

Zherong Pan

Basic Information

Senior Researcher
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Education & Positions Held

Senior Researcher	2021-present
Lightspeed Studios, Tencent America	Host: Prof. Kris Hauser
Postdoctoral Associate in Computer Science	2020-2021
University of Illinois Urbana-Champaign	Advisor: Prof. Dinesh Manocha
Ph.D. in Computer Science	2015-2019
University of North Carolina at Chapel Hill	Advisor: Prof. Jin Huang
Research Assistant	2011-2015
CAD&CG Lab of Zhejiang University	
B.E. in Software Engineering	
Minor in Mathematics	
Shanghai Jiaotong University	2007-2011

Research Interest Physics-Informed Learning, Reinforcement Learning, Generative AI

Ph.D. Dissertation Zherong Pan. Efficient Motion Planning for Deformable Objects with High Degrees of Freedom. (Dec. 2019)
Committee: Dinesh Manocha, Ming C. Lin, Ron Alterovitz, Marc Niethammer, C. Karen Liu

Publications

- [1] Rui Yin, Biao Jia, **Zherong Pan**, Yulun Zhang. SRPose: Two-view Relative Pose Estimation with Sparse Keypoints. (ECCV 2024)
- [2] Duo Zhang, Chen Liang, Xifeng Gao, Kui Wu, **Zherong Pan**. Provably Robust Semi-Infinite Program Under Collision Constraints via Subdivision. Transactions on Robotics (TRO 2024)
- [3] Chen Liang, Xifeng Gao, Kui Wu, **Zherong Pan**. Second-Order Convergent Collision-Constrained Optimization-Based Planner. IEEE Robotics and Automation Letters (RA-L 2024)
- [4] Hongkun Zhang, **Zherong Pan**, Lifeng Zhu, Congyi Zhang, Xifeng Gao. TexPainter: Generative Mesh Texturing with Multi-view Consistency. (SIGGRAPH 2024)
- [5] Xuebo Ji, **Zherong Pan**, Xifeng Gao, Jia Pan. Text-Guided Synthesis of Crowd Animation. (SIGGRAPH 2024)
- [6] Jerry Hsu, Tongtong Wang, **Zherong Pan**, Xifeng Gao, Cem Yuksel, Kui Wu. Real-Time Physically Guided Hair Interpolation. ACM Transactions on Graphics (TOG 2024)
- [7] Zhongtian Zhang, Xifeng Gao, **Zherong Pan**, Tongtong Wang, Kui Wu. Proxy Asset Generation for Cloth Simulation in Games. ACM Transactions on Graphics (TOG 2024)
- [8] Xuan Zhang, Xifeng Gao, Kui Wu, **Zherong Pan**. Learning Neural Traffic Rules. IEEE Robotics and Automation Letters (RA-L 2024)
- [9] Zhongtian Zheng, Xifeng Gao, **Zherong Pan**, Wei Li, Kui Wu, Pengshuai Wang. Visual-Guided Mesh Repair. IEEE Transactions on Visualization and Computer Graphics (IEEE TVCG 2024)
- [10] **Zherong Pan**, Xifeng Gao, Kui Wu. Learning Reduced Fluid Dynamics. The Association for the Advancement of Artificial Intelligence (AAAI 2024)
- [11] Yuzhe Luo, Kui Wu, **Zherong Pan**, Xiaogang Jin, Xifeng Gao. Texture Atlas Compression Based on Repeated Content Removal. (SIGGRAPH Asia 2023)
- [12] Haozhe Su, Siyu Zhang, **Zherong Pan**, Xifeng Gao, Kui Wu. Real-time Height-field Simulation of Sand and Water Mixtures. (SIGGRAPH Asia 2023)
- [13] Zeshi Yang, **Zherong Pan**, Kui Wu, Manyi Li, Xifeng Gao. Learning-based 2D Irregular Shape Packing. ACM Transactions on Graphics (TOG 2023)
- [14] Wei Li, Kui Wu, Xifeng Gao, **Zherong Pan**, Tongtong Wang, Mathieu Desbrun. Lightweight & Lightspeed Simulation of Turbulent Flows Through High-order Moment-encoded LBM. ACM Transactions on Graphics (TOG 2023)
- [15] Chen Liang, Xifeng Gao, Kui Wu, **Zherong Pan**. Learning Reduced-Order Soft Robot Controller. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2023)
- [16] Hang Zhao, **Zherong Pan**, Kai Xu. Learning Physically Realizable Packing Skills for General 3D Shapes. ACM Transactions on Graphics (TOG 2023)
- [17] Julian Knodt, **Zherong Pan**, Xifeng Gao, Kui Wu. Joint UV Optimization and Texture Baking for Geometry in the Wild. ACM Transactions on Graphics (TOG 2023)
- [18] Zhen Chen, Kui Wu, **Zherong Pan**, Etienne Vouga, Xifeng Gao. Robust Low-Poly Meshing for General 3D Models. ACM Transactions on Graphics (TOG 2023)

