

XIAOFENG GUO

Department of Mechanical Engineering

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EDUCATION

Tsinghua University

Bachelor of Engineering in Mechanical Engineering

Beijing, China

Aug. 2016 – Jun. 2020

- GPA: 3.56/4.00
- Visiting summer research intern at Georgia Institute of Technology Jul. 2019 – Oct. 2019

PUBLICATIONS AND PATENTS

1. **Xiaofeng Guo**, Bryan Blaise, Jennifer Molnar, Jeremiah Coholich, Shantanu Padte, Ye Zhao, and Frank L. Hammond III. Soft Foot Sensor Design and Terrain Classification for Dynamic Legged Locomotion. In *2020 IEEE International Conference on Soft Robotics*. (in review)
2. Deng, Y.^{*}, **Guo, X.^{*}**, Wei, Y.^{*}, Lu, K.^{*}, Fang, B., Guo, D., Sun, F., & Liu, H. (2019). Robot Grasping in Cluttered Environment with Active Exploration. In *2019 International Conference on Intelligent Robots and Systems (IROS)*. IEEE
3. **Guo, X.**, Mo, A., Luo, C., & Zhang, W. (2018). DSCL Hand: A Novel Underactuated Robot Hand of Linearly Parallel Pinch and Self-adaptive Grasp with Double-Slider Co-circular Linkage Mechanisms. In *2018 International Conference on Intelligent Robotics and Applications (ICIRA)* (pp. 64-76). Springer, Cham
4. A Chinese patent which has been published and is to be authorized: Conccyclic connecting rod gear slide shaft type linear flat clamp self-adaptive finger device, Applicant: Tsinghua University, Inventor: **Xiaofeng Guo**, An Mo, Wenzeng Zhang, Public number: 108818580A
5. A Chinese patent which has been published and is to be authorized: Sucker-gripper composite grabbing device, Applicant: Tsinghua University, Inventor: Bin Fang, Huaping Liu, **Xiaofeng Guo**, Yuhong Deng, Kai Lu, Yixuan Wei, Public number: 109465840A

RESEARCH EXPERIENCE

Foot Sensor Design and Terrain Classification for Dynamic Locomotion Jul. 2019 – Oct. 2019

Research Intern

Georgia Institute of Technology

Advisor: Prof. Ye Zhao

- Designed and fabricated a soft contact pad for a legged robot with multiple types of sensors embedded in for acquiring rich sensing information of terrains, using the tactile sensor, acoustic sensor, capacitive sensor, and accelerometers
- Set up a testbed, using Instron and ten types of terrains to simulate the stepping motion of a real bipedal robot—Cassie Robot
- Performed signal pre-processing and feature extraction on the tactile, acoustic, capacitive and acceleration signals and developed a terrain classification algorithm based on Random Forests and a designed memory function, which had a high classification accuracy of 96.7%
- Performed multiple cross-validation experiments for proving the robustness of the classification model and reliability of the whole sensing system for real application

Composite Grasping System for Cluttered Environment

Oct. 2017 – Dec. 2019

Research Assistant

Tsinghua University

Advisor: Prof. Huaping Liu

- Designed and fabricated three kinds of composite robotic hands that combined the suction cup and different grippers for efficient grasping: the underactuated adaptive gripper, the cable-

driven dexterous gripper, and the parallel gripper, having the dual advantage of the suction cup for universal grasping and the advantage of the gripper for stable grasping

- Built a mechatronics system for integrating tactile sensors and actuators, and implemented the low-level control algorithms using the microcontroller
- Designed an object recognition algorithm based on multiple pressure statistical eigenvalues and completed an object classification system based on haptics and computer vision together with teammates
- Developed an efficient grasping strategy and trained an active exploration model based on deep Q-Network in the V-REP virtual simulation environment which can push down the stacked objects to make the cluttered environment sparse until there is an object predicted to be easily grasped
- Performed multiple grasping experiments to prove that our composite grasping system with active affordance exploration strategy was indeed more efficient than others

Novel Underactuated Robotic Hand for Universal Grasping

Oct. 2017 – Jul. 2019

Research Assistant

Tsinghua University

Advisor: Prof. Wenzeng Zhang

- Proposed a novel underactuated mechanism which was able to accomplish the linear parallel pinching mode and the self-adaptive grasping mode using only one actuator, switching between the two modes automatically according to the position of the object to be grasped
- Developed the kinematic model and the dynamic model to analyze the working area and gripping force of the mechanism, and selected a set of optimal parameters
- Designed a new type of two-finger underactuated robotic hand based on the mechanism and fabricated a prototype to prove its working principle

Technical Challenge Competition on World Robot Conference

Aug. 2017 & Aug. 2018

Team Leader

Beijing, China

Advisor: Prof. Wenzeng Zhang

- Designed and assembled a small wheeled humanoid robot with servos, grayscale sensors, distance sensors, and a camera
- Completed the program to make this robot auto-complete a series of tasks on one platform without falling, including searching for specific pillars, picking up and transporting a ball among pillars, searching for one fixed door, and pushing down a specific box without touching the others
- Won 3rd Place at World Robot Conference 2017 and 2nd Place at World Robot Conference 2018

SELECTED AWARDS AND HONORS

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| • 1st Prize at Tsinghua Academic and Science Competition (top 5%) | Apr. 2019 |
| • School Scholarship of Tsinghua University: Academic Performance (top 10%) | Dec. 2018 |
| • 1st Place at the 20th National Robot and Artificial Intelligence Competition | Oct. 2018 |
| • 3rd Place at the 13th ASME Student Mechanism and Robot Design Competition | Aug. 2018 |
| • School Scholarship of Tsinghua University: Technological Innovation (top 10%) | Dec. 2017 |
| • 3rd Prize in 34th National Physics Competition for College Students | Dec. 2017 |

ADDITIONAL INFORMATION

Programming Skills and Software: C, C++, MATLAB, Simulink, Python, SolidWorks, AutoCAD, ROS, V-REP, TensorFlow, LabVIEW, LaTeX

Microcontrollers: Arduino, MSP430, STM32

Experimental Skills: 3D Print, Laser Cutter, Lathe, Band Saw, Drill, Soldering Station

Languages: Mandarin (native), English (fluent)