

FEI LIU

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 f4liu@ucsd.edu  [Personal Website](#)  [Google Scholar](#)

RESEARCH FOCUS

My research interests lie at the intersection of control theory and robotics, encompassing computational modeling, advanced control, AI, and integrated hardware/software for robotic autonomy. I focus on applying these in unstructured environments, including biomedical, manufacturing, industrial, natural, and household settings.

- **Computational Modeling:** includes mechanics, kinematics, dynamics, physics-informed simulation and constrained optimization.
- **Advanced Control and AI:** model-based and data-driven control, decision making, visual perception, human-in-the-loop.
- **Integrated real-time embedded system and hardware/software platforms co-design.**

EDUCATION

Institut National des Sciences Appliquées de Lyon ([INSA de Lyon](#))

Sep. 2013 – Sep. 2016

Ph.D. in Robotics

Lyon, France

*Top **Engineering school** in France (Grande école)*

*Top **51-75 worldwide** in Mechanical Engineering based on **ARWU (Shanghai) Ranking***

- Thesis title : Dual-user Haptic Training System
- Supervisors : Prof. Arnaud Lelevé, Prof. Tanneguy Redarce, Dr. Damien Eberard

Institut National des Sciences Appliquées de Lyon ([INSA de Lyon](#))

Sep. 2012 – Aug. 2013

Master of Science in Robotics

Lyon, France

- Thesis title : Teleoperation System Using Port-Hamiltonian Approach
- Supervisor : Prof. Arnaud Lelevé

Northwestern Polytechnical University ([NWPU](#))

Sep. 2008 – Jul. 2012

Bachelor of Science in Automation

Xi'an, China

*Top **151-200 worldwide** in all subjects based on **ARWU (Shanghai) Ranking***

*Top **22nd worldwide** in Mechanical Engineering in **ARWU (Shanghai) Ranking***

*Top **51-75 worldwide** in Automation and Control based on **ARWU (Shanghai) Ranking***

Speciality: Automation and Inertial Navigation

WORKING APPOINTMENTS

Postdoctoral Scholar

Dec. 2019 – present

Advanced Robotics and Controls Lab, University of California San Diego

San Diego, CA, USA

Advisor: Prof. [Michael Yip](#)

Senior Research Associate

Apr. 2019 – Nov. 2019

Biorobotics Institute, Scuola Superiore Sant'Anna

Pisa, Italy

Advisor: Prof. [Filippo Cavallo](#)

Research Associate/Postdoc

Center for Micro-BioRobotics, IIT@SSSA, Italian Institute of Technology

Mar. 2018 – Mar. 2019

Pisa, Italy

Senior Control Engineer & Project Director

[ROBO Medical Technology Co., Ltd](#)

Oct. 2016 – Feb. 2018

Shenzhen, China






PUBLICATIONS

Preprints & Submitted (* shares the first author)

