Qiang Zhang

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Education

Princeton University   New Jersey, USA
Ph.D. Candidate in Computer Science   *Sep. 2021 - Present*

Shanghai Jiao Tong University   Shanghai, China
B.Eng. in Computer Science and Engineering (Summa Cum Laude)   *Jun. 2021*

Research Interest (Google Scholar)

Computer Vision, **Robotics**, **Machine Learning**

Publications and Manuscripts

* denotes equal contribution (co-first author).

Dynamic Modeling of Hand-Object Interactions via Tactile Sensing.
- **Qiang Zhang**, Yunzhu Li, Yiyue Luo, Wan Shou, Michael Foshey, Wojciech Matusik, Joshua Tenenbaum, Antonio Torralba.
- *Published on International Conference on Intelligent Robots and Systems*, **IROS 2021**

Learning Cross-Domain Correspondence for Control with Dynamics Cycle-Consistency.
- **Qiang Zhang**, Tete Xiao, Alexei A. Efros, Lerrel Pinto, Xiaolong Wang.
- *Published on International Conference on Learning Representations*, **ICLR 2021** **Oral,2%**

Testing the Safety of Self-driving Vehicles by Simulating Perception and Prediction.
- **Qiang Zhang***, Kelvin Wong*, Ming Liang, Bin Yang, Renjie Liao, Abbas Sadat, Raquel Urtasun.
- *Published on European Conference on Computer Vision*, **ECCV 2020**

Concept2Robot: Leaning Manipulation Concepts from Instructions and Human Demonstrations.
- Lin Shao, Toki Migimatsu, **Qiang Zhang**, Karen Yang, Jeannette Bohg.
- *Published on Robotics:Science and System Conference*, **RSS 2020**

Learning Context Graph for Person Search.
- **Qiang Zhang***, Yichao Yan*, Bingbing Ni, Wendong Zhang, Xiaokang Yang.
- *Published on Conference on Computer Vision and Pattern Recognition*, **CVPR 2019** **Oral,5%**

Modeling Point Clouds with Self-Attention and Gumbel Subset Sampling.
- Jiancheng Yang, **Qiang Zhang**, Bingbing Ni, Linguo Li, Jinxian Liu, Qi Tian.
- *Published on Conference on Computer Vision and Pattern Recognition*, **CVPR 2019**

Fine-grained Video Captioning via Graph-basesd Multi-Granularity Interaction Representation.
- Yichao Yan, Ning Zhuang, Bingbing Ni, Jian Zhang, Minghao Xu,
  Qiang Zhang, Zheng Zhang, Shuo Cheng, Qi Tian, Xiaokang Yang, Wenjun Zhang.
- *Published on IEEE Transactions on Pattern Analysis and Machine Intelligence*, **TPAMI, 2019**

Recognition Oriented Facial Image Quality Assessment via Deep Convolutional Neural Network.
- Ning Zhuang, **Qiang Zhang**, Cenhui Pan, Bingbing Ni, Yi Xu, Xiaokang Yang, Wenjun Zhang.
- *Published on the Neurocomputing Journal*, **Neurocomputing, 2019**

Adversarial Attack and Defense on Point Sets.
- **Qiang Zhang***, Jiancheng Yang*, Rongyao Fang*, Bingbing Ni, Jinxian Liu, Qi Tian.
- *Submitted to IEEE Transactions on Information Forensics and Security*, **TIFS**

Research Experiences

Massachusetts Institute of Technology — **Cambridge, USA**

Research Intern, Computer Science and Artificial Intelligence Laboratory (CSAIL) — *Jul. 2020 – Dec. 2020*

- **Advisor**: Prof. Antonio Torralba
- **Research Focus**: Visual and Tactile Multi-Modality Learning
- **IROS 2021**: 1. I built a multi-modality dataset on hand-object interactions with both the touch (from a tactile glove) and visual information recorded. The visual data was used to estimate the hand-object motion trajectory ground-truth. 2. Then I proposed a dynamics model to predict the long-term trajectory from the tactile input. 3. The model was also object-agnostic, meaning it could be adapted and thus be able to generalize to novel unseen objects.

University of California in Berkeley — **Berkeley, USA**

Research Intern, Berkeley Artificial Intelligence Research Lab (BAIR) — *Mar. 2020 – Jul.2020*

- **Advisor**: Prof. Alexei A. Efros, Prof. Xiaolong Wang
- **Research Focus**: Self-Supervised State Estimation and Cross-domain Alignment
- **ICLR 2021 Oral**: 1. I designed a novel framework to automatically align dynamic robotic behavior across two domains, which could be different in their physical parameters, observation modality, or morphology. 2. I also verified its effectiveness through real robot experiments by using this alignment to estimate the robot arm pose without any labels. 3. Besides, once this alignment is established, we could train a policy in one domain and test it on another domain.

