

Chen Wang

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EDUCATION

Stanford University, CA, US
Incoming *Ph.D.* in Computer Science

Shanghai Jiao Tong University, Shanghai, China
Bachelor of Science in Computer Science and Engineering Sep 2015 – Jun 2020

PUBLICATIONS

Chen Wang*, Shaoxiong Wang*, Branden Romero, Filipe Veiga, Edward Adelson
SwingBot: Learning Physical Features from In-hand Tactile Exploration for Dynamic Swing-up Manipulation
International Conference on Intelligent Robots and Systems, **IROS 2020 Best Paper Award**

Chen Wang, Roberto Martín-Martín, Danfei Xu, Jun Lv, Cewu Lu, Li Fei-Fei, Silvio Savarese, Yuke Zhu
6-PACK: Category-level 6D Pose Tracker with Anchor-Based Keypoints
International Conference on Robotics and Automation, ICRA 2020

Chen Wang, Danfei Xu, Yuke Zhu, Roberto Martín-Martín, Cewu Lu, Li Fei-Fei, Silvio Savarese
DenseFusion: 6D Object Pose Estimation by Iterative Dense Fusion
Computer Vision and Pattern Recognition, CVPR 2019

Junfeng Ding*, **Chen Wang***, Cewu Lu
Transferable Force-Torque Dynamics Model for Peg-in-hole Task
International Conference on Intelligent Robots and Systems, IROS 2019

Chen Wang*, Junfeng Ding*, Xiangyu Chen, Zelin Ye, Jialu Wang, Ziruo Cai, Shixiang Gu, Cewu Lu
TendencyRL: Multi-stage discriminative hints for efficient goal-oriented reverse curriculum learning
International Conference on Intelligent Robots and Systems, IROS 2019
Deep Reinforcement Learning Symposium, NIPS 2017 symposium

RESEARCH EXPERIENCE

Perceptual Science Group at **Massachusetts Institute of Technology**, MA, USA

- Research Intern Sep 2019 – Mar 2020
 - Project: Learning Physical Features from In-hand Tactile Exploration (In submission to IROS 2020)
 - Supervisor: **Prof. Edward (Ted) Adelson**
 - Introduced a method to enable a robot with a parallel gripper to learn the physical features of an held object through simple tactile-based exploration actions (tilting and shaking). With the acquired information, the robot is able to search for the optimal control parameters for completing a dynamic swing-up manipulation.

Stanford Vision and Learning Lab at **Stanford University**, CA, USA

- Research Intern Jun 2018 – Aug 2019
 - Project: Category-level 6-DoF Object Pose Tracking with Keypoints (ICRA 2020)
 - Supervisors: **Prof. Yuke Zhu**, **Prof. Silvio Savarese** and **Prof. Fei-Fei Li**
 - Developed *6-PACK*, an anchor-based unsupervised 3D keypoints generation approach used for category-level 6D object pose tracking. The proposed framework achieves real-time 6D pose tracking inference speed and can be used for real-world robot manipulation tasks on unseen objects without known 3D models.
 - Project: 6-DoF Object Pose Estimation for Robot Manipulation (CVPR 2019)
 - Supervisors: **Prof. Silvio Savarese** and **Prof. Fei-Fei Li**
 - Introduced *DenseFusion*, a color-geometry information fusion framework which learns to estimate the 6-DoF pose of objects in an end-to-end manner. Proposed *DenseFusion Iterative Refinement*, a neural-based RGB-D iterative refinement technique that surpasses traditional ICP algorithm in both accuracy and inference speed.

Flexiv Robotics Ltd. Research Team, Shanghai, China

- Research Intern Jan 2018 – May 2018
 - Project: Transferable Force-Torque Dynamics Model for Peg-in-hole Task (IROS 2019)
 - Supervisors: **CEO Shiquan Wang** and **Prof. Cewu Lu**
 - Proposed a learning-based force-torque dynamics model, which can be used for sample-efficient model-based reinforcement learning on real-world robot to tackle the peg-in-hole challenge.

Machine Vision and Intelligence Group at Shanghai Jiao Tong University, Shanghai, China

- Research Assistant Aug 2016 – May 2018
 - Project: Deep Reinforcement Learning with Sparse Rewards (NIPS 2017 Symposium, IROS 2019)
 - Supervisors: **Prof. Cewu Lu** and **Dr. Shixiang Gu**
 - Developed *Tendency Reinforcement Learning*, a reverse curriculum reinforcement learning framework which learns to solve sparse reward tasks with high efficiency.
 - Project: Active Vision System for Grasping in Occluded Environments
 - Supervisor: **Prof. Cewu Lu**
 - Apply *Tendency Reinforcement Learning* to tackle Next-Best-View problem for better grasping performance in occluded environments.

- OPEN-SOURCED PROJECTS**
- DenseFusion** (<https://github.com/j96w/DenseFusion>, ~670 stars, ~200 forks) Jan 2019
Open-source to facilitate further research
- Full implementation code of the paper **DenseFusion** (CVPR 2019)
 - A dense fusion network that combines pixel-wise color and depth information to an integral color-depth feature embedding for 6-DoF object pose estimation.
 - An iterative refinement procedure within the neural network architecture that enhances model performance while keeping the inference speed real-time.
- 6-PACK** (<https://github.com/j96w/6-PACK>, ~190 stars) Oct 2019
Open-source to facilitate further research
- Full implementation code of the paper **6-PACK** (ICRA 2020)
 - An unsupervised 3D keypoints generation network used for category-level 6D object pose tracking. This method can track objects without knowing their mesh models.
- SLAM-based 6D pose tracking baseline** (<https://github.com/j96w/6D-tracking-baseline>) May 2019
Open-source to facilitate further research
- An implementation of a basic model-free rigid object 6D pose tracking baseline with ICP(w/wo color registration) and truncated signed distance function(TSDF) fusion. The idea is partially inspired by Co-fusion (Rünz et al. 2017).
- MuJoCo-Unity UR5 robot arm simulation** (https://github.com/j96w/MuJoCo_Unity_UR5) May 2018
Open-source to facilitate further research
- A simulation environment combined with the Unity rendering engine and MuJoCo physics engine, which can be used as training tools for Reinforcement Learning tasks.
- SERVICE**
- Reviewer
- IEEE Robotics and Automation Letters (RA-L)
 - International Conference on Intelligent Robots and Systems (IROS)
- PUBLIC PRESENTATIONS**
- Uncovering the 6-DoF object pose from RGB-D inputs
- Stanford Vision and Learning Lab Monday Talk Aug 2018
 - Stanford People, AI & Robots Group (PAIR) Meeting Jul 2018