

HAOSHU FANG

+1 (857) 298-8707
<https://fang-haoshu.github.io/>
fhs@mit.edu

EDUCATION

Massachusetts Institute of Technology (MIT), USA Dec. 2023 - present
Postdoctoral Researcher
Shanghai Jiao Tong University (SJTU), China Sep. 2019 - Sep. 2023
Ph.D., Wu Wenjun Honorable Class
Shanghai Jiao Tong University (SJTU), China Sep. 2013 - Jun. 2019
Bachelor of Engineering in Computer Science and Engineering

SELECTED AWARDS

SJTU Outstanding Graduates Sep. 2023
National Scholarship Oct. 2021
ByteDance Fellowship (10 winner in mainland China) June. 2021
Microsoft Research Asia Fellowship (12 winner in Asia Pacific) Nov. 2020
Baidu Fellowship (10 winner Globally) Dec. 2019
CCF-CV Rising Scholar Award (3 winner in mainland China) Sep. 2019

PUBLICATIONS

total citations: 5109

Journal Papers

AnyGrasp: Robust and Efficient Grasp Perception in Spatial and Temporal Domains [paper][project]
H-S. Fang, C. Wang, H. Fang, M. Gou, J. Liu, H. Yan, W. Liu, Y. Xie, C. Lu
IEEE Transaction on Robotics (T-RO), 2023

Robust Grasping Across Diverse Sensor Qualities: The GraspNet-1Billion Dataset [paper][project]
Hao-Shu Fang, Minghao Gou, Chenxi Wang, Cewu Lu
The International Journal of Robotics Research (IJRR), 2023

InstaBoost++: Visual Coherence Principles for Unified 2D/3D Instance Level Data Augmentation [paper] [code]
Jianhua Sun*, **Hao-Shu Fang***, Yuxuan Li, Runzhong Wang, Minghao Gou, Cewu Lu
The International Journal of Computer Vision (IJCV), 2023

AlphaPose: Whole-body Regional Multi-person Pose Estimation and Tracking in Real-time [paper] [code]
Hao-Shu Fang*, Jiefeng Li*, Hongyang Tang, Chao Xu, Haoyi Zhu, Yuliang Xiu, Yong-Lu Li, Cewu Lu
IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI), 2022

AlphaTracker: a Multi-animal Tracking and Behavioral Analysis Tool [paper] [code]
Zexin Chen*, Ruihan Zhang*, **Hao-Shu Fang***, Yu E Zhang, Aneesh Bal, Haowen Zhou, Rachel R Rock, Nancy Padilla-Coreano, Laurel R Keyes, Haoyi Zhu, Yong-Lu Li, Takaki Komiyama, Kay M Tye, Cewu Lu
Frontiers in Behavioral Neuroscience, 2022

TransCG: A Large-scale Real-world Dataset for Transparent Object Depth Completion [paper] [project]
Hongjie Fang, **Hao-Shu Fang**, Sheng Xu, Cewu Lu
IEEE Robotics and Automation Letters (RA-L), 2022

Cortical Ensembles Orchestrate Social Competition Through Hypothalamic Outputs [paper][code]
N.P.-Coreano, K. Batra, M. Patarino, Z. Chen, R. R. Rock, R. Zhang, S. B. Hausmann, J. C. Weddington, R. Patel, Y. E. Zhang, **H.-S. Fang**, S. Mishra, D. O. LeDuke, J. Revanna, H. Li, M. Borio, R. Pamintuan, A. Bal, L. R. Keyes, A. Libster, R. Wichmann, F. Mills, F. H. Taschbach, G. A. Matthews, J. P. Curley, I. R. Fiete, C. Lu, K. M. Tye
Nature, 2022

SuctionNet-1Billion: A Large-Scale Benchmark for Suction Grasping [paper] [project]
Hanwen Cao, **Hao-Shu Fang**, Wenhai Liu, Cewu Lu
IEEE Robotics and Automation Letters (RA-L), 2021

Conference Papers (Selected)

RH20T: A Comprehensive Robotic Dataset for Learning Diverse Skills in One-Shot [[paper](#)][[project](#)]

Hao-Shu Fang, Hongjie Fang, Zhenyu Tang, Jirong Liu, Chenxi Wang, Junbo Wang, Haoyi Zhu, Cewu Lu
The International Conference on Robotics and Automation (ICRA), 2024

