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, and mobile robots), leveraging the strength of robust and optimal control, deep learning, reinforcement learning, imitation learning, explainable AI, and causality. Applications of my research include multi-agent interaction modeling, trajectory prediction, motion planning, and vehicle control.

WORK EXPERIENCE

Department of Computer Science, UT Austin   *August 2023 - Present*
Postdoctoral Fellow (Supervisor: Prof. Peter Stone)

– Working on autonomous driving and robot navigation at LARG.

Department of Mechanical Engineering, UC Berkeley   *July 2022 - July 2023*
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 explanations 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

Journal

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)*, pp. 1–8, 2023

2. J. Li, **C. Tang**, W. Zhan, and M. Tomizuka, "Hierarchical planning through goal-conditioned offline reinforcement learning," *IEEE Robotics and Automation Letters (RA-L)*, vol. 7, no. 4, pp. 10216–10223, 2022

3. **C. Tang***, Z. Xu*, and M. Tomizuka, "Disturbance-observer-based tracking controller for neural network driving policy transfer," *IEEE Transactions on Intelligent Transportation Systems (T-ITS)*, vol. 21, no. 9, pp. 3961–3972, 2019

4. 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

5. 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. Li*, **C. Tang***, H. Nishimura, J. Mercat, M. Tomizuka, and W. Zhan, "Residual q-learning: Offline and online policy customization without value," in *Advances in Neural Information Processing Systems (NeurIPS)*, 2023 (**acceptance rate: 26.1%**)

2. 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," in *22nd IFAC World Congress (IFAC)*, 2023

3. 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," in *European Conference on Computer Vision (ECCV)*, pp. 34–50, 2022 (**acceptance rate: 28%**)

4. **C. Tang**, W. Zhan, and M. Tomizuka, "Interventional behavior prediction: Avoiding overly confident anticipation in interactive prediction," in *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 11409–11415, 2022 (**acceptance rate: 48%**)

5. 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," in *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 13034–13041, 2022 (**acceptance rate: 48%**)

6. **C. Tang**, W. Zhan, and M. Tomizuka, "Exploring social posterior collapse in variational autoencoder for interaction modeling," in *Advances in Neural Information Processing Systems (NeurIPS)*, vol. 34, pp. 8481–8494, 2021 (**acceptance rate: 26%**)

7. J. Li, **C. Tang**, M. Tomizuka, and W. Zhan, "Dealing with the unknown: Pessimistic offline reinforcement learning," in *Conference on Robot Learning (CoRL)*, pp. 1455–1464, PMLR, 2022 (**acceptance rate: 38.25%**)

8. 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

9. **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 (**acceptance rate: 44%**)

10. 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

11. 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**)

12. 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

13. C. Zhao, R. Xu, K. Song, D. Liu, S. Ma, **C.. 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. W. Chang*, **C. Tang***, C. Li, Y. Hu, M. Tomizuka, and W. Zhan, "Editing driver character: Socially-controllable behavior generation for interactive traffic simulation," in *CVPR Workshop on Multi-Agent Behavior: Properties, Computation, and Emergence (MABe)*, 2023

2. **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

Under Review

1. T. Benciolini, **C. Tang**, M. Leibold, C. Weaver, M. Tomizuka, and W. Zhan, "Active exploration in iterative gaussian process regression for uncertainty modeling in autonomous racing," *IEEE Transactions on Control Systems Technology (T-CST)*, under review

2. Y. Chen, **C. Tang**, R. Tian, C. Li, J. Li, M. Tomizuka, and W. Zhan, "Quantifying agent interaction in multi-agent reinforcement learning for cost-efficient generalization," double-blind review

3. J. Li, X. Liu, B. Zhu, J. Jiao, M. Tomizuka, **C. Tang**, and W. Zhan, "Guided online distillation: Promoting safe reinforcement learning by offline demonstration," *2024 IEEE International Conference on Robotics and Automation (ICRA)*, under review

4. Y. Li*, S. Z. Zhao*, C. Xu, **C. Tang**, C. Li, M. Ding, M. Tomizuka, and W. Zhan, "Pre-training on synthetic driving data for trajectory prediction," *2024 IEEE International Conference on Robotics and Automation (ICRA)*, under review

