

# CHEN TANG

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## EDUCATION

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**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

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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 knowledge-infused learning, interpretable machine learning, explainable AI, control, and causality. Applications of my research include multi-agent trajectory prediction, interaction modeling, motion planning, and vehicle control.

## WORK EXPERIENCE

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**University of California Berkeley**

*June 2022 - Present*

*Postdoctoral Scholar (Supervisor: Prof. Masayoshi Tomizuka)*

- Coordinate 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

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**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

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### PhD Dissertation

Designing Explainable Autonomous Driving System for Trustworthy Interaction, 2022

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

### Under Review

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

### 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 (**acceptance rate: 28%**)
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 (**acceptance rate: 26%**)
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 (**acceptance rate: 38.25%**)
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

### Working Papers

1. C. Hao, E. Bergkvist, **C. Tang**, C. Weaver, W. Zhan, and M. Tomizuka, "Outracing human racers with model-based autonomous racing," in preparation for submission to *IEEE Transactions on Intelligent Vehicles (T-IV)*
2. S. Shaoshu, C. Hao, **C. Tang**, W. Zhan, and M. Tomizuka, "Double-iterative gaussian process regression for modeling error compensation in autonomous racing," in preparation for submission to *IFAC World Congress 2023*

### 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

(The superscript \* indicates equal contribution.)

### INVITED TALKS

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#### 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

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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

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### Reviewer

- AAAI Conference on Artificial Intelligence (Special Track on Safe and Robust AI)
- American Control Conference
- Conference on Robot Learning
- ICCV 2021 Workshop on Multi-Agent Interaction and Relational Reasoning
- IEEE International Conference on Control, Automation, Robotics, and Vision
- IEEE/RSJ International Conference on Intelligent Robots and Systems
- IEEE International Conference on Robotics and Automation
- IEEE Intelligent Vehicles Symposium
- IEEE Transaction on Intelligent Transportation Systems
- IEEE Transactions on Pattern Analysis and Machine Intelligence
- Modeling, Estimation, and Control Conference
- NeurIPS 2022 Workshop on Machine Learning for Autonomous Driving

### Program Committee

- Leading Organizer of Workshop on at NeurIPS, 2022  
*Title: Progress and Challenges in Trustworthy Embodies AI*
- 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
- Associate Editor at IEEE Intelligent Transportation Systems Conference (ITSC), 2022

## MENTORSHIP

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### 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)