1. [ICRA'24] [Fei Liu](#)*, Yutong Zhang*, Xiao Liang, Michael C. Yip. Achieving Autonomous Cloth Manipulation with Optimal Control via Differentiable Physics-Aware Regularization and Safety Constraints. *IEEE International Conference on Robotics and Automation (ICRA)*, 2024. *under review*  [ARXIV]
2. [ICRA'24] [Fei Liu](#)*, Xiao Liang*, Yutong Zhang, Yuelei Li, Shan Lin, Michael C. Yip. Real-to-Sim Deformable Object Manipulation: Optimizing Physics Models with Residual Mappings for Robotic Surgery. *IEEE International Conference on Robotics and Automation (ICRA)*, 2024. *under review*  [ARXIV]
3. [ICRA'24] Shan Lin, Albert Miao, Ali Alabiad, [Fei Liu](#), Kaiyuan Wang, Jingpei Lu, Florian Richter, Michael C. Yip. SuPerPM: A Large Deformation-Robust Surgical Perception Framework Based on Deep Point Matching Learned from Physical Constrained Simulation Data. *IEEE International Conference on Robotics and Automation (ICRA)*, 2024. *under review*  [ARXIV]
4. [ICRA'24] Christopher D'Ambrosia, Florian Richter, Zih-Yun Chiu, Nikhil Shinde, [Fei Liu](#), Henrik Christensen, Michael C. Yip. Robust Surgical Tool Tracking with Pixel-based Probabilities for Projected Geometric Primitives. *IEEE International Conference on Robotics and Automation (ICRA)*, 2024. *under review*  [PDF]
5. [T-RO] [Fei Liu](#), Mingen Li, Jingpei Lu, Entong Su, Michael C. Yip. Parameter Identification and Motion Control for Articulated Rigid Body Robots Using Differential Position-based Dynamics. *IEEE Transactions on Robotics (T-RO)*, 2023. *In revision (check for PDF preview)*  [ARXIV]
6. [RA-L] Kaiyuan Wang, Shan Lin, Jingpei Lu, [Fei Liu](#), Florian Richter, and Michael Yip. SUPER-Robust : A Robust Long-term Deformation Tracking and Reconstruction Framework for Endoscopic Videos. *IEEE Robotics and Automation Letters (RAL)*. *To submit*
7. [RA-L] Shan Lin, Jingpei Lu, [Fei Liu](#), Florian Richter, and Michael Yip. Deformation Tracking-based Online Jacobian Estimation for Deformable Object Manipulation. *IEEE Robotics and Automation Letters (RAL)*. *To submit*
8. [RA-L] [Fei Liu](#), Florian Richter, Michael C. Yip. Continuum Robot Shape Reconstruction and Tracking from Monocular Endoscopic Image Sequences. *IEEE Robotics and Automation Letters (RAL)*. *To submit*
9. [T-MECH] Zhaowei Yu, Dimitri A. Schreiber, [Fei Liu](#), Alexander M. Grant, Michael C. Yip. An Underwater Remote Teleoperation Robot Arm with Rolling Diaphragm Actuation and End Effector Force Reconstruction. *IEEE/ASME Transactions on Mechatronics (T-MECH)*. *Manuscript along with patent application (check for PDF preview)*  [PDF]

Journal & Book Articles

10. [RAL'23] [Fei Liu](#)*, Entong Su*, Jingpei Lu, Mingen Li, Michael C. Yip. Robotic Manipulation of Deformable Rope-like Objects Using Differentiable Compliant Position-based Dynamics. *IEEE Robotics and Automation Letters (RAL)*, 2023.  [DOI]


11. [T-BME'23] Xiao Liang, Shan Lin, [Fei Liu](#), Dimitri Schreiber, Michael C. Yip. ORRN: An ODE-based Recursive Registration Network for Deformable Respiratory Motion Estimation with Lung 4DCT Images. *IEEE Transactions on Biomedical Engineering (T-BME)*, 2023.  [\[doi\]](#)
12. [RAL'21] Florian Richter, Shihao Shen, [Fei Liu](#), Jingbin Huang, Emily K. Funk, Ryan K. Orosco, Michael C. Yip. Autonomous Robotic Suction to Clear the Surgical Field for Hemostasis Using Image-Based Blood Flow Detection. *IEEE Robotics and Automation Letters (RAL)*, 2021.  [\[doi\]](#) **Nominated for Best Paper Award at ICRA 2021**
13. [Applied Sciences'20] [Fei Liu](#)^{*}, Sarmad Mehrdad^{*}, Minh Tu Pham, Arnaud Lelevé, S. Farokh Atashzar. Review of Advanced Medical Telerobots. *Applied Sciences*, 2020.  [\[doi\]](#)
14. [Haptic Interfaces'19] Angel R. Licona, [Fei Liu](#), David Pinzon, Ali Torabi, Pierre Boulanger, Arnaud Lelevé, Richard Moreau, Minh Tu Pham, Mahdi Tavakoli, Troy McDaniel. Applications of Haptics in Medicine. *Haptic Interfaces for Accessibility, Health, and Enhanced Quality of Life*, Nov. 2019.  [\[doi\]](#)
15. [Robotica'19] [Fei Liu](#), Angel Ricardo Licona, Arnaud Lelevé, Damien Eberard, Minh Tu Pham, Tanneguy Redarce. An Energy-Based Approach for n-dof Passive Dual-user Haptic Training Systems. *Robotica*, 2019.  [\[doi\]](#)