Uber Advanced Technologies Group — **Toronto, Canada**

Research Intern, ATG Toronto — *Sep. 2019 – Dec.2019*

- **Advisor**: Prof. Raquel Urtasun
- **Research Focus**: Autonomous Driving Technology
- **ECCV 2020**: Autonomous driving planners provided driving strategies based on the perception system output, which was not the same as the real ground truth. Consequently, I built a system that could simulate the perception results and evaluate the safety of new planners.

Stanford University — **Palo Alto, USA**

Research Intern, Stanford Artificial Intelligence Laboratory (SAIL) — *Jul. 2019 – Sep.2019*

- **Advisor**: Prof. Jeannette Bohg
- **Research Focus**: Robot Imitation Learning from Humans without Hand-crafted Reward
- **RSS 2020**: 1. I built a PyBullet simulation environment and defined corresponding tasks such as "put something in front of something." 2. Then, I trained a classifier on the "20bn-Sth-Sth" human action dataset, whose output probability was used as the reward function. 3. Next, I used the DDPG algorithm to maximize this reward such that the robot learned to imitate human actions. 4. I also extended the framework to be able to solve multiple tasks in only one single model.

Shanghai Jiao Tong Univeristy — **Shanghai, China**

Research Assistant, Artificial Intelligence Institute — *Mar. 2018 – Jun. 2019*

- **Advisor**: Prof. Xiaokang Yang, Prof. Bingbing Ni
- **Research Focus**: Person Search, 3D Vision, Adversarial Examples.
- **CVPR 2019 Oral**: 1. I used the detected person information that appeared in the same image of the target person as the context and built a graph convolution network to fuse this context feature. 2. Besides, a region-based attention module was also adopted to further improve the performance. Our method achieved state-of-the-art results at the submission time.
- **CVPR 2019**: 1. I used self-attention to model the relationship among different points to provide a stronger backbone. 2. I also leveraged the Gumbel-softmax method to make the sampling process differentiable, learnable, and more efficient. This model achieved excellent performance while maintaining a small size.
- **TIFS submission**: I proposed a series of effective gradient-based and perturbation-based statistical methods for generating and detecting the 3D point cloud adversarial examples.

Honors and Awards

- **Bachelor Honor Degree Award**(Summa Cum Laude), Shanghai Jiao Tong University. 2021
- **Outstanding Undergraduate Thesis**(Top 1%), Shanghai Jiao Tong University. 2021
- **Shanghai Outstanding Undergraduate**, Shanghai Municipal Commission of Education. 2021
- **Zhiyuan Outstanding Student Award**, Zhiyuan College, Shanghai Jiao Tong University. 2021
- **Overseas Research Scholarship**, Shanghai Jiao Tong University. 2020
- **SenseTime Scholarship**(30 per year in China), SenseTime Group Ltd. 2019
- **CSC-IBM Scholarship**(40 per year in China), IBM. 2019
- **Lixin-Tang Scholarship**(Top 60 among $\sim$ 42000), Shanghai Jiao Tong University. 2018 & 2019.
- **Academic Excellence Scholarship(A-class)** (Top 1%), Shanghai Jiao Tong University. 2018 & 2019.
- **SJTU Encouragement People Prize** (10 per year in SJTU), Shanghai Jiao Tong University. 2019.
- **Zhiyuan College Honors Scholarship** (Top 5%), Shanghai Jiao Tong University. 2017-2019.
- **National Scholarship** (Top 0.5% Nationwide), Ministry of Education of P.R.China. 2018.
- **National Championship** in RoboCup China Competition (Selected as the only representative from $\sim$ 2700 competitors). Chinese Association of Automation. 2018.
- **Meritorious Winner** of The Mathematical Contest in Modeling(Top 5%). 2018.
- **National Scholarship for Encouragement**, Ministry of Education of P.R.China. 2017.
- **Second Prize** in China Undergraduate Physical Contest, Shanghai Division. 2017.
- **First Prize** in China Undergraduate Mathematical Contest in Modeling, Shanghai Division. 2017.
- **SJTU Merit Students**, Shanghai Jiao Tong University. 2017.

Others

Academic Services

- **Conference Reviewer**: CVPR 2020, CVPR 2021, NeurIPS 2020, NeurIPS 2021, ICML 2021

Skills

- **Programming**: Python, C/C++ , SQL, Matlab, Java, JavaScript, LaTeX
- **Packages**: PyTorch, TensorFlow, PyBullet, MuJoCo, OpenCV, Open3D, OpenGL