# Yongxiang 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

**FANUC America Corporation**  **Union City, CA**

*Research Engineer in FANUC Advanced Research Laboratory*  *Jul. 2019-present*
- Develop algorithm for robotic grasping in industrial picking applications
- Design and optimize gripper for reliable industrial picking

**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

## PATENTS

Akeel, Hadi and **Fan, Yongxiang**. 2017. *Vision guided robot path programming*. U.S. Patent 10,556,347, granted on February 11, 2020.

**Yongxiang Fan.** 2020. *Network Modularization to Learn High Dimensional Robot Tasks*. U.S. Utility Patent No. US/61276-1 / 240531.

**Yongxiang Fan.** 2020. *Efficient Data Generation for Grasp Learning with General Grippers.* U.S. Utility Patent No. US/61419-1 / 242089

**Yongxiang Fan.** 2020. *Grasp Learning Using Modularized Neural Networks.* U.S. Utility Patent No. US/61595-1 / 244930.

**Yongxiang Fan.** 2021. *Grasp Generation for Machine Tending.* U.S. Utility Patent No. US/xx/247878]

## RELEVANT SKILLS

*Programming Language*: C/C++, Python, Matlab, AMPL
*Software*: ROS, Mujoco, Eclipse, Visual Studio, AutoCAD, Solidworks, LabView, ABAQUS, V-REP, Blender

## SCHOLARSHIP & AWARDS

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| 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. Xinghao Zhu, **Yongxiang Fan**, Shiyu Jin, Changhao Wang, and Masayoshi Tomizuka "Why Does Robotic Dexterous Hand Grasp Fail?" accepted by *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) Workshop*

15. 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*.

16. 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.

17. 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.

18. 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.

19. 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)

20. Xinghao Zhu, Yefan Zhou, **Yongxiang Fan**, Lingfeng Sun, and Masayoshi Tomizuka "Learn to Grasp with Less Supervision: A Data-Efficient Posterior Grasp Sampling Loss" submitted to *2021 IEEE/RSJ International Conference on Intelligent Robots and Systems* (IROS).