Dr Fan Zhang

Contact Information

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Research Interests

Multi-modal Robot Manipulation, Sim-to-Real Learning, Self-Supervised Learning, World Model, Flow Matching

Professional Appointments

Senior Scientist, 2025-present
Guest Scientist, 2024-2025
Honda Research Institute EU

Visiting Researcher, 2024-present
Eric and Wendy Schmidt AI in Science Postdoctoral Fellow, Schmidt Futures, 2023-2024
Research Associate, 2021-2023
Imperial College London (UK Global Talent Visa, sponsored by Royal Academy of Engineering)

Education

Ph.D. in Electrical and Electronic Engineering (Robotics), 2016-2020
Imperial College London
Thesis**:** Perception and Manipulation in Robotic-Assisted Dressing
Supervisor: Prof. Yiannis Demiris (Royal Academy of Engineering Chair in Emerging Technologies)

Awards

Best Research Paper, AI & Robotics Research Awards, held by TAS Hub and the Royal Society 2025
The UK Best PhD in Robotics Award 1st place, held by Advanced Robotics @ Queen Mary 2020
Best Student Paper Award, IEEE International Conference on Mechatronics and Automation 2016

Highlighted Publications

Affordance-based Manipulation with Flow Matching
Fan Zhang, Michael Gienger
arXiv, 2025. (paper, website, code, invited by Hugging Face LeRobot)

Learning Garment Manipulation Policies towards Robot-Assisted Dressing
Fan Zhang, Yiannis Demiris
Science Robotics, 2022. (paper, video, website, code)

Probabilistic Real-Time User Posture Tracking for Personalized Robot-Assisted Dressing
Fan Zhang, Antone Cully, Yiannis Demiris
IEEE Transactions on Robotics, 2019. (paper, video)

Contrastive Self-Supervised Learning for Automated Multi-Modal Dance Performance Assessment
Yun Zhong, Fan Zhang, Yiannis Demiris
ICASSP, 2023. (paper, video, code)

Talks

IROS Workshop on Manipulation of Deformable Objects (RoMaDo)	2025
IPAB visitor seminar, Edinburgh Centre for Robotics	2025
YorRobots Seminar, University of York	2025
Adaptive and Intelligent Robotics Lab, Imperial College London	2025
Guest Lecture, TAMS, University of Hamburg	2024
Social AI & Robotics Laboratory, King's College London	2023
Tsinghua University, (live audience: 150,000)	2022
Apple Weekly Seminar	2022
Human Motion Analysis for Healthcare Applications, IET (video)	2019
The Hamlyn Centre, Imperial College London	2017

In the Press

Robotic nurse can dress a mannequin in a hospital gown, New Scientist	2022
Robotic nurse that helps you dress could aid staff shortage, Bloomberg	2019
The Times, Daily Mail, Telegraph, TechXplore	2019

Academic Activities

IROS 2025 Session: Factory Automation and Failure Detection	Co-chair
RSS 2024 Workshop: Learning for Assistive Robotics	Organizer
Imperial-X Breaking Topics in AI conference, Schmidt Futures	Organizer
ICRA 2023 Workshop: Emerging Paradigms for Assistive Robotic Manipulation	Organizer
Frontiers in Robotics and AI-Robot Learning and Evolution	Review Editor
Scientific Reports, T-RO, IJRR, ICRA, IROS, RA-L, RSS, WACV, Humanoids	Reviewer
The Centre for AI in Assistive Autonomy, The University of Edinburgh,	Collaborator
Doctoral annual review (Leonard Hinckeldey), The University of Edinburgh	Committee

Research Mentorship

Jonathan Sutphen (Msc, TU Darmstadt, Robot Manipulation with Audio)	2025-present
Leonard Hinckeldey (PhD, The University of Edinburgh, Multi-Agent RL)	2025-present
Amirreza Razmjoo (PhD, EPFL, Robot Failure Recovery)	2024-2025
Jenny Fu (PhD, Cornell University, Robot Character Learning)	2024-2025
Nikki Zhong (PhD, Imperial college London, Human Motion Modeling)	2022-2024

