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. The goal of my research is 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, 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)

– 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

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

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 *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 *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*, 2020

(The superscript * indicates equal contribution.)

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

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

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

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 Kalisetti (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)