

Chang Shi

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EDUCATION

The University of Texas at Austin

Ph.D. Mechanical Engineering (Advisor: Prof. Amy Zhang)

Austin, TX
Aug 2021 - Present

Research focus: Machine Learning, Imitation Learning, Reinforcement Learning, Robotics

Carnegie Mellon University

M.S. Robotics System Development (Advisor: Prof. John Galeotti and Prof. Howie Choset)

Pittsburgh, PA
Aug 2019 - May 2021

Selected Coursework: Deep RL and Control; Robot Autonomy; Computer Vision; Multimodal ML; SLAM; Manipulation, Estimation and Control

Renmin University of China

B.S. Computer Science (Advisor: Prof. Xinqi Gong)

Beijing, China
Sept 2015 - June 2019

Selected Coursework: Computer Vision; Computer Graphics; Image Processing; Deep Learning; Game Theory

PUBLICATIONS

TP-PPO: Non-Myopic 3D Bin Packing with Tree Search Guided Online Planning

Chang Shi, Amy Zhang | Underreview for RA-L.

FLAM: Scaling Latent Action World Models with Factorization

Chang Shi^{*}, Zizhao Wang^{*}, Jiaheng Hu, Roberto Martin-Martin, Amy Zhang, Peter Stone | NeurIPS 2025 Embodied World Models for Decision Making Workshop, Underreview for ICLR 2026.

FastDP: Deployable Diffusion Policy for Fast Inference Speed

Chang Shi, Amy Zhang | RLC 2025 RL for Real System Workshop, Underreview for ICRA 2026.

Null Counterfactual Factor Interactions for Goal-Conditioned Reinforcement Learning

Caleb Chuck, Fan Feng, Carl Qi, **Chang Shi**, Amy Zhang, Scott Niekum | ICLR 2025.

Robot Air Hockey: A Manipulation Testbed for Robot Learning with Reinforcement Learning

Caleb Chuck^{*}, Carl Qi^{*}, Michael J Munje^{*}, Shuoze Li^{*}, Max Rudolph^{*}, **Chang Shi**^{*}, Siddhant Agarwal^{*}, Harshit Sikchi^{*}, Abhinav Peri, Sarthak Dayal, Evan Kuo, Kavan Mehta, Anthony Wang, Peter Stone, Amy Zhang, Scott Niekum | ICRA 2024 Agile Robotics Workshop, Manipulation Skills Workshop.

Haptic Guidance Using a Transformer-Based Surgeon-Side Trajectory Prediction Algorithm for Robot-Assisted Surgical Training

Chang Shi, Jonathan Madera, Heath Boyea, Ann Majewicz Fey | RO-MAN 2023.

Recognition and Prediction of Surgical Gestures and Trajectories Using Transformer Models in Robot-Assisted Surgery

Chang Shi^{*}, Zheng Yi^{*}, Ann Majewicz Fey | IROS 2022.

Non-rigid cutaneous tissue deformation estimation with iterative RANSAC and TPS from digital images over semi-ambiguous artificial markings

Chang Shi, Dustin P. DeMeo, Emma L. Larson, John M. Galeotti, Bryan T. Carroll | CARS 2021.

Uncertainty quantification for semi-supervised multi-class classification in image processing and ego-motion analysis of body-worn videos

Yiling Qiao, **Chang Shi**, Chenjian Wang, Hao Li, Matt Haberland, Xiyang Luo, Andrew M. Stuart, Andrea L. Bertozzi | EI 2019.

ACADEMIC EXPERIENCE

Machine Intelligence through Decision-making and Interaction Lab, UT Austin

Advisor: Prof. Amy Zhang

Austin, TX
Aug 2023 - present

- Designing factorized world model for multi-agent dynamics learning on robotics demonstration videos without action labels
- Exploring the application of state space models and diffusion models for efficient and multi-modal robot policy learning
- Used object-centric representation and neural-symbolic methods to identify the actual cause of physical interactions to increase goal-conditioned RL efficiency

Austin Villa Robocup@Home Team, UT Austin

Advisor: Prof. Peter Stone, Prof. Justin Hart

Austin, TX
Jan 2022 - Jan 2025

- Trained object detection, human tracking models and integrated speech-to-text module for home service robot
- Wrote solutions for robot as receptionist and restaurant waiter tasks

Human-Enabled Robotic Technology Lab, UT Austin

Advisor: Prof. Ann Majewicz Fey

Austin, TX
Aug 2021 - Dec 2023

- Developed an optical flow-based method for surgical tool tracking on operation videos and conducted motion analysis
- Implemented transformer-based model for predicting da Vinci robot manipulator trajectories during surgical operations
- Designed haptic guidance for assistive autonomy on surgical tasks and conducted human subject study

Biomedical Image Guidance Lab, CMU

Advisor: Prof. John Galeotti

Pittsburgh, PA

May 2020 - May 2021

- Tuned customized calibration on Realsense depth camera to get point cloud data for dermatological tissue samples
- Developed iterative bidirectional blob matching and thin plate spline warping for 2D non-rigid tissue image registration

Biorobotics Lab, CMU

Advisor: Prof. Howie Choset

Pittsburgh, PA

Sept 2019 - Jan 2021

- Designed a stiffness-based automatic tumor localization system for minimally invasive surgery on da Vinci Surgical System
- Used motion estimation and sensor fusion to reconstruct organ surface with depth camera and laser sensor data
- Developed customized dVRK robot control code under limited workspace and wrist joint constraints
- Implemented a dynamic collision avoidance module with motion compensation
- Designed an online palpation path planner based on stiffness updates, largely reduced misclassification rate of tissue health conditions

Applied Mathematics Lab, UCLA | CSST Undergraduate Research Program

Advisor: Prof. Andrea Bertozzi

Los Angeles, CA

June 2018 - Sept 2018

- Optimized feature extraction and change point detection based on video motion on LAPD body-worn camera videos
- Applied uncertainty quantification on graph-based semi-supervised multi-class image classification problem
- Designed a human-in-the-loop relabeling system to improve classification accuracy

INDUSTRIAL EXPERIENCE

Amazon Robotics

Applied Scientist Intern

Boston, MA

May 2023 - Aug 2023, May 2024 - Oct 2024

- Designed an MCTS and RL-based bin packing solutions for online multi-bin assembly lines
- Optimized the robot-automated package consolidation planning procedure
- Validated the optimized solution both in simulation and on real robots

NEC Laboratories America

Research Intern

Princeton, NJ

May 2021 - Aug 2021

- Operated object tracking and key frame detection on collision event video dataset
- Designed a transformer style model for inter-object counterfactual reasoning and video question answering on collision events

Cisco

Research Intern

San Jose, CA

Sept 2018 - July 2019

- Developed novel sensory fusion algorithms to combine AP data with phone IMU data to do path-matching for Connected Mobile Experiences Indoor Location, improved indoor localization accuracy
- Designed a deep learning model deepPHY and surpassed bit and package error rate of 802.11ax PHY baseline from traditional channel estimation methods, especially on low SNR cases

PROJECTS

Deep Graph Network (DGN) for Multi-agent Cooperation on StarCraft II 25 vs 25 Battle Game UT Austin | Spring 2022

- Formulated the problem as a Decentralized Partially Observable Markov Decision Process (Dec-POMDP) and compared the performance of DGN and Deep Q Network in StarCraft II game setting

Collaborative Robot Manipulation over Two-arm Handover Problem in Robosuite Simulation UT Austin | Fall 2021

- Formulated the problem as a Centralized Training Decentralized Execution (CTDE) reinforcement learning paradigm. Tested Independent Soft Actor-Critic (ISAC) and Multi-Agent Deep Deterministic Policy Gradient (MADDPG) algorithms

May I See Your Face? Automatic Face Mask Removal using Generative Adversarial Networks Carnegie Mellon | Spring 2021

- Tested CycleGAN, Pixel2Pixel and several versions of StyleGAN2 on Flickr-Face-HQ (FFHQ) and MaskedFace-Net dataset. Used Poisson blending for further image generation improvement.

Multimodal Graph-structured Trajectory Prediction with Spatio-temporal Attention Mechanism Carnegie Mellon | Fall 2020

- Explored Trajectron++ model on NuScenes autonomous vehicle trajectory prediction task, proposed improvements by fusing Lidar data, LaneGCN and Spatial-temporal attention Mechanism

Autonomous Bin Picking in RLBench Simulation

Carnegie Mellon | Spring 2020

- Used Grasp Quality Convolutional Neural Networks (GQCNN) for optimal grasping pose prediction, and Rapidly-exploring Random Tree (RRT) for trajectory planning.

Arduino Car Based Auto Tracking & Guidance System for The Blind

Renmin University | Fall 2017

- Build a small Arduino car with functionality of voice control, obstacle avoidance and path tracking using real-time video processing, voice recognition and stereo system

TEACHING AND SERVICE

- Teaching Assistant, ME369P, Application Programming for Engineers, UT Austin, Fall 2025.
- Teaching Assistant, M325K Discrete Mathematics, UT Austin, Spring 2025.
- Teaching Assistant, M365C Real Analysis, UT Austin, Spring 2025.
- Teaching Assistant, ECE461L Software Engineering and Design Lab, UT Austin, Spring & Fall 2024.
- Teaching Assistant, 10-716 Advanced Machine Learning: Theory and Methods, Carnegie Mellon, Spring 2021.
- Teaching Assistant, 10-708 Probabilistic Graphical Models, Carnegie Mellon, Fall 2020.
- Coorganizer of Reinforcement Learning Reading Group (RLRG) at UT Austin.
- Reviewer for ICLR, ICML, NeurIPS, AAAI, AISTATS, IROS, ICRA, CoRL, ISMR, Transaction on HRI
- Volunteer for STEM Girl Day at UT Austin 2023, 2024

HONORS AND AWARDS

- AAAI Doctoral Consortium 2026
- UT Professional Development Awards 2023, 2025
- ISMR Travel Awards 2021
- Meritorious Winner of the American Mathematical Contest in Modeling, COMAP 2017
- First Prize in National Mathematical Modeling Contest, China Capital Areas 2017
- Scholarship of Academic Excellence, Renmin University 2016, 2017 & 2018

SKILLS

- **Programming Languages:** Python, C/C++, MATLAB, Javascript, Scala
- **Frameworks& Libraries:** PyTorch, Keras, TensorFlow, OpenCV, ROS
- **Others& Tools:** Docker, Git, Scrapy, Django, Arduino, Raspberry Pi, Autodesk