- [19] Jerry Hsu, Tongtong Wang, **Zherong Pan**, Xifeng Gao, Cem Yuksel, Kui Wu. Sagging-Free Initialization for Hybrid Strand-based Hairs. *ACM Transactions on Graphics (TOG)* (2023)
- [20] Xiaohan Ye, **Zherong Pan**, Xifeng Gao, Kui Wu, Bo Ren. Differentiable Learning of Scalable Multi-Agent Navigation Policies. *IEEE Robotics and Automation Letters (RA-L)* (2023)
- [21] Liang He, **Zherong Pan**, Dinesh Manocha. Real-Time Decentralized Navigation of Nonholonomic Agents Using Shifted Yielding Areas. *IEEE International Conference on Robotics and Automation (ICRA)* (2023)
- [22] **Zherong Pan**, Xifeng Gao, Kui Wu. First-Order Bilevel Topology Optimization for Fast Mechanical Design. *Computer-Aided Design (CAD)* (2023)
- [23] **Zherong Pan**, Xifeng Gao, Kui Wu. Environment Warped Gait Trajectory Optimization for Complex Terrains. *IEEE Robotics and Automation Letters (RA-L)* (2022)
- [24] Kui Wu, Xu He, **Zherong Pan**, Xifeng Gao. Occluder Generation for Buildings in Digital Games. (*Pacific Graphics* 2022)
- [25] Liang He, **Zherong Pan**, Kiril Solovey, Biao Jia, Dinesh Manocha. Multi-Agent Path Planning Using Medial-Axis-Based Pebble-Graph Embedding. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* (2022)
- [26] Qingyang Tan, **Zherong Pan**, Breannan Smith, Takaaki Shiratori, Dinesh Manocha. Active Learning of Neural Collision Handler for Complex 3D Mesh Deformations. *International Conference on Machine Learning (ICML)* (2022)
- [27] **Zherong Pan**, Andy Zeng, Yunzhu Li, Jinjing Yu, Kris Hauser. Algorithms and Systems for Manipulating Multiple Objects. *Transactions on Robotics (TRO)* (2022)
- [28] Xiaohan Ye, **Zherong Pan**, Taiyuan Zhang, Bo Ren. Versatile Control of Fluid-Directed Solid Objects Using Multi-Task Reinforcement Learning. *ACM Transactions on Graphics (TOG)* (2022)
- [29] Xifeng Gao, **Zherong Pan**, Ruiqi Ni. Multi-Robot Path Planning in Complex Environments via Graph Embedding. *IEEE Robotics and Automation Letters (RA-L)* (2022)
- [30] Xifeng Gao, **Zherong Pan**, Kui Wu. Low-poly Mesh Generation for Building Models. (*SIGGRAPH* 2022)
- [31] Ruiqi Ni, **Zherong Pan**, Xifeng Gao. Robust Multi-Robot Trajectory Generation Using Alternating Direction Method of Multiplier. *IEEE Robotics and Automation Letters (RA-L)* (2022)
- [32] **Zherong Pan**, Duo Zhang, Changhe Tu, Xifeng Gao. Planning of Power Grasps Using Infinite Program Under Complementary Constraints. *IEEE Robotics and Automation Letters (RA-L)* (2022)
