Yongxiang (Bruce) Fan

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EDUCATION

University of California, Berkeley (UCB) (Advisor: Masayoshi Tomizuka) **Berkeley, CA**

Ph.D. in Mechanical Engineering, GPA: 3.95/4.0 *May. 2019*

- Major: Controls, Minor: Robotics and Optimization
- Related Fields: Reinforcement Learning, Machine Learning

University of Science and Technology of China (USTC) **Hefei, China**

B.E. Degree in Precision Machinery and Precision Instrumentation, *Jun. 2014*

- GPA: 92.7/100, Ranking: 1/61

National Tsing Hua University (NTHU) (Advisor: Shang-Hong Lai) **HsinChu, Taiwan**

Research Visitor in Computer Science, *Jun. 2013-Aug. 2013*

- GPA: 4/4

WORK EXPERIENCE

Anyware Robotics Inc. **Fremont, CA**

Chief Technology Officer *Dec. 2022 - Present*

- Lead the R&D team to build Pixmo, our general-purpose mobile manipulator,
- Target the Pixmo for warehouse automation including truck unloading and palletizing / depalletizing

FANUC America Corporation **Union City, CA**

Senior Research Scientist in FANUC Advanced Research Laboratory *Jul. 2019-Dec. 2022*

- Automatic grasp generation and AI bin picking for logistics & manufacturing applications
- Industrial assembly by skill-learning and force control
- Automatic robot path generation and intelligent interference avoidance
- Safe collaboration between humans and machines

Autodesk Inc. **San Francisco, CA**

Artificial Intelligent Researcher in AI Lab *Jun. 2018-Aug. 2018*

- Combined reinforcement learning with control and optimization for robotic assembly
- Implemented the proposed planner to UR robots for Lego house assembly

FANUC Corporation **Yamanashi, Japan**

Robotics Research Intern *Jul. 2017-Sep. 2017*

- Proposed a force control structure for FANUC multi-fingered hand
- Implemented a manipulation controller for robust grasping and dexterous manipulation

Brachium Inc. **San Ramon, CA**

Vision & Robotics Researcher *Jun. 2016-Aug. 2016*

- Real-time mouth/jaw detection and registration for dental automation
- Trajectory mapping and tracking for dental robots from single human demonstration

FANUC Corporation **Yamanashi, Japan**

Robotics Research Intern *Jun. 2015-Jul. 2015*

- Proposed a real-time safe visual tracking algorithm and verified on industrial robots
- Built safety checking strategies for real-time collision/singularity avoidance

RESEARCH PROJECTS

Skill Learning for Precision Industrial Assembly *Jun. 2018-May. 2019*

- Proposed a novel Guided-DDPG to improve the efficiency and performance of RL
- Implemented the Guided-DDPG to Universal robots for Lego house assembly

Dexterous In-Hand Manipulation for Multi-Fingered Hands *Apr. 2016-May. 2019*

- Robust manipulation under object and contacts uncertainties
- Real-time finger gaits planning for dexterous manipulation

Grasp Planning for Customized Grippers/Multi-Fingered Hands *Oct. 2017-May. 2019*

- Grasp planning for multi-fingered hands by finger splitting
- Grasp planning for customized grippers by iterative surface fitting

Real-Time Motion Planning *Mar. 2015-Apr. 2016*

- Realized online trajectory planning with collision avoidance for industrial robots
- Trained neural network policy for motion planning by guided policy search

Object Position and Orientation Tracking for 6-DOF Manipulators *Jun. 2015-Mar. 2016*

- Target pose estimation with sensor physics consideration
- Quaternion based controller design for asymptotically stable tracking

Lead-Through Teaching and Collision Avoidance for 6-DOF Manipulators *Mar. 2015-Feb. 2016*

- Lead-through teaching with automatic collision avoidance
- Online safety checking package for FANUC manipulators

Development and Manufacturing of Intelligent Cooking Robot *Oct. 2012-Jun. 2014*

- 5-DOF manipulator and 9-DOF hand design for cooking
- Real-time object recognition/localization by deep learning

GRANTED PATENTS

1. **Fan, Yongxiang.** "Grasp generation for machine tending." U.S. Patent No. 11,919,161. 5 Mar. 2024.
2. Lin, Hsien-Chung, **Yongxiang Fan**, and Tetsuaki Kato. "Point set interference check." U.S. Patent No. 11,878,424. 23 Jan. 2024.
3. **Fan, Yongxiang**. "Network modularization to learn high dimensional robot tasks." U.S. Patent No. 11,809,521. 7 Nov. 2023.
4. **Fan, Yongxiang.** "Efficient data generation for grasp learning with general grippers." U.S. Patent No.

11,654,564. 23 May 2023.