Research Experience

---- **General Multi-Modal Robot Manipulation**

- Multi-modal (audio, vision, language) world model for learning robot manipulation.
- Parameter-efficient prompt tuning for learning manipulation affordance with VLM.
- Generative learning for robot manipulation with special focus on flow matching.
- Robot failure recovery with compositional diffusion models.
- Learning flow matching models for robotic expressions and characters.
- Invited to integrate the flow matching policy to Hugging Face LeRobot.
- The above works have been published in top journals and conferences: IROS, ROMAN.

---- **Robot-Assisted Dressing for Bedridden Patients**

- Deformable visual-tactile manipulation for garment grasping unfolding using deep Q learning from demonstration and model-based reinforcement learning.
- Sim-to-real garment physics learning and robot manipulation policy transfer in physics domain using self-supervised learning.

- Contrastive learning for human motion modeling, including personalized user impairments modeling and dancing performance assessment.
- Building large real and synthetic dataset of garment, including RGB-D, event images and pointcloud.
- Real-time user posture tracking using vision and haptic information with a probabilistic particle filter.
- Building controllers for hierarchical multi-task human-robot interaction.
- The above works have been published in top journals and conferences: Science Robotics, IEEE Transactions on Robotics, RA-L, ICRA, IROS, ICASSP, ICMA (Best Student Paper). Live demos for National Health Service, Apple, etc.
- Media covered by Bloomberg, The Times, Daily Mail, Telegraph , NewScientist, TechXplore.
- The Science Robotics paper has been selected as the Best Research Paper, Early Career Researcher, AI & Robotics Research Awards, held by TAS Hub, Responsible Ai UK, and the Royal Society.
- Based on above works, I have been awarded the UK Best PhD in Robotics Award 2020 1st place.
- The above works are supported by MURI UKRI Closed-Loop Multisensory Brain-Computer Interface for Enhanced Decision, TAS Trust Node UKRI Trustworthy Autonomous Systems Node in Trust, Innovate UK D-RISK Learning Edge Cases for Autonomous Vehicles.

Selected Publications

- **Composition of Conditional Diffusion Policies with Guided Sampling**
  Amirreza Razmjoo, Sylvain Calinon, Michael Gienger, Fan Zhang
  IROS 2025. (paper, website)

- **Generation of Real-time Robotic Emotional Expressions Learning from Human Demonstration in Mixed Reality**
  Chao Wang, Michael Gienger, Fan Zhang
  IROS 2025, Foundation Models for Robotic Design workshop. (paper, website)

- **Contrastive Self-Supervised Learning for Automated Multi-Modal Dance Performance Assessment**
  Yun Zhong, Fan Zhang, Yiannis Demiris
  ICASSP, 2023. (paper, video, code)

- **Visual-Tactile Learning of Garment Unfolding for Robot-Assisted Dressing**
  Fan Zhang, Yiannis Demiris
  RA-L, 2023. (paper, video)

- **Learning Grasping Points for Garment Manipulation in Robot-Assisted Dressing**
  Fan Zhang, Yiannis Demiris
  ICRA, 2020. (paper, video)

- **Personalized Robot-Assisted Dressing using User Modeling in Latent Spaces**
  Fan Zhang, Antone Cully, Yiannis Demiris
  IROS, 2017. (paper, video)

- **Preoperative Planning for the Multi-Arm Surgical Robot using PSO-GP-based Performance Optimization**
  Fan Zhang, Zhiyan Yuan, Zhijiang Du
  ICRA, 2017. (paper, video)

- **An under-actuated manipulation controller based on Workspace Analysis and Gaussian Processes**
  Fan Zhang, Yanyu Su, Xiang Zhang, Wie Dong, Zhijiang Du
  IROS, 2015. (paper, video)