- [33] **Zherong Pan**, Min Liu, Xifeng Gao, Dinesh Manocha. Joint Search of Optimal Topology and Trajectory for Planar Linkages. *The International Journal of Robotics Research (IJRR)* (2022)
- [34] Xuebo Ji, He Li, **Zherong Pan**, Xifeng Gao, Changhe Tu. Decentralized, Unlabeled Multi-Agent Navigation in Obstacle-Rich Environments Using Graph Neural Networks. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* (2021)
- [35] Qingyang Tan, **Zherong Pan**, Dinesh Manocha. LCollision: Fast Generation of Collision-Free Human Poses using Learned Non-Penetration Constraints. *The Association for the Advancement of Artificial Intelligence (AAAI)* (2021)
- [36] **Zherong Pan**, Kris Hauser. Implicit Integration for Articulated Bodies with Contact via the Nonconvex Maximal Dissipation Principle. *IEEE International Conference on Robotics and Automation (ICRA)* (2021)
- [37] **Zherong Pan**, Kris Hauser. Decision Making in Joint Push-Grasp Action Space for Large-Scale Object Sorting. *IEEE International Conference on Robotics and Automation (ICRA)* (2021)
- [38] Ruiqi Ni, Teseo Schneider, Daniele Panozzo, **Zherong Pan**, Xifeng Gao. Robust & Asymptotically Locally Optimal UAV-Trajectory Generation Based on Spline Subdivision. *IEEE International Conference on Robotics and Automation (ICRA)* (2021)
- [39] Joao Marcos Correia Marques, Ramya Ramalingam, **Zherong Pan**, Kris Hauser. Optimized Coverage Planning for UV Surface Disinfection. *IEEE International Conference on Robotics and Automation (ICRA)* (2021)
- [40] Yeonju Kim, Kris Hauser, **Zherong Pan**. MO-BBO: Multi-Objective Bilevel Bayesian Optimization for Robot and Behavior Co-Design. *IEEE International Conference on Robotics and Automation (ICRA)* (2021)
- [41] Yifan Zhu, **Zherong Pan**, Kris Hauser. Contact-Implicit Trajectory Optimization With Learned Deformable Contacts Using Bilevel Optimization. *IEEE International Conference on Robotics and Automation (ICRA)* (2021)
- [42] Qingyang Tan, **Zherong Pan**, Lin Gao, Dinesh Manocha. Realtime Simulation of Thin-Shell Deformable Materials using CNN-Based Mesh Embedding. *IEEE Robotics and Automation Letters (RA-L)* (2020)
- [43] **Zherong Pan**, Xifeng Gao, Dinesh Manocha. Grasping Fragile Objects Using A Stress-Minimization Metric. *IEEE International Conference on Robotics and Automation (ICRA)* (2020)