5. Akeel, Hadi, and **Yongxiang Fan**. "Vision guided robot path programming." U.S. Patent No. 10,556,347. 11 Feb. 2020.

SCHOLARSHIP & AWARDS

Best Application Paper Award Granted (CASE2018)	*Aug. 2018*
J. K. Zee Fellowship (UC Berkeley)	*Jan. 2018-May. 2018*
Graduate Division Block Grant Award (UC Berkeley)	*May. 2017-Aug. 2017*
Berkeley Fellowship (UC Berkeley)	*Aug. 2014-Aug. 2016*
Outstanding Graduate Scholarship (USTC)	*Apr. 2014*
Guo Moruo Scholarship (Highest honor for seniors at USTC)	*Nov. 2013*
National Scholarship (Highest honor for non-seniors at USTC)	*Nov. 2012*

PUBLICATIONS

1. **Y. Fan*** (2019). *Dexterity in Robotic Grasping, Manipulation and Assembly* (Doctoral dissertation, UC Berkeley).
2. **Y. Fan***, M. Tomizuka. "Efficient Grasp Planning and Execution With Multifingered Hands by Surface Fitting." *IEEE Robotics and Automation Letters* 4.4 (2019): 3995-4002.
3. **Y. Fan***, X. Zhu, M. Tomizuka. "Optimization Model for Planning Precision Grasps with Multi-Fingered Hands." *in Intelligent Robots and Systems (IROS), 2019 IEEE/RSJ International Conference.*
4. **Y. Fan***, J. Luo, M. Tomizuka, "A Learning Framework for Precision Industrial Assembly. " accepted by *Robotics and Automation (ICRA), 2019 IEEE International Conference on*.
5. **Y. Fan***, T. Tang, H.-C. Lin, M. Tomizuka, "Real-time grasp planning for multi-fingered hands by finger splitting," *in Intelligent Robots and Systems (IROS), 2018 IEEE/RSJ International Conference.*
6. **Y. Fan***, H.-C. Lin, T. Tang, M. Tomizuka. "A Learning Framework for Robust Bin Picking by Customized Grippers." *arXiv preprint arXiv:1809.08546* (2018).
7. **Y. Fan***, H.-C. Lin, T. Tang, M. Tomizuka, "Grasp Planning for Customized Grippers by Iterative Surface Fitting." *Automation Science and Engineering (CASE), 2018 IEEE International Conference on*. **(Best Application Paper Award)**
8. **Y. Fan***, T. Tang, H.-C. Lin, Y. Zhao, and M. Tomizuka, "Real-time robust finger gaits planning under object shape and dynamics uncertainties," *in Intelligent Robots and Systems (IROS), 2017 IEEE/RSJ International Conference.*
9. **Y. Fan***, et. al, "Robust dexterous manipulation under object dynamics uncertainties," 2017 *IEEE International Conference on Advanced Intelligent Mechatronics (AIM).* **(Best Conference Paper Award Finalist)**
10. **Y. Fan***, W. Gao, and M. Tomizuka, "Real-time finger gaits planning for dexterous manipulation," *The 20th World Congress of the International Federation of Automatic Control (IFAC), 2017.*

11. **Y. Fan***, et. al, “Object position and orientation tracking for manipulators considering nonnegligible sensor physics,” *in Flexible Automation (ISFA), International Symposium on. IEEE, 2016, pp. 450–457.*
12. T. Tang, **Y. Fan**, H-C. Lin, and M. Tomizuka, “State estimation for deformable objects by point registration and dynamic simulation,” *in Intelligent Robots and Systems (IROS), 2017 IEEE/RSJ International Conference.*
13. H-C. Lin, **Y. Fan**, T. Tang, and M. Tomizuka, “Human guidance programming on a 6-DoF robot with collision avoidance,” *in Intelligent Robots and Systems (IROS), 2016 IEEE/RSJ International Conference.*
14. H. C. Lin, T. Tang, **Y. Fan**, M. Tomizuka, (2018, October) A framework for robot grasping transferring with non-rigid transformation." In *Intelligent Robots and Systems (IROS), 2018 IEEE/RSJ International Conference on*.
15. H.-C. Lin, C. Liu, **Y. Fan**, M. Tomizuka, "Real-time collision avoidance algorithm on industrial manipulators." *2017 IEEE Conference on Control Technology and Applications (CCTA)*. IEEE, 2017.
16. H.-C. Lin, T. Tang, **Y. Fan**, Y. Zhao, M. Tomizuka, W. Chen, "Robot learning from human demonstration with remote lead through teaching." *2016 European Control Conference (ECC)*. IEEE, 2016.
17. T. Tang, H.-C. Lin, Y. Zhao, **Y. Fan**, W. Chen, M. Tomizuka, "Teach industrial robots peg-hole-insertion by human demonstration." *2016 IEEE International Conference on Advanced Intelligent Mechatronics (AIM)*. IEEE, 2016.
18. Xinghao Zhu, Lingfeng Sun, **Yongxiang Fan**, and Masayoshi Tomizuka “6-DoF Contrastive Grasp Proposal Network”, accepted by *2021 IEEE International Conference on Robotics and Automation* (ICRA).
19. Zhu, X., Zhou, Y., **Fan, Y.,** Sun, L., Chen, J., & Tomizuka, M. (2022, May). Learn to grasp with less supervision: A data-efficient maximum likelihood grasp sampling loss. In 2022 International Conference on Robotics and Automation (ICRA) (pp. 721-727). IEEE.
20. Wang, K., **Fan, Y**., & Sakuma, I. (2023). Robot programming from a single demonstration for high precision industrial insertion. Sensors, 23(5), 2514.
21. **Fan, Y.** (2022). Robust dexterous manipulation and finger gaiting under various uncertainties. In Tactile Sensing, Skill Learning, and Robotic Dexterous Manipulation (pp. 297-331). Academic Press.
22. Wang, K., **Fan, Y.,** & Sakuma, I. (2024). Robot Grasp Planning: A Learning from Demonstration-Based Approach. Sensors, 24(2), 618.