



FANGYI ZHANG

Research Fellow in Manipulation and Vision

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SUMMARY

I have been focusing on robotics and machine learning since 2014. I have over 20 peer-reviewed publications including those in top conferences and journals in robotics (The International Journal of Robotics Research, IEEE International Conference on Robotics and Automation, IEEE/RSJ International Conference on Intelligent Robots and Systems and IEEE Robotics & Automation Magazine) and machine learning (Conference on Neural Information Processing Systems, and The International Conference on Learning Representations).

I have achieved several awards for academic research, including a Best Paper Award Finalist in ACRA 2017 and a Best Industry Paper in IJCAIW 2021. I have an h-index of 10 with over 800 citations, and with one paper cited more than 350 times. I involved numerous international academic activities and events of robotics: reviewing a grant proposal submitted to the 2020 FONDECYT Regular Competition of the Chilean National Commission for Scientific and Technological Research (CONICYT), chairing the Tactile Sensing I session at IROS 2023, co-organizing workshops on representing and manipulating deformable objects for ICRA 2023 and ICRA 2024, giving invited talks in Oxford Robotics Institute and Bristol Robotics Laboratory, and reviewing papers for top journals and conferences including Nature Machine Intelligence. I have been serving as an Associate Editor for the IEEE Robotics and Automation Letters (RA-L), one of the top journals in robotics. All these reflect my global impact in the areas of robotics and machine learning.

In addition, I have more than 6 years of work experience in the industry and have accumulated both hardware and software experience in robotics, machine learning, mechatronics, semiconductor manufacturing and testing, and high-end equipment manufacturing. I have been collaborating with SINTEF (Norway), Inria (France), and MIT (US) in the GentleMAN project (financed by the Research Council of Norway; RCN299757) for two years, and have recently demonstrated for the first time a robot cutting salmon fillets using a sashimi knife. With this unique expertise, experience and international collaborations, I am perfectly placed to deliver research in AI and Robotics; lead the translation of the research outcomes into practice; and train future researchers and engineers in this field.

RESEARCH AREAS

Robot Learning, Robotic Manipulation, Tactile Sensing, Robotic Vision, Reinforcement Learning, and Autonomous Systems

EDUCATION

Doctor of Philosophy 02/2015 – 09/2018

Queensland University of Technology (QUT), Brisbane, Australia
Australian Centre for Robotic Vision (ACRV)

PhD Thesis: Learning Real-world Visuo-motor Policies from Simulation

Supervisors: Prof. Peter Corke, Dr. Jürgen Leitner, and Prof. Michael Milford

Bachelor of Engineering 09/2006 – 07/2010

East China Jiaotong University (ECJTU), Nanchang, Jiangxi, P. R. China

Thesis Title: Design of MiroSot Soccer Robot Control System

Outstanding Thesis Award

WORK/VISIT EXPERIENCE

- Research Fellow** 12/2021 – present
QUT Centre for Robotics, Brisbane, Australia
Research on robotic physical interaction with a particular focus on tactile sensing and tactile-based robotic manipulation.
- Algorithm Expert** 10/2018 – 11/2021
Alibaba DAMO Academy, China
R&D in machine learning, data mining, robotic vision, and mobile robots.
- Visiting PhD Student** 09/2016 – 12/2016
University of Maryland, College Park, USA
Collaboration in building a mobile manipulation robot for housework in a kitchen scenario.
- Research Assistant** 03/2014 – 12/2014
Hong Kong University of Science and Technology (HKUST)
Research on VLC-based indoor localization and 3D-sensing using a 2D-laser-scanner.
- Software Engineer** 08/2012 – 03/2013
CRRC Zhuzhou Institute, China
Developing control algorithms and software for the adhesion control of locomotives.
- Application Engineer** 07/2010 – 07/2012
CRRC Zhuzhou Institute, China
Developing testing and application technologies and equipment for power electronic devices.