- [44] Min Liu, **Zherong Pan**, Kai Xu, Dinesh Manocha. Deep Differentiable Grasp Planner for High-DOF Grippers. *Robotics: Science and Systems (RSS 2020)*
- [45] **Zherong Pan***, Min Liu*, Kai Xu, Dinesh Manocha. Globally Optimal Grasp Planning using a Two-Stage Branch-And-Bound Algorithm. *IEEE Robotics and Automation Letters (RA-L 2020)*
- [46] **Zherong Pan**, Xifeng Gao. Inner-Approximation of Manipulable and Reachable Regions using Bilinear Matrix Inequalities. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2020)*
- [47] Biao Jia, **Zherong Pan**, Zhe Hu, Jia Pan, Dinesh Manocha. Cloth Manipulation Using Random-Forest-based Imitation Learning Framework. *IEEE Robotics and Automation Letters (RA-L 2019)*
- [48] **Zherong Pan***, Biao Jia*, Dinesh Manocha. Fast Motion Planning for High-DOF Robot Systems Using Hierarchical System Identification. *IEEE International Conference on Robotics and Automation (ICRA 2019)*
- [49] **Zherong Pan**, Bo Ren, Dinesh Manocha. GPU-Based Contact-Aware Trajectory Optimization Using A Smooth Force Model. *Symposium of Computer Animation (SCA 2019)*
- [50] Min Liu, **Zherong Pan**, Kai Xu, Kanishka Ganguly, Dinesh Manocha. Generating Grasp Poses for a High-DOF Gripper Using Neural Networks. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2019)*
- [51] **Zherong Pan**, Min Liu, Xifeng Gao, Dinesh Manocha. Globally Optimal Joint Search of Topology and Trajectory for Planar Linkages. *The International Symposium on Robotics Research (ISRR 2019)*
- [52] Shan Yang, **Zherong Pan**, Tanya Ambert, Ke Wang, Licheng Yu, Tamara L. Berg, Ming C. Lin. Detailed Garment Recovery from a Single-View Image. *ACM Transactions on Graphics (TOG 2018)*
- [53] **Zherong Pan**, Dinesh Manocha. Active Animations of Reduced Deformable Models with Environment Interactions. *ACM Transactions on Graphics (TOG 2018)*
- [54] **Zherong Pan**, Dinesh Manocha. Realtime Planning for High-DOF Deformable Bodies using Two-Stage Learning. *IEEE International Conference on Robotics and Automation (ICRA 2018)*
- [55] Pingchuan Ma*, Yunsheng Tian*, **Zherong Pan**, Bo Ren, Dinesh Manocha. Coupled Fluid/Rigid Control using Deep Reinforcement Learning. *ACM Transactions on Graphics (TOG 2018)*
- [56] **Zherong Pan**, Dinesh Manocha. Position-based Optimizable Time-Integrator for Frictional Articulated Bodies Dynamics. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2018)*
- [57] **Zherong Pan**, Dinesh Manocha. Time Integrating Articulated Body Dynamics Using Position-Based Collocation Method. *International Workshop on the Algorithmic Foundations of Robotics (WAFR 2018)*
- [58] **Zherong Pan**, Dinesh Manocha. Efficient Solver for Spacetime Control of Smoke. *ACM Transactions on Graphics (TOG 2017)*
- [59] **Zherong Pan**, Dinesh Manocha. Editing smoke animation using a deforming grid. *Computational Visual Media (CVM 2017)*
- [60] Xifeng Gao, Jin Huang, Kaoji Xu, **Zherong Pan**, Zhigang Deng, Guoning Chen. Evaluating Hex-mesh Quality Metrics via Correlation Analysis. *Symposium on Geometry Processing (SGP 2017)*
- [61] **Zherong Pan**, Dinesh Manocha. Feedback Motion Planning for Liquid Transfer using Supervised Learning. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2017)*
- [62] **Zherong Pan**, Jin Huang, Hujun Bao. Modelling Developable Ribbons Using Ruling Bending Coordinates. *Arxiv:1603.04060 (Arxiv 2016)*
- [63] **Zherong Pan**, Chonhyon Park, Dinesh Manocha. Robot Motion Planning for Pouring Liquids. *The International Conference on Automated Planning and Scheduling (ICAPS 2016)*
- [64] **Zherong Pan**, Dinesh Manocha. Motion planning for fluid manipulation using simplified dynamics. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2016)*
- [65] **Zherong Pan**, Hujun Bao, Jin Huang. Subspace dynamic simulation using rotation-strain coordinates. *ACM Transactions on Graphics (TOG 2015)*
- [66] Siwang Li, **Zherong Pan**, Jin Huang, Hujun Bao, Xiaogang Jin. Deformable Objects Collision Handling with Fast Convergence. *Computer Graphics Forum (CGF 2015)*
- [67] Jin Huang, **Zherong Pan**, Guoning Chen, Wei Chen, Hujun Bao. Image-Space Texture-Based Output-Coherent Surface Flow Visualization. *IEEE Transactions on Visualization and Computer Graphics (IEEE TVCG 2013)*
- [68] **Zherong Pan**, Jin Huang, Yiying Tong, Changxi Zheng, Hujun Bao. Interactive localized liquid motion editing. *ACM Transactions on Graphics (TOG 2013)*
- [69] **Zherong Pan**, Jin Huang, Yiying Tong, Hujun Bao. Wake Synthesis For Shallow Water Equation. *Computer Graphics Forum (CGF 2012)*

