Jie **Fan**

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jie.fan.0414@gmail.com
Knoxville, 37922, TN

Education

Scuola Superiore Sant'Anna (SSSA) & Istituto Italiano di Tecnologia (IIT) Pisa, Italy
Ph.D. in BioRobotics Oct. 2018 – Jun. 2023
Top 7th in the Global Robotics Ranking (2025)

- **Thesis title**: Morphological Characterization and Analysis of Thin, Continuum Structures based on Non-constant Curvature Clothoid Spiral
- **Supervisors**: **Prof. Barbara Mazzolai**, **Prof. Paolo Dario**
- **Co-Tutors**: **Prof. Francesco Visentin**, **Prof. Emanuela Del Dottore**

Institut National des Sciences Appliquées de Lyon (INSA de Lyon) Lyon, France
M.Sc. in Control System and Automation Engineering Jan. 2015 – Dec. 2016

- **Thesis title**: Receding Horizon Optimal Control (RHOC) for Linear Process Systems

Northwestern Polytechnical University (NWPU) Xi'An, China
B.S. in Computer Science Sep. 2009 – Jul. 2013

- **Thesis title**: 3D Scene Reconstruction and Localization of Indoor Environment and Pose Estimation of the Camera
- **Supervisor**: **Prof. Tao Yang**

Publications

Journal & Conference Proceedings

[IJCV '26] **Morphological Characterization of Thin, Continuum Biological Structures based on Non-constant Curvature Analysis** [DOI]
Jie Fan, Francesco Visentin, Barbara Mazzolai, and Emanuela Del Dottore
International Journal of Computer Vision, 2025.

[ICRA WS'25-1] **Toward Aligning Human and Robot Actions via Multi-Modal Demonstration Learning** [DOI]
Azizul Zahid, **Jie Fan**, Farong Wang, Ashton Dy, Sai Swaminathan, and Fei Liu
International Conference on Robotics and Automation, Worshop Human-Centered Robot Learning, 2025.

[ICRA WS'25-2] **Learning Latent Linear Dynamics from Surgical Videos via Koopman-based Visual Representations**
Luke Whatley, Andrei Cozma, **Jie Fan**, Hairong Qi, and Fei Liu
International Conference on Robotics and Automation, Workshop Robot-Assisted Medical Imaging, 2025.

[IWACIII '25] **Intelligent Detection Student Classroom Behavior Based on an Improved YOLOv8 Model** [DOI]
Meng Zhou, Huifang Zhang, Yuchao Peng, Jing Wang, Zhe Dong, and **Jie Fan**
The 9th International Workshop on Advanced Computational Intelligence and Intelligent Informatics, 2025.

[FRI '24] **Methods and instruments for the evaluation of food texture: Advances and perspectivese** [DOI]
Liwen Huang, **Jie Fan**, Chaoyue Han, Chengjin Du, Zhenbo Wei, and Dongdong Du.
Food Research International, 2024.

[JFE '23] **Nondestructive Evaluation of Harvested Cabbage Texture Quality Using 3D Scanning Technology** [DOI]

Dongdong Du, Yongkai Ye, Dongfang Li, **Jie Fan**, Rob BN Scharff, Jun Wang, and Fake Shan.
Journal of Food Engineering, 2023.

[LM '20] **An Image-Based Method for the Morphological Analysis of Tendrils with 2D Piece-Wise Clothoid Approximation Model** [DOI]
Jie Fan, Francesco Visentin, Emanuela Del Dottore and Barbara Mazzolai.
Biomimetic and Biohybrid Systems, 2020.

[Robosoft '20] **Image-based Approach to Reconstruct Curling in Continuum Structures** [DOI]
Jie Fan, Emanuela Del Dottore, Francesco Visentin and Barbara Mazzolai
3rd IEEE International Conference on Soft Robotics (RoboSoft), 2020.

Dissertations and Technical Papers

[PhD '23] **Morphological Characterization and Analysis of Thin, Continuum Structures based on Non-constant Curvature Clothoid Spiral – Taking Inspiration from Climbing Organs - Tendrils** [DOI]
Jie Fan, PhD Dissertation, SSSA & IIT, 2023.