SELECTED PUBLICATIONS

Please refer to my [Google Scholar profile](#) for a complete list.

*: Equal contribution, listed in alphabetical order by last name. **: Corresponding author.

- [1] Maceon Knopke, Liguozhu, Peter Corke, **Fangyi Zhang****, "Towards Assessing Compliant Robotic Grasping from First-Object Perspective via Instrumented Objects," in IEEE Robotics and Automation Letters (**RA-L**), vol. 9, no. 7, pp. 6320–6327, July 2024, doi: 10.1109/LRA.2024.3405371. ([Web](#))
- [2] Robert Lee, Jad Abou-Chakra, **Fangyi Zhang**, Peter Corke, "Learning Fabric Manipulation in the Real World with Human Videos", in Proceedings of the IEEE International Conference on Robotics and Automation (**ICRA**), pp. 3124–3130, 2024. ([Web](#))
- [3] **Fangyi Zhang**, Peter Corke, "Re-evaluating Parallel Finger-tip Tactile Sensing for Inferring Object Adjectives: An Empirical Study," in Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), pp. 8951–8957, 2023. doi: 10.1109/IROS55552.2023.10342262 ([PDF](#))
- [4] Yaohua Wang*, **Fangyi Zhang***, et al., "Robust Graph Structure Learning over Images via Multiple Statistical Tests," *Advances in Neural Information Processing Systems 35: 36th Conference on Neural Information Processing Systems (NeurIPS)*, pp. 32083–32096, 2022. ([PDF](#))
- [5] **Fangyi Zhang**, Jürgen Leitner, Zongyuan Ge, Michael Milford, Peter Corke, "Adversarial Discriminative Sim-to-real Transfer of Visuo-motor Policies," *International Journal of Robotics Research (IJRR)*, vol. 38, no. 10–11, pp. 1229–1245, 2019. doi: 10.1177/0278364919870227 ([PDF](#))
- [6] **Fangyi Zhang**, Jürgen Leitner, Michael Milford, Peter Corke, "Modular Deep Q Networks for Sim-to-real Transfer of Visuo-motor Policies," in Proceedings of the Australasian Conference on Robotics and Automation (**ACRA**), 2017. ([PDF](#)) (**Best Paper Award Finalist**)
- [7] **Fangyi Zhang**, Jürgen Leitner, Michael Milford, Peter Corke, "Tuning Modular Networks with Weighted Losses for Hand-Eye Coordination," in Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition Workshops (**CVPRW**), 2017. doi: 10.1109/CVPRW.2017.74 ([PDF](#))

SELECTED PUBLICATIONS – CONTINUED

[8] **Fangyi Zhang**, Jürgen Leitner, Michael Milford, Ben Upcroft, Peter Corke, "Towards Vision-Based Deep Reinforcement Learning for Robotic Motion Control," in Proceedings of the Australasian Conference on Robotics and Automation (**ACRA**), 2015, ANU, Canberra, Australia. ([PDF](#)) ([Cited by 352](#))

[9] **Fangyi Zhang**, Kejie Qiu, Ming Liu, "Asynchronous Blind Signal Decomposition Using Tiny-Length Code for Visible Light Communication-Based Indoor Localization," in Proceedings of the IEEE International Conference on Robotics and Automation (**ICRA**), pp. 2800–2805, 2015. doi: 10.1109/ICRA.2015.7139580 ([PDF](#))

[10] Yaohua Wang, Yaobin Zhang, **Fangyi Zhang**, et al., "Ada-NETS: Face Clustering via Adaptive Neighbour Discovery in The Structure Space," in Proceedings of the International Conference on Learning Representations (**ICLR**), 2022. ([PDF](#))

[11] Huafeng Yang, Xingjian Chen, **Fangyi Zhang****, et al., "GCN-Based Linkage Prediction for Face Clustering on Imbalanced Datasets: An Empirical Study," in Workshops of the International Joint Conference on Artificial Intelligence (**IJCAI**), 2021. ([PDF](#)) (**Best Industry Paper**)