- Preprints & In-submissions**
- [1] Xuebo Ji, **Zherong Pan**, Xifeng Gao, Changhe Tu, Wenping Wang, Jia Pan. Human Personality Estimation in Crowds via Active Human-Robot Interaction. HRI 2023 (In Submission)
 - [2] Xiaoxuan Wang, **Zherong Pan**, Xifeng Gao, Yu Xing, Lin Lu. Worst-case Non-parametric Shape Optimization. SIGGRAPH Asia 2024 (In Submission)
 - [3] Xiaohan Ye, **Zherong Pan**, Xifeng Gao, Kui Wu, Taku Komura. SDRS: Shape-Differentiable Robot Simulator. SIGGRAPH Asia 2024 (In Submission)
 - [4] **Zherong Pan**, Yifan Zhu. Provably Feasible and Stable White-Box Trajectory Optimization. WAFR 2024 (In Submission)

- Presentations & Talks**
- [1] ICRA 2021: Decision Making in Joint Push-Grasp Action Space for Large-Scale Object Sorting.
 - [2] ICRA 2021: Implicit Integration for Articulated Bodies with Contact via the Nonconvex Maximal Dissipation Principle.
 - [3] RSS 2020: Deep Differentiable Grasp Planner for High-DOF Grippers.
 - [4] IROS 2020: Inner-Approximation of Manipulable and Reachable Regions using Bilinear Matrix Inequalities.
 - [5] ISRR 2019: Globally Optimal Joint Search of Topology and Trajectory for Planar Linkages.
 - [6] SCA 2019: GPU-Based Contact-Aware Trajectory Optimization Using A Smooth Force Model.
 - [7] IROS 2018: Position-based Optimizable Time-Integrator for Frictional Articulated Bodies Dynamics.
 - [8] ICRA 2018: Realtime Planning for High-DOF Deformable Bodies using Two-Stage Learning.
 - [9] SIGGRAPH 2018: Coupled Fluid/Rigid Control using Deep Reinforcement Learning.
 - [10] SIGGRAPH 2018: Active Animations of Reduced Deformable Models with Environment Interactions.
 - [11] SIGGRAPH 2017: Efficient Solver for Spacetime Control of Smoke.
 - [12] IROS 2017: Feedback Motion Planning for Liquid Transfer using Supervised Learning.
 - [13] ICAPS 2016: Robot Motion Planning for Pouring Liquids.
 - [14] SIGGRAPH ASIA 2013: Interactive localized liquid motion editing.
 - [15] Pacific Graphics 2012: Wake Synthesis For Shallow Water Equation.

Reviewer IROS, ICRA, WAFR, ISRR, IJRR, RAL, TRO, Humanoids, Autonomous Robotics, CGF, C&G, Visual Computer, TVCG, SIGGRAPH

Program Committee WAFR 2020, 2024
AAAI 2021-2024
SIGGRAPH 2024
SIGGRAPH Asia 2024

Associate Editor IROS 2020-2024
ICRA 2024

Technical Skills C++, Python, TensorFlow, Torch, Latex, Maxima, Matlab, ROS, Gazebo

Intern & Student (Co-)Mentoring Min Liu (NUDT Ph.D.) Biao Jia (UNC Ph.D.) Pingchuan Ma (NKU BS→MIT Ph.D.) Yunsheng Tian (NKU BS→MIT Ph.D.) Qingyang Tan (UMD Ph.D.) Yifan Zhu (UIUC Ph.D.) Yeonju Kim (UIUC MS) Ruiqi Ni (FSU MS→Purdue Ph.D.) Duo Zhang (SDU BS→NYU MS) Xuebo Ji (SDU MS→HKU Ph.D.) Xiaohan Ye (NKU MS→HKU Ph.D.) Zeshi Yang (Tencent Intern) Yuankai Teng (Tencent Intern) Xuan Zhang (Tencent Intern) Chen Liang (Tencent Intern)

Contact Reference

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