Low-Cost Exoskeletons for Learning Whole-Arm Manipulation in the Wild [[paper](#)][[project](#)]

Hongjie Fang*, **Hao-Shu Fang***, Yiming Wang*, Jieji Ren, Jingjing Chen, Ruo Zhang, Weiming Wang, Cewu Lu
The International Conference on Robotics and Automation (ICRA), 2024

A Surprisingly Efficient Representation for Multi-Finger Grasping

Hengxu Yan*, **Hao-Shu Fang***, Cewu Lu

The International Conference on Robotics and Automation (ICRA), 2024

Open X-Embodiment: Robotic Learning Datasets and RT-X Models [[paper](#)][[project](#)]

Open X-Embodiment Collaboration, 147 authors

The International Conference on Robotics and Automation (ICRA), 2024

Flexible Handover with Real-Time Robust Dynamic Grasp Trajectory Generation [[paper](#)]

Gu Zhang, **Hao-Shu Fang**, Hongjie Fang, Cewu Lu

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2023

Target-Referenced Reactive Grasping for Dynamic Objects [[paper](#)][[code](#)]

Jirong Liu, Ruo Zhang, **Hao-Shu Fang**, Minghao Gou, Hongjie Fang, Chenxi Wang, Sheng Xu, Hengxu Yan, Cewu Lu

IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) 2023

Correlation Field for Boosting 3D Object Detection in Structured Scenes [[paper](#)]

Jianhua Sun, **Hao-Shu Fang**, Xianghui Zhu, Jiefeng Li, Cewu Lu

AAAI Conference on Artificial Intelligence (AAAI) 2022

DIRV: Dense Interaction Region Voting for End-to-End Human-Object Interaction Detection [[paper](#)][[code](#)]

Hao-Shu Fang*, Yichen Xie*, Dian Shao, Cewu Lu

AAAI Conference on Artificial Intelligence (AAAI) 2021

RGB Matters: Learning 7-DoF Grasp Poses on Monocular RGBD Images [[paper](#)][[code](#)]

Minghao Gou, **Hao-Shu Fang**, Zhanda Zhu, Sheng Xu, Chenxi Wang, Cewu Lu

The International Conference on Robotics and Automation (ICRA) 2021

Graspness Discovery in Clutters for Fast and Accurate Grasp Detection [[paper](#)]

Chenxi Wang*, **Hao-Shu Fang***, Minghao Gou, Hongjie Fang, Jin Gao, Cewu Lu

IEEE/CVF International Conference on Computer Vision (ICCV) 2021

GraspNet-1Billion: A Large-Scale Benchmark for General Object Grasping [[paper](#)][[code](#)]

Hao-Shu Fang, Chenxi Wang, Minghao Gou, Cewu Lu

IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) 2020

InstaBoost: Boosting Instance Segmentation via Probability Map Guided Copy-pasting [[paper](#)][[code](#)]

Hao-Shu Fang*, Jianhua Sun*, Runzhong Wang*, Minghao Gou, Yong-Lu Li, Cewu Lu

IEEE/CVF International Conference on Computer Vision (ICCV) 2019

Pairwise Body-Part Attention for Recognizing Human-Object Interactions [[paper](#)]

Hao-Shu Fang, Jinkun Cao, Yu-Wing Tai, Cewu Lu

European Conference on Computer Vision (ECCV) 2018

Weakly and Semi Supervised Human Body Part Parsing via Pose-Guided Knowledge Transfer [[paper](#)][[code](#)]

Hao-Shu Fang, Guansong Lu, Xiaolin Fang, Jianwen Xie, Yu-Wing Tai, Cewu Lu

IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) 2018

Learning Pose Grammar to Encode Human Body Configuration for 3D Pose Estimation [[paper](#)] [[code](#)]

Hao-Shu Fang*, Yuanlu Xu*, Wenguan Wang, Xiaobai Liu and Song-Chun Zhu

AAAI Conference on Artificial Intelligence (AAAI) 2018

RMPE: Regional Multi-Person Pose Estimation [[paper](#)] [[code](#)]

Hao-Shu Fang, Shuqin Xie, Yu-Wing Tai and Cewu Lu

IEEE/CVF International Conference on Computer Vision (ICCV) 2017

For the full publication list, please visit my [Google Scholar](#) page.