[12] Cangning Fan, **Fangyi Zhang**, et al., "Importance Weighted Adversarial Discriminative Transfer for Anomaly Detection," arXiv preprint arXiv:2105.06649, 2021. ([PDF](#))

[13] Kejie Qiu, **Fangyi Zhang**, Ming Liu, "Let the Light Guide Us: VLC-based Localization," IEEE Robotics and Automation Magazine (**RAM**), vol. 23, no. 4, pp. 174–183, 2016. doi: 10.1109/MRA.2016.2591833 ([PDF](#))

[14] Kejie Qiu, **Fangyi Zhang**, Ming Liu, "Visible Light Communication-based Indoor Localization using Gaussian Process," in Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), pp. 3125–3130, 2015. doi: 10.1109/IROS.2015.7353809 ([PDF](#))

[15] Kejie Qiu, **Fangyi Zhang**, Ming Liu, "Visible Light Communication-based Indoor Environment Modeling and Metric-free Path Planning", in Proceedings of the IEEE International Conference on Automation Science and Engineering (CASE), pp. 200–205, 2015. doi: 10.1109/CoASE.2015.7294062 ([PDF](#))

SELECTED PROJECTS

Please refer to my [research page](#) for more details.

Note: In Projects 1, 3, 4, 5, 8 and 11, I am the principal investigator

1. Tactile Sensing and Dexterous Manipulation 12/2021 – present

- IBaselines and research for tactile sensing and learning tactile-based manipulation.
- IDesign and development of novel instrumented objects for assessing compliant robotic grasping.
- IDexterous manipulation with multiple-finger hands and tactile sensors.

2. Gentle and Advanced Robotic Manipulation of 3D Compliant Objects (GentleMAN) 12/2021 – present

- An IKTPLUSS project funded by the Research Council of Norway.
- Global collaboration with SINTEF (Norway), MIT (US), and Inria (France).
- Demonstrated for the first time a triple-arm robot cutting salmon fillets using a sashimi knife.

3. Deep Learning and Data Mining 04/2020 – 11/2021

- Research on deep-learning-based clustering techniques for computer vision applications.
- Investigation of computer vision approaches for remote sensing image understanding.
- Supervision on research interns and collaboration with fellow researchers for publications.

4. Indoor Visual Localization and Navigation on UAVs 10/2018 – 03/2020

- Co-founder of a robotic vision group within the Alibaba DAMO Academy.
- Investigation of different VSLAM approaches for indoor localization on UAVs.
- Investigation of various 3D sensing approaches using either stereo or monocular cameras.
- Investigation of approaches for real-time path planning and obstacle avoidance.
- System integration for autonomous navigation, obstacle avoidance and target following.

SELECTED PROJECTS – CONTINUED

5. Learning Real-world Visuo-motor Policies from Simulation 02/2015 – 09/2018

- Feasibility analysis on learning vision-based robotic planar reaching using DQNs in simulation.
- Proposed a modular deep Q network architecture for fast and low-cost transfer of visuo-motor policies from simulation to the real world.
- Proposed an end-to-end fine-tuning method using weighted losses to improve hand-eye coordination.
- Proposed a kinematics-based guided policy search method (K-GPS) to speed up Q learning for robotic applications where kinematic models are known.
- Demonstrated in robotic reaching tasks on a real Baxter robot in velocity and position control modes, e.g., table-top object reaching in clutter and planar reaching.
- More investigations are undergoing for semi-supervised and unsupervised transfer from simulation to the real world using adversarial discriminative approaches.

6. Robotic Manipulation for Warehouse and Household Applications 2016

- Baxter robot hand-eye calibration for the Amazon Picking Challenge (collaboration with Dr. Leo Wu).
- A mobile manipulation robot for housework in a kitchen scenario, mainly taking in charge of the sub-task of table cleaning (project during my visit to the University of Maryland, College Park, Sep-Dec 2016).

