FANGYI ZHANG

Researcher and Engineer in AI and Robotics

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SUMMARY

I am an experienced researcher and engineer in robotics and machine learning, soon to join Curtin University as a Lecturer. My goal is to contribute to advancing robotics and AI in fields such as agriculture, healthcare, construction, and environmental monitoring and disaster management, while also dedicating myself to educating and mentoring the next generation of researchers and engineers.

Since 2014, I have focused on machine learning and robotics, publishing over 20 peer-reviewed papers in prestigious conferences and journals, including the Conference on Neural Information Processing Systems (NeurIPS), the International Conference on Learning Representations (ICLR), the International Journal of Robotics Research (IJRR), the IEEE Robotics and Automation Letters (RA-L), and the IEEE International Conference on Robotics and Automation (ICRA). My contributions have been recognized with several awards, such as a Best Paper Award Finalist at ACRA 2017 and Best Industry Paper at IJCAIW 2021. I hold an h-index of 10 with over 800 citations, including one paper cited more than 370 times.

My global impact in the field extends to numerous international academic activities, such as chairing the Tactile Sensing I session at IROS 2023, co-organizing workshops at ICRA 2023 and 2024, delivering invited talks at Oxford Robotics Institute and Bristol Robotics Laboratory, and serving as an Associate Editor for RA-L. I also frequently review papers for leading journals, including Nature Machine Intelligence.

Beyond academia, I have over 6 years of industry experience, with expertise spanning hardware and software in robotics, machine learning, mechatronics, semiconductor manufacturing, and high-end equipment. Recently, I collaborated with SINTEF (Norway), Inria (France), and MIT (US) on the GentleMAN project, where we achieved a groundbreaking demonstration of a robot using a sashimi knife to cut salmon fillets. With my unique blend of technical expertise, research leadership, and international collaboration, I am well-positioned to drive innovative R&D in AI and robotics.

RESEARCH AREAS

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

WORK/VISIT EXPERIENCE

Research Fellow — 12/2021 - 11/2024
QUT Centre for Robotics (QCR), Brisbane, Australia
Research on robotic physical interaction with focuses on tactile sensing and tactile-based robotic manipulation.

Senior Algorithm Engineer (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 (UMD), 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
R&D of control algorithms and software for the adhesion control of locomotives.

Application Engineer — 07/2010 - 07/2012
CRRC Zhuzhou Institute, China
R&D of testing and application technologies and equipment for power electronic devices.

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

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, Liguo Zhu, 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, 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. doi: 10.1109/ICRA57147.2024.10610062 (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)

[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 372**)

[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] 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)

[13] 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)

SELECTED GRANTS

QUT Centre for Robotics ECR and MCR Funding Scheme 10/2022- 06/2023
Assessing Compliant Robotic Grasping Performance through Novel Instrumented Objects ($20,000)

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 (QCR) 12/2021 - present

- Led the development of a new program focused on tactile sensing and its utility for robotic manipulation.
- An innovative work on using instrumented objects for assessing compliant robotic grasping, **which has been featured by QUT News**. (funded by the QCR Funding Scheme)
- Dexterous manipulation with multiple-finger hands and tactile sensors.

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

- GentleMAN: an IKTPLUSS project funded by the Research Council of Norway.
- Global collaboration with SINTEF (Norway), MIT (US), and Inria (France).
- As a key contributor, developed the first demonstration of a triple-arm robot precisely cutting salmon fillets with a sashimi knife.

3. Deep Learning and Data Mining (Alibaba) 04/2020 - 11/2021

- Co-led the research on deep-learning-based clustering techniques for computer vision applications (works published on NeurIPS and ICLR).
- 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 (Alibaba) 10/2018 - 03/2020

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

5. Learning Real-world Visuo-motor Policies from Simulation (PhD Thesis) 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 (ACRV and UMD) 2016

- Developed Baxter robot hand-eye calibration methods for the Amazon Picking Challenge (in collaboration with Dr. Leo Wu at ACRV).
- Developed a mobile manipulation robot for housework in a kitchen scenario, mainly taking charge of the sub-task of table cleaning (project during my visit to the University of Maryland, College Park, 09-12/2016).

7. Visible Light Communication (VLC) based Indoor Localization (HKUST) 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.
- Development of a light-intensity distribution map generation algorithm using Gaussian Process Regression.
- Development of localization and path planning algorithms using Kalman Filter (KF) and A star.

8. R&D of the Adhesion Control for Locomotives (CRRC) 2012 - 2013

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

SELECTED PROJECTS - CONTINUED

9. R&D of Testing and Application Technologies for Power Electronic Devices (CRRC) 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).
- Developed software for the auto scan of an X-TEK X-ray instrument for IGBT.
- Investigated the characteristics of newly designed semiconductor devices (pulsed thyristor and IGCT), such as gate, frequency and high-temperature characteristics.

10. FIRA-MiroSot Soccer Robot Control System (Excellent Graduation Project, ECJTU) 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 motion control 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 (top 5%), CRRC Zhuzhou Institute, 2011
- The Excellent Undergraduate Graduate (top 1%), ECJTU, 2010
- The Excellent Undergraduate Graduation Project and Thesis (top 1%), ECJTU, 2010
- National Scholarship, China, 2009

SELECTED SKILLS

ROS, Linux, Python, C++, C, PyTorch, TensorFlow, LLM frameworks and tools, SQL, Embedded Systems, etc.

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
- **Reviewer**: Nature Machine Intelligence, IJRR, RA-L, T-ASE, TNNLS, ISJ, AURO, ICRA, IROS, Humanoids
- **Grant Review**: FONDECYT (Chilean National Fund for Science and Technology)