[Master '16] **Receding Horizon Optimal Control (RHOC)**
Jie Fan, MSc Thesis, INSA de Lyon, 2016.

[Bachelor '13] **3D Scene Reconstruction and Localization of Indoor Environment and Pose Estimation of the Camera**
Jie Fan, BS Thesis, NWPU, 2013.
Outstanding Dissertation Award

[IARC '12] **Northwestern Polytechnical University Team Entry for the AUVSI International Aerial Robotics Competition** [PDF]
Fei Liu, Yinan Sang, Jie He, Jie Chen, **Jie Fan**, Ruichao Li, Haoyu Li
International Aerial Robotics Competition (IARC) Symposium, Aug. 2012.
Innovative Design Award & Excellent Team Culture Award

Patents

[CN103413352A] **3D Scene Reconstruction based on RGBD Multi-sensor Fusion** [PATENT]
Tao Yang, Yanning Zhang, **Jie Fan**, Sibing Wang, 2013.

[CN103413304A] **Virtual Camera Array Synthetic Aperture Imaging Based on Color Depth Fusion** [PATENT]
Tao Yang, Yanning Zhang, Sibing Wang, Wenguang Ma, Xiaomin Tong, **Jie Fan**, 2013.

[201310323475.X] **Hidden Target Imaging Method of Synthetic Aperture Imaging Under Unstructured Light Field**
Tao Yang, Yanning Zhang, **Jie Fan**, Sibing Wang, 2013.

Professional Experiences

Computer Vision Consultant & Subproject Leader — **Mar. 2023 – Now**
ROBO Medical Technology Co., Ltd — Hangzhou, China

- 3D reconstruction of upper digestive tract, abnormal lesion detection, localization, and segmentation for cancer early detection.
- Real-time visual pose estimation and tracking with optimization for tendon-driven articulated end-effector of surgical tools.
- Data acquisition and processing : CT/Endoscopic images detection, segmentation, labeling, keypoint feature tracking, etc.
- Collaboration on optical imaging with **Shenzhen Institute of Advanced Technology Chinese Academy of Sciences**.

PhD Thesis: Morphological Characterization and Analysis of Thin, Continuum Structures based on Non-constant Curvature Clothoid Spiral **Oct. 2018 – Jun. 2023**

Advisors: Dr. Barbara Mazzolai, Prof. Paolo Dario, Prof. Francesco Visentin, Prof. Emanuela Del Dottore Pisa, Italy

Bioinspired Soft Robotics@SSSA

- Modeling and shape representation of tendril-like continuum structures in 2D and 3D.
- Morphological analysis of biological tendril bending and coiling under external stimuli.
- Published several international conference and journal papers.

Master Thesis: Receding Horizon Optimal Control (RHOC) **Mar. 2016 – Aug. 2016**

Internship at LAGEPP Laboratory Lyon 1, France

Advisor: Prof. Chengzhong Xu

- Theoretical research on RHOC algorithm : controller, feasibility, stability.
- Implementation with trajectory tracking problem using Matlab/Simulink.

French Courses and Studies **Sep. 2013 – May. 2015**

Level: 0 to B2 Peking, China & Lyon, France

- Studied both in China and France at Alliance Française.
- Passed the TEF (Test d'évaluation de Français) exam for B2 level.

Undergraduate Thesis **Sep. 2012 – Jun. 2013**

Laboratory Research Assistant NWPU, Xi'an, China

- Extension and implementation of PTAM (Parallel Tracking and Mapping) algorithm.
- 3D real-time indoor environment reconstruction and localization (Visual SLAM).

Company Internship : Design of a Shopping Website "Ba Bao" **Jul. 2012 – Aug. 2012**

Team Leader Guo Xin'an National IT Center, Chengdu, China

- Database build and web pages design using ASP & .NET.
- Team report writing and presentation.
- Awarded **"Primary Network Engineer" Certificate**.

Lab Project: Panorama Scene Reconstruction and Ground Moving Target Detection and Tracking **Oct. 2011–Jun. 2012**

Laboratory Research Assistant NWPU, Xi'an, China

- Implementation of panoramic image stitching algorithm.
- Implementation of object detection and tracking algorithm.