7. Visible Light Communication (VLC) based Indoor Localization 2014

- Developed a beacon code selection algorithm and a decomposition algorithm for blindly mixed beacon signals, based on CDMA code selection principles and Gold-sequence correlation properties.
- Participated in the development of a light-intensity distribution map generation algorithm using Gaussian Process Regression.
- Participated in the development of localization and path planning algorithms using Kalman Filter (KF) and A star.

8. 3D-sensing based on a 2D-laser-scanner 2014

- Developed a software framework based on Robot Operating System (ROS).
- Developed a motor position estimation algorithm using Extended Kalman Filter (EKF).
- Developed an algorithm to project point clouds from 2D-space to 3D-space.

9. R&D of the Adhesion Control for Locomotives 2012 – 2013

- Optimized a Matlab (Simulink) model of adhesion control for more realistic simulation.
- Optimized the adhesion control algorithm by taking use of the derivative of wheel acceleration.
- Applied the algorithm on various electric locomotives, diesel locomotives and metro vehicles.

10. R&D of Testing and Application Technologies for Power Electronic Devices 2010 – 2012

- Developed controllers for various experimental circuits, using Freescale MCU-based embedded systems.
- Participated in the simulation (using PSIM), design and building of a 150 kA Pulse Discharge Testboard, including its main and control circuits. Developed an offline test data analysis software for the testboard using Visual Basic for Applications (VBA).
- Participated in enabling the auto scan of an X-TEK X-ray instrument for IGBT, using Visual Basic.
- Investigated the characteristics of newly designed semiconductor devices (pulsed thyristor and IGCT), such as gate, frequency and high-temperature characteristics.

11. FIRA-MiroSot Soccer Robot Control System (Excellent Graduation Project) 2009 – 2010

- Developed a host computer software system for soccer robots, which consists of three subsystems: image processing, behaviour control and multi-agent coordination. The implementation is based on Visual C++, using multithreading, dynamic link library (DLL) and database techniques.
- Developed algorithms for some basic motions using PID. Regression approaches were used to fit experimental data for robot motion characteristics to prevent robots from being out of control.
- Optimized a mid-perpendicular-based method for more reliable shooting motions. A higher shooting success rate was achieved by specifying wheel velocities using an experimentally fitted function.
- Realized real-time path planning including obstacle avoidance, using an optimized artificial potential field (APF) approach. Solved the "local minimum trap" problem of APF and improved the smoothness of planned paths by optimizing artificial potential functions.

SELECTED AWARDS & HONORS

- Best Supporter Citizen, QCR 2024
- Recognized as Global Talents, Australia 2021
- Best Industry Paper, IJCAI 2021
- Recognized as High-end Talents, Hangzhou, China 2020
- Best Paper Award Finalist, ACRA 2017
- ACRV Best Team Project (for my contribution to the Amazon Picking Challenge) 2016
- The Excellent Graduate Trainee, CRRZ Zhuzhou Institute 2011
(Only the top 5% graduate trainees can get this honour.)
- The Excellent Undergraduate Graduate, ECJTU 2010
(The top 1% undergraduate graduates can get this honor.)
- The Excellent Undergraduate Graduation Project and Thesis, ECJTU 2010
(The top 1% undergraduate graduation projects and theses can get this honor.)
- National Scholarship, China 2008 - 2009

ACADEMIC SERVICES

- **Associate Editor:** RA-L since 2023
- **Session Chair:** Chair for the Tactile Sensing I Session at IROS 2023
- **Workshop Organization:** the 3rd and 4th workshops on representing and manipulating deformable objects at ICRA 2023 and ICRA 2024
- **Journal Reviewer:** Nature Machine Intelligence, IJRR, RA-L, T-ASE, TNLS, ISJ, AURO
- **Conference Reviewer:** ICRA, IROS, Humanoids
- **Grant Review:** FONDECYT (Chilean National Fund for Science and Technology)