ACADEMIC SERVICES

Reviewer for journals including T-RO, IJRR, T-PAMI, IJCV, TMM, TOC, TIP, RA-L, *etc.*

Reviewer for conferences including RSS, ICRA, IROS, CoRL, CVPR, NeurIPS, ICLR, ICCV, ECCV, AAAI, *etc.*

SELECTED PROJECTS

RH20T

The current largest robotic manipulation dataset, 140+ skills, 40+ TB in size

First author
Oct, 2021 - Now

- Contains 110,000+ *contact-rich* robot manipulation sequences, all collected in the real world.
- Comprises diverse skills, robots, viewpoints, objects, backgrounds, *etc.*
- Provides rich visual, tactile, audio, and proprioception information.
- Each robotic manipulation is paired with diverse human demonstrations for the same task.

GraspNet

First community for 6-DoF general object grasping

First author
June, 2020 - Now

- The first large-scale real-world benchmark for 6-DoF cluttered object grasping.
- Enables robots to achieve human-level grasping.
- Published **8 papers** on top-tier journals/conferences, I am the first/second author.
- Ranks **the 2nd most influential** 6-DoF grasping paper in a [review by Monash, Nvidia, Stanford and UW, etc.](#)

AlphaPose

Over 6.5K stars on GitHub (ranking top 0.01% among all GitHub repos)

First author
2018 - 2022

- Fast and accurate multi-person pose estimation and tracking system. Supports PyTorch, Mxnet and Jittor.
- Commercial license bought by over 20 oversea companies.
- Excellent open-source project in China, 2020 (the only one from the University among 10 winners).

TEACHING

Teaching Assistant, AI1602 Introduction to Artificial Intelligence

Spring, 2022

- Prepare and give a lesson on PyTorch, help design the project and final exam, scoring, *etc.*

INVITED TALKS

- 2023/08, ByteDance Robotic Team, Beijing, “Introduction to RH20T: the Current Largest Robotic Dataset”
- 2023/07, *Learning Dexterous Manipulation @RSS 2023*, Korea, “Data Efficiency in Robotic Manipulation”
- 2023/06, Vision And Learning Sminar, Wuxi, “Towards General Robotic Skill Learning”
- 2023/04, BIGAI, Beijing, “From General Object Grasping to General Skill Learning in Robotic Manipulation”
- 2022/12, SU lab, UCSD, “Efficient Learning for Robotic Manipulation in Real World”
- 2022/08, IDEA, Shenzhen, “AnyGrasp: Human-level General Robotic Grasping”
- 2021/08, Qsinghua Univ, Beijing, “AnyGrasp: Human-level General Robotic Grasping”
- 2021/06, Xi’an Jiao Tong Univ, Xi’an, “From Human Behavior Understanding to Robotic Manipulation”

STUDENTS MENTORED

Undergraduate students

- Yichen Xie, published 2 co-first-author papers on the AAAI, SJTU undergrad → UCB PhD student
- Hanwen Cao, published 1 first-author paper on RA-L, SJTU undergrad → UCSD PhD student
- Jianhua Sun, published 1 co-first-author papers on the ICCV, SJTU undergrad → SJTU PhD student
- Hongjie Fang, published 1 first-author paper on RA-L, SJTU undergrad → SJTU PhD student
- Gu Zhang, published 1 first-author paper on IROS, SJTU undergrad → Tsinghua PhD student

- Haoyi Zhu, published 1 first-author paper on WACV, SJTU undergrad → UTSC PhD student

Graduate students

- Minghao Gou, published 1 first-author paper on ICRA, SJTU Master's student → DJI Robotics
- Chenxi Wang, published 1 first-author paper on ICCV, SJTU Master's student → Flexiv Robotics
- Jirong Liu, published 1 first-author paper on CVPR, SJTU PhD student
- Hengxu Yan, published 1 first-author paper on ICRA, SJTU PhD student

INTERNSHIPS

Flexiv Robotics, Shanghai

Research Intern

Jul. 2018 - Sep. 2019

- General Object Grasping, Object 6D Pose Estimation

VCLA, UCLA, California

Research Intern(advisor: Prof. [Song-Chun Zhu](#))

Jun. 2017 - Oct. 2017

- Grammar Model, Monocular 3D Human Pose Estimation

Youtu Lab, Tencent, Shanghai

Research Intern(advisor: Dr. [Yu-Wing Tai](#))

Feb. 2017 - Jun. 2017

- Body Part Segmentation, Human-Object-Interaction Recognition