Funded Student Project for Mobile Robot **Nov. 2010 – Jun. 2012**

Project Member NWPU, Xi'an, China

Financial support: *Chinese National Ministry of Education* (**5K ¥**)

- Implemented path planning algorithms for a mobile robot ($A^\star$, genetic algorithm, fuzzy control, etc.).
- Team report writing and presentation.

Competitions & Awards

Obtained **Full PhD Scholarship by IIT@SSSA** **Aug. 2018 – Jun. 2023**
Pisa, Italy

DJI RoboMasters Mobile Manipulation Challenge **Aug. 2014**
Team Coordinator Shenzhen, China

Dajiang Innovations Technology Co., Ltd (DJI)

- Implemented fast on-board object tracking and recognition algorithms.
- Design of autonomous mobile robot using VSLAM.
- Team daily report and coordination.

Awarded **Outstanding Dissertation Award of NWPU 2013, Top 3%** **Jun. 2013**
NWPU, Xi'an, China

International Aerial Robotics Competition (IARC) **Feb. 2012 – Aug. 2012**
Team Assistant Peking, China

- Mathematical modeling of a self-made low-cost laser rangefinder based on geometric calculation for environment mapping.
- Autonomous control of the quadrotor using environment mapping and detection algorithms (wall and window detection using point cloud analysis).
- Team paper writing (collaboratively) and UAV-Icarus team culture organizations.
- Awarded **Innovative Design & Excellent Team Culture**.

"Freescale Cup" National Smart Car Design Competition **Dec. 2010 – May. 2011**
Team Member NWPU, Xi'an, China

- Motion control of an intelligent car with vision-based feedback.
- Implementation of lane detection and path following algorithm using a CCD camera.
- Awarded **Third Prize** in NWPU Open 2011.

FIRA Robot Cup Team : Humanoid Robot Design and Robot Vision **Sep. 2010 – Aug. 2011**
Team Member NWPU, Xi'an, China

- Implementation of object detection and tracking algorithm (yellow ball).
- Developed robot vision architecture both under Windows and Linux platform.
- Awarded **First Prize** in Penalty Kick Competition of 13th FIRA China-Cup.

"Heart++" Youth Volunteer Service Team **Sep. 2010**
Awarded **Excellent Young Volunteer** NWPU, Xi'an, China

Mathematical Contest in Modeling of NWPU **May. 2010**
Team Leader NWPU, Xi'an, China

- optimization Design of express delivery route.
- Awarded **Second Prize** in NWPU Open 2010.

Grants

Endoscopic Ultrasound(EUS) surgical robot assistant system for an Intelligent Endoscopic Submucosal Dissection (ESD))
Shenzhen Science and Technology Innovation Commission Sep. 2024 – Aug. 2027
Subproject Leader: ROBO Medical Technology Co. Ltd
Project Funding: **3M ¥**

- Develop AI assistant system for Automated tumor detection and segmentation using Multi-modal (CT-Ultrasound-Endoscopic) data.
- Generate personalized plan for ESD optimal cutting paths based on tumor shape, location and invasion depth, aiming to minimize tissue damage and reduce surgery time.
- Contribute to the grant writing process, defense preparation, algorithms development.

Continuum Surgical Robotic Systems for Precise Diagnosis and Treatment of Digestive Tract Diseases
Shenzhen Science and Technology Innovation Commission Sep. 2023 – Dec. 2025
Subproject Leader: ROBO Medical Technology Co.Ltd
Project Funding: **2M ¥**

- Develop AI Analysis system for Abdominal 3D reconstruction, navigation and precision motion control for digestive tract diagnosis and treatment based on multi-mode data (CT-Endoscopic-Photo-ascoustic) fusion.
- Develop algorithm for tumor invasion depth, boundary identification and treatment guidance based on photo-acoustic imaging.
- Contribute to grant writing process, algorithms development, meetings and reports.

National College Student Innovation and Entrepreneurship Training Program

Nov. 2010 – Jun. 2012

Team Member
Project Funding: **1K ¥**

- Implemented path planning algorithms for mobile robot navigation.
- Participate the grant writing, team report writing and presentation.

Languages

English: Advanced, Fluent

Chinese: Native

French: Beginner