5. H. Ce*, C. Weaver*, **C. Tang**, K. Kawamoto, M. Tomizuka, and W. Zhan, "Skill-critic: Refining learned skills for hierarchical reinforcement learning," *IEEE Robotics and Automation Letters (RA-L)*, under review

6. C. Hao, **C. Tang**, E. Bergkvist, C. Weaver, L. Sun, W. Zhan, and M. Tomizuka, "Outracing human racers with model-based planning and control for time-trial racing," *IEEE Transactions on Intelligent Vehicles (T-IV)*, under revision

7. **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

INVITED TALKS

Designing Explainable Autonomous Driving System for Trustworthy Interaction

– ASME DSCD Rising Stars Invited Talks
– Robotics: Science and Systems Pioneers Workshop

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

RSS Pioneers, 2023
ASME DSCD Rising Stars Award, 2022
Graduate Division Block Grant Summer, 2020
IEEE ITSC Best Student Paper Runner-up, 2018
HKUST Academic Achievement Medal (top 1%), 2016
HKUST President's Cup Silver Award, 2016
The Joseph Lau Luen Hung Charitable Trust Scholarship, 2015
The Charted Institution of Building Services Engineers Prize, 2014, 2015
The Cheng Foundation Scholarships for Chinese Mainland Undergraduate Students, 2014, 2015
HKSAR Government Scholarship Fund Talent Development Scholarship, 2014
ROBOCON Hong Kong Contest First Runner-up, Best Engineering Award, 2013, 2014
ABU ROBOCON Final Eight, Best Engineering Award, 2013

ACADEMIC SERVICES

Journal Reviewer

– IEEE Robotics and Automation Letters (RA-L)
– 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 Reviewer

– AAAI Conference on Artificial Intelligence (AAAI)
– American Control Conference (ACC)

- Conference on Neural Information Processing Systems (NeurIPS)
- 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 Transportation Systems Conference (ITSC)
- IEEE Intelligent Vehicles Symposium (IV)
- International Conference on Learning Representations (ICLR)
- Learning for Dynamics and Control (L4DC)
- Modeling, Estimation, and Control Conference (MECC)
- North American Manufacturing Research Conference (NAMRC)
- Robotics: Science and Systems (RSS)
- World Congress of the International Federation of Automatic Control (IFAC)

Program Committee

- Associate Editor at IEEE Intelligent Transportation Systems Conference (ITSC), 2021-2023
- Leading Organizer of Workshop at NeurIPS, 2022
  Title: Progress and Challenges in Trustworthy Embodied AI
- Co-organizer of Workshop at IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021
  Title: Multi-Agent Interaction and Relational Reasoning
- 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
- Program Committee of NeurIPS Workshop on Machine Learning for Autonomous Driving, 2022
- Program Committee of NeurIPS Workshop on Robot Learning, 2023
- Program Committee of Symposium on Machine Learning for Autonomous Driving, 2023
- Program Committee of Workshop on Visual Perception for Navigation in Human Environments: The JackRabbot Human Motion Forecasting at ICCV, 2023
- Program Committee of RSS Pioneers, 2024

MENTORSHIP

Undergraduate Students

- Lu Wen (now a Ph.D. student at the University of Michigan)
- Tianchen Ji (now a Ph.D. student at UIUC)
- Chen Liu (now a Ph.D. student at the University of Cambridge)
- Yiping Dong (now a Master's student at CMU)
- Chenran Li (now a Ph.D. student at UC Berkeley)
- Vade Shah (now a Ph.D. student at UC Santa Barbara)
- Pengcheng Wang (undergraduate student at Tsinghua University)
- Haotian Lin (undergraduate student at Tsinghua University)
- Namila Rahmani (undergraduate student at UT Austin)

Master Students

- Julin Salt Ducaju (now a Ph.D. student at Lund University)
- Eric Bergkvist (now an application engineer at Embotech)
- Yaru Niu (now a Ph.D. student at CMU)
- Shaoshu Su (now a Ph.D. student at the University at Buffalo)
- Zhihao Zhao (Master's student at UC Berkeley)
- Xinyi Liu (Master's student at the University of Michigan)

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)
- Tommaso Benciolini (Ph.D. student at TUM)
- Michael Munje (Ph.D. student at UT Austin)
- Jiaxun Cui (Ph.D. student at UT Austin)