student at UC Berkeley)
- Chenfeng Xu (Ph.D. student at UC Berkeley)
- Wei-Jer Chang (Ph.D. student at UC Berkeley)
- Yiheng Li (Ph.D. student at UC Berkeley)
- Chenran Li (Ph.D. student at UC Berkeley)
- Yuxin Chen (Ph.D. student at UC Berkeley)
- Yixiao Wang (Ph.D. student at UC Berkeley)
- John Viljoen (Ph.D. student at UC Berkeley)