Conference Proceedings

16. [IROS IPPC'23] [Fei Liu](#), Michael C. Yip. Shape Reconstruction of Soft, Continuum Robots using Differentiable Rendering with Geometrical Shape Primitive. *IROS Workshop on Integrated Perception, Planning, and Control for Physically and Contextually-Aware Robot Autonomy*, 2023.  [\[PDF\]](#)
17. [IROS IPPC'23] [Fei Liu](#)^{*}, Xiao Liang^{*}, Yutong Zhang, Yuelei Li, Michael C. Yip. Bridging Real-to-Sim Gaps through Online Material Property Optimization with Perception-Enabled Residual Mapping. *IROS Workshop on Integrated Perception, Planning, and Control for Physically and Contextually-Aware Robot Autonomy*, 2023.  [\[PDF\]](#)
18. [ICRA'23] [Fei Liu](#)^{*}, Jingpei Lu^{*}, Michael C. Yip. Image-based Pose Estimation and Shape Reconstruction for Robot Manipulators and Soft, Continuum Robots via Differentiable Rendering. *IEEE International Conference on Robotics and Automation (ICRA)*, 2023.  [\[doi\]](#)
19. [ICRA'23] Neelay Joglekar, [Fei Liu](#), Ryan Orosco, Michael C. Yip. Suture Thread Spline Reconstruction from Endoscopic Images for Robotic Surgery with Reliability-driven Keypoint Detection. *IEEE International Conference on Robotics and Automation (ICRA)*, 2023.  [\[doi\]](#)
20. [ICRA'21] [Fei Liu](#)^{*}, Zihan Li^{*}, Yuhai Han, Jingpei Lu, Florian Richter, Michael C. Yip. Real-to-Sim Registration of Deformable Soft-Tissue with Position-Based Dynamics for Surgical Robot Autonomy. *IEEE International Conference on Robotics and Automation (ICRA)*, 2021.  [\[doi\]](#)
21. [ICRA'21] [Fei Liu](#)^{*}, Jingbin Huang^{*}, Florian Richter, Michael C. Yip. Model-Predictive Control of Blood Suction for Surgical Hemostasis using Differentiable Fluid Simulations. *IEEE International Conference on Robotics and Automation (ICRA)*, 2021.  [\[doi\]](#)
22. [ACIRS'21] Sajiv Shah, Ayaan Haque, [Fei Liu](#). Simulated Data Generation Through Algorithmic Force Coefficient Estimation for AI-Based Robotic Projectile Launch Modeling. *The 6th Asia-Pacific Conference on Intelligent Robot Systems (ACIRS)*, 2021.  [\[doi\]](#)
23. [IROS'20] Jacob J. Johnson, Linjun Li, [Fei Liu](#), Ahmed H. Qureshi, Michael C. Yip. Dynamically constrained motion planning networks for non-holonomic robots. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2020.  [\[doi\]](#)

24. [IROS CRS'20] Yunhai Han, [Fei Liu](#), Michael C. Yip. A 2D Surgical Simulation Framework for Tool-Tissue Interaction. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) Workshop on Cognitive Robotic Surgery*, 2020.  [\[ARXIV\]](#)
25. [ICMCE'18] Angel Ricardo Licona Rodriguez, [Fei Liu](#), Arnaud Lelevé, Damien Eberard, Minh Tu Pham. Collaborative Hands-on Training on Haptic Simulators. *7th International Conference on Mechatronics and Control Engineering*, Nov. 2018.  [\[DOI\]](#)
26. [IROS'16] [Fei Liu](#), Arnaud Lelevé, Damien Eberard, Tanneguy Redarce. An Energy Based Approach for Passive Dual-user Haptic Training Systems. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Oct. 2016.  [\[DOI\]](#)
27. [EBMC'15] [Fei Liu](#), Arnaud Lelevé, Damien Eberard, Tanneguy Redarce. A Dual-user Teleoperation System with Online Authority Adjustment for Haptic Training. *37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, Aug. 2015.  [\[DOI\]](#)
28. [MESROB'15] [Fei Liu](#), Arnaud Lelevé, Damien Eberard, Tanneguy Redarce. A Dual-user Teleoperation System with Adaptive Authority Adjustment for Haptic Training. *4th International Workshop on Medical and Service Robots*, Jul. 2015.  [\[DOI\]](#)
29. [IARC'12] [Fei Liu](#), Yinan Sang, Jie He, Jie Fan, Ruichao Li, Xiongyi Cui, Haoyu Li, Jie Chen. Northwestern Polytechnical University Team Entry for the 2012 AUVSI International Aerial Robotics Competition. *International Aerial Robotics Competition (IARC) Symposium*, Aug. 2012.  [\[PDF\]](#)
30. [MCM'11] [Fei Liu](#), Haoyu Li, Li Li. Modeling of the Snowboard Course, International Mathematical Contest in Modeling (MCM) Symposium, Apri. 2011

Dissertations

1. [PHD] [Fei Liu](#), Dual-user Haptic Training System,  [\[PDF\]](#), Ph.D. Dissertation, INSA de Lyon, 2017.
2. [Master] [Fei Liu](#), Cooperative Haptic Hands-on Minimally Invasive Surgery (MIS) Trainer, M.Sc. Thesis, INSA de Lyon, 2013.

PATENTS

1. [Fei Liu](#), Michael C. Yip, Florian Richter. Real-to-Simulation Matching of Deformable Soft Tissue and Other Objectss with Position-based Dynamics for Robot Control.  [PCT/US22/22820](#). 2022.
2. Jialin Yang, Qinghao Hu, Jianxiao Chen, [Fei Liu](#), Fei Long. Flexible Mechanical Arm and Surgical Equipment.  [CN 215651505 U](#). 2021.
3. Jialin Yang, Qinghao Hu, Jianxiao Chen, [Fei Liu](#), Fei Long, Luchen Shen, Liyang Lin. Main Hand Control Unit and Auxiliary Robot for Digestive Tract Operation.  [CN 216603056 U](#). 2021.
4. Jialin Yang, Qinghao Hu, Jianxiao Chen, [Fei Liu](#), Fei Long, Luchen Shen, Liyang Lin. Main Operator and Force Feedback Device.  [CN 215273291 U](#). 2021.
5. Jialin Yang, Qinghao Hu, Jianxiao Chen, [Fei Liu](#), Fei Long, Luchen Shen, Liyang Lin. Operation Executor.  [CN 114129228 A](#). 2021.
6. Jialin Yang, Qinghao Hu, Jianxiao Chen, [Fei Liu](#), Fei Long, Luchen Shen, Liyang Lin. Operation Executor.  [CN 114176660 A](#). 2021.
7. Junjie Gao, [Fei Liu](#), Shunzheng Meng, Sihao Zuo, Jialin Yang. A Kind of Flexible Joint Mechanism.  [CN 209713128 U](#). 2018.
8. Jialin Yang, Xilong Hou, Lijuan Yao, [Fei Liu](#). Lifting Operation Instrument.  [CN 209574762 U](#). 2018.

RESEARCH EXPERIENCE

Advanced Robotics and Controls Lab, UCSD

Dec. 2019 – present

PostDoc, [ARCLab](#)

San Diego, CA, USA

- Developing the unified modeling, simulation, and control of deformable, rigid, articulated, fluid object using position-based dynamics (PBD), in particular for articulated manipulation (impedance control, trajectory optimization, rope shape control etc) and surgical applications (soft tissue, membrane, blood and tools).
- Differentiability for the PBD simulation using adjoint method based on chain-rule and Autodiff tools.
- Developing our constrained-based solver and software architecture in conjunction with NVIDIA Flