Danfei Xu

Contact Information

Website: https://faculty.cc.gatech.edu/ danfei/
Email: danfei@gatech.edu

Employment

Georgia Institute of Technology (Atlanta, GA) Aug. 2022 - Present
Tenure-Track Assistant Professor, School of Interactive Computing

NVIDIA Corporation (Santa Clara, CA) Sep. 2021 - Present
Research Scientist (part-time), NVIDIA AI Research

Education

Stanford University, Stanford, CA, USA
Ph.D. in Computer Science (Sep. 2021)
Thesis: Compositional Reasoning in Robot Learning
Advisors: Fei-Fei Li, Silvio Savarese

Columbia University, New York, NY, USA
B.S. in Computer Science (May 2015)

Funded Research

National Science Foundation (2024-2027)
PI: Scalable Robot Validation and Data Creation with Compositional Generative Simulation ($1,034,949)

Autodesk Inc. (2023)
PI: High-Precision Manipulation for Smart Manufacturing ($70,000 unrestricted gift)

National Science Foundation (2022-2025)
Co-PI: AstroSLAM - A Robust and Reliable Visual Localization and Pose Estimation Architecture for Space Robots in Orbit ($792,864)

Recent Awards

Best Paper Honorable Mention, 2024
IEEE Robotics and Automation Letters (RA-L)

Best Paper, 2024
IEEE International Conference on Robotics and Automation (ICRA)

Best Paper & Best Systems Paper Nomination, 2023
Conference on Robot Learning (CoRL)

Riser Award, 2022
Defense Advanced Research Projects Agency (DARPA)

Conference Publications (Chronological)

U. Mishra, Y. Chen, D. Xu, Generative Factor Chaining: Coordinated Manipulation with Diffusion-based Factor Graph, Conference on Robot Learning (CoRL) 2024.

S. Cheng, C. Garrett, A. Mandlekar, D. Xu, NOD-TAMP: Multi-Step Manipulation Planning with Neural Object Descriptors, Conference on Robot Learning (CoRL) 2024.

K. Yu, Y. Han, Q. Wang, V. Saxena, D. Xu, Ye Zhao, MimicTouch: Leveraging Multi-modal Human Tactile Demonstrations for Contact-rich Manipulation, Conference on Robot Learning (CoRL) 2024.

Many Authors, Open X-Embodiment: Robotic Learning Datasets and RT-X Models: Open X-Embodiment Collaboration, *International Conference on Robotics and Automation (ICRA) 2024*

J. Yang, B. Ivanovic, O. Litany, X. Weng, S.W. Kim, B. Li, T. Che, D. Xu, S. Fidler, M. Pavone, Y. Wang, Emernerf: Emergent spatial-temporal scene decomposition via self-supervision, *International Conference on Learning Representations (ICLR) 2024*

S. Xue, J. Dill, P. Mathur, F. Dellaert, P. Tsiotras, D. Xu, Neural Visibility Field for Uncertainty-Driven Active Mapping, *The IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) 2024*.

U. Mishra, S. Xue, Y. Chen, D. Xu, Generative Skill Chaining: Long-Horizon Skill Planning with Diffusion Models, *Conference on Robot Learning (CoRL) 2023*.

S. Xue, S. Cheng, P. Kachana, D. Xu, Neural Field Dynamics Model for Granular Object Piles Manipulation, *Conference on Robot Learning (CoRL) 2023*.

S. Kuhar, S. Cheng, S. Chopra, M. Bronars, D. Xu, Learning to Discern: Imitating Heterogeneous Human Demonstrations with Preference and Representation Learning, *Conference on Robot Learning (CoRL) 2023*.

A. Mandlekar*, C. Garret*, D. Xu, D. Fox , Human-in-the-Loop Task and Motion Planning for Imitation Learning, *Conference on Robot Learning (CoRL) 2023*.

Z. Zhong, D. Rempe, Y. Chen, B. Ivanovic, Y. Cao, D. Xu, M. Pavone, B. Ray, Language-Guided Traffic Simulation via Scene-Level Diffusion, *Conference on Robot Learning (CoRL) 2023*.

C. Wang, L. Fan, J. Sun, R. Zhang, L. Fei-Fei, D. Xu, Y. Zhu, A. Anandkumar, Mimicplay: Long-horizon imitation learning by watching human play, *Conference on Robot Learning (CoRL) 2023*.

Z. Zhong, D. Rempe, D. Xu, Y. Chen, S. Veer, T. Che, B. Ray, M. Pavone, Guided Conditional Diffusion for Controllable Traffic Simulation, *International Conference on Robotics and Automation (ICRA) 2023*

D. Xu*, Y. Chen*, B. Ivanovic, M. Pavone, BITS: Bi-level Imitation for Traffic Simulation, *International Conference on Robotics and Automation (ICRA) 2023*

Ishika Singh, Valts Blukis, Arsalan Mousavian, Ankit Goyal, Danfei Xu, Jonathan Tremblay, Dieter Fox, Jesse Thomason, Animesh Garg, ProgPrompt: Generating Situated Robot Task Plans using Large Language Models, *International Conference on Robotics and Automation (ICRA) 2023*

Y. Cao, D. Xu, A. Anandkumar, C. Xiao, M. Pavone, Robust Trajectory Prediction against Adversarial Attacks *Conference on Robot Learning (CoRL)* 2022.

Y. Cao, C. Xiao, A. Anandkumar, D. Xu, M. Pavone, AdvDO: Realistic Adversarial Attacks for Trajectory Prediction *European Conference on Computer Vision (ECCV)* 2022.

A. Mandlekar, D. Xu, J. Wong, S. Nasiriany, C. Wang, R. Kulkarni, L. Fei-Fei, S. Savarese, Y. Zhu, R. Martin Martin, What Matters in Learning from Offline Human Demonstrations for Robot Manipulation, *Conference on Robot Learning (CoRL)* 2021.

C. Wang, C. D'Arpino, D. Xu, K. Liu, S. Savarese, Co-GAIL: Learning Diverse Strategies for Human-Robot Collaboration, *Conference on Robot Learning (CoRL)* 2021.

C. Wang*, R. Wang*, A. Mandlekar, L. Fei-Fei, S. Savarese, D. Xu, Generalization Through Hand-Eye Coordination: An Action Space for Learning Spatially-Invariant Visuomotor Control, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* 2021.

D. Xu, A. Mandlekar, R. Martin Martin, Y. Zhu, S. Savarese, L. Fei-Fei, Deep Affordance Foresight: Planning Through What Can Be Done in the Future, *International Conference on Robotics and Automation (ICRA)* 2021.

D. Xu, M. Denil, Positive-Unlabeled Reward Learning, *Conference on Robot Learning (CoRL)* 2020.

C. Chang, DA. Huang, D. Xu, Ehsan Adeli, Li Fei-Fei, Juan Carlos Niebles, Procedure Planning in Instructional Videos, *16th European Conference on Computer Vision (ECCV)* 2020.

D. Xu*, A. Mandlekar*, R. Martin Martin, S. Savarese, L. Fei-Fei, GTI: Learning to Generalize Across Long-Horizon Tasks from Human Demonstrations, *Robotics: Science and Systems (RSS)* 2020.

W. Chen, R. Martin Martin, D. Xu, J. Lv, C. Lu, L. Fei-Fei, S. Savarese, Y. Zhu 6-PACK: Category-level 6D Pose Tracker with Anchor-Based Keypoints, *International Conference on Robotics and Automation (ICRA)* 2020.

D. Xu, R. Martin-Martin, , DA. Huang, Y. Zhu, S. Savarese, L. Fei-Fei, Regression Planning Networks, *Thirty-third Conference on Neural Information Processing Systems (NeurIPS)* 2019.

DA. Huang, D. Xu, Y. Zhu, A. Garg, S. Savarese, L. Fei-Fei, JC. Niebles, Continuous Relaxation of Symbolic Planner for One-Shot Imitation Learning, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* 2019.

W.B. Shen, D. Xu, Y. Zhu, L. Guibas, L. Fei-Fei, S. Savarese, Situational Fusion of Visual Representation for Visual Navigation, *International Conference on Computer Vision (ICCV)* 2019.

DA. Huang*, S. Nair*, D. Xu*, Y. Zhu, A. Garg, S. Savarese, L. Fei-Fei, JC. Niebles, Neural Task Graphs: Generalizing to Unseen Tasks from a Single Video Demonstration, *Conference on Computer Vision and Pattern Recognition (CVPR)* 2019.

W. Chen, D. Xu, Y. Zhu, R. Martin Martin, L. Fei-Fei, S. Savarese, DenseFusion: 6D Object Pose Estimation by Iterative Dense Fusion", *Conference on Computer Vision and Pattern Recognition (CVPR)* 2019.

D. Xu, S. Nair, Y. Zhu, A. Garg, J. Gao, L. Fei-Fei, S. Savarese, Neural Task Programming: Learning to Generalize across Hierarchical Tasks, *International Conference on Robotics and Automation (ICRA)* 2018.

D. Xu, D. Anguelov, A. Jain, PointFusion: Deep Sensor Fusion for 3D Bounding Box Estimation, *Conference on Computer Vision and Pattern Recognition (CVPR)* 2018.

S. Pirk, O. Diamanti, B. Thibert, D. Xu and L. Guibas, 2017, September. Shape-aware spatio-temporal descriptors for interaction classification. *IEEE International Conference on Image Processing* (ICIP), 2017.

D. Xu, Y. Zhu, CB. Choy, L. Fei-Fei, Scene Graph Generation by Iterative Message Passing, *Conference on Computer Vision and Pattern Recognition (CVPR)* 2017.

CB. Choy, D. Xu, J. Gwak, K. Chen, S. Savarese, 3D-R2N2: A Unified Approach for Single and Multi-view 3D Object Reconstructionl, *European Conference on Computer Vision (ECCV)* 2016.

Y. Li, X. Hu, D. Xu, Y. Yue, E. Grinspun and P.K. Allen, Multi-sensor surface analysis for robotic ironing. *International Conference on Robotics and Automation* (ICRA), 2016.

Y. Li, Y. Yue, D. Xu, E. Grinspun and P.K. Allen, Folding deformable objects using predictive simulation and trajectory optimization. *IEEE/RSJ International Conference on Intelligent Robots and Systems* (IROS), 2015.

Y. Li, D. Xu, Y. Yue, Y. Wang, S. Chang, E. Grinspun, P.K. Allen, Recognition, Regrasping, and Unfolding of Deformable Object using Predictive Thin Shell Model, *IEEE International Conference on Robotics and Automation (ICRA)* 2015.

D. Xu, H. Badino, D. Huber, Topometric Localization on a Road Network, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* 2014.

D. Xu, G.E. Loeb, J.A. Fishel, Tactile identification of objects using Bayesian exploration, *IEEE International Conference on Robotics and Automation (ICRA)* 2013.

Journal Publication

Z. Zhao, S. Chen, Y. Ding, Z. Zhou, S. Zhang, D. Xu, Y. Zhao, A Survey of Optimization-based Task and Motion Planning: From Classical To Learning Approaches, *IEEE Transactions on Mechatronics* 2024.

Matthew Bronars, Shuo Cheng, Danfei Xu, Legibility Diffuser: Offline Imitation for Intent Expressive Motion, *IEEE Robotics and Automation Letters (RA-L) 2024*

S. Cheng, D. Xu, Guided Skill Learning and Abstraction for Long-Horizon Manipulation, *IEEE Robotics and Automation Letters (RA-L) 2023*

C. Wang, D. Xu, L. Fei-Fei, Generalizable Task Planning through Representation Pretraining, *IEEE Robotics and Automation Letters (RA-L)* 2022.

Academic Talks

- Robot Learning from Humans: Scaling up vs. Niching Down — 2024
  - Toyota Research Institute
- Towards a Perpetual Data Engine for Robot Learning — 2023
  - CoRL 2023 Workshop
  - Georgia Tech IRIM Industry Symposium
- Bridging Reasoning and Acting for Everyday Autonomy — 2022
  - Brown University
  - Talk Robotics
- Compositional Reasoning in Robot Learning — 2021
  - University of Texas - Austin
  - Microsoft Research (Redmond)
  - Microsoft Research (New York)
  - University of Pennsylvania
  - University of Michigan - Ann Arbor
  - Georgia Institute of Technology
  - Cornell University
  - Yale University
  - University of Wisconsin - Madison
  - The Chinese University of Hong Kong
  - Simon Fraser University
- Vision Seminar, MIT — Feb 2021
  - Compositional Reasoning for Robot Learning

- DeepMind — Jan 2021
  - Hierarchy and Modularity in Robot Learning
- Cognitive Learning for Vision and Robotics Lab, USC — Dec 2020
  - Learning to Reason About the Physical World
- Robotic AI & Learning Lab, UC Berkeley — Dec 2020
  - Learning to Reason About the Physical World
- NVIDIA Research — Dec 2020
  - Learning to Reason About the Physical World
- Cornell Robotics Seminar, Cornell University — Nov 2020
  - Hierarchy and Modularity in Visual Imitation
- Robot Perception and Learning Lab, University of Texas, Austin — Nov 2020
  - Towards Compositional Generalization in Robot Learning
- DeepMind — July 2019
  - Compositional Priors for Visual Imitation

Teaching

- CS8803: Deep Learning for Robotics — Spring 2024
  Instructor — Georgia Institute of Technology
- CS4644/7643: Deep Learning — Fall 2023
  Instructor — Georgia Institute of Technology
- CS8803: Deep Learning for Robotics — Spring 2023
  Instructor — Georgia Institute of Technology
- CS4644/7643: Deep Learning — Fall 2022
  Instructor — Georgia Institute of Technology
- CS231N: Convolutional Neural Networks for Visual Recognition — Spring 2021
  Instructor — Stanford University
- CS231N: Convolutional Neural Networks for Visual Recognition — Spring 2020
  Instructor — Stanford University
- CS231N: Convolutional Neural Networks for Visual Recognition — Spring 2019
  Teaching Assistant, Lecturer — Stanford University
- CS231N: Convolutional Neural Networks for Visual Recognition — Spring 2018
  Teaching Assistant, Lecturer — Stanford University
- CS231A: Computer Vision, From 3D Reconstruction to Recognition — Winter 2018
  Teaching Assistant — Stanford University
- COMS 4121: Computing Systems for Data Science — Spring 2015
  Teaching Assistant — Columbia University

Academic Activities

- Workshop organization:
  - Workshop on Data Generation for Robotics at RSS 2024
  - Workshop on Neural Field Representation for Robotics at ICCV 2023
  - Workshop on Learning for Task and Motion Planning at RSS 2023
  - Workshop on 3D Perception for Autonomous Driving at ECCV 2022
  - Workshop on Overlooked Aspects of Imitation Learning: Systems, Data, Tasks, and Beyond at RSS 2022
  - Tutorial on Deep Representation and Estimation of State for Robotics at IROS 2020
  - Workshop on Advances and Challenges in Imitation Learning for Robotics at RSS 2020

Academic Services

- Organizing Committee: Conference on Robot Learning (2024)
- Associate Editor: International Journal of Robotics Research (2023, 2024)
- Area Chair: Conference on Robot Learning (2022, 2023, 2024)

- Conference Reviewing:
  - Computer Vision and Pattern Recognition
  - Conference on Robot Learning
  - European Conference of Computer Vision
  - IEEE International Conference on Robotics and Automation
  - IEEE/RSJ International Conference on Intelligent Robots and Systems
  - Neural Information Processing Systems
  - Robotics: Science and Systems
  - International Conference on Computer Vision
  - International Conference on Machine Learning
- Journal Reviewing:
  - Transactions on Pattern Analysis and Machine Intelligence
  - Transactions on Robotics
  - IEEE Robotics and Automation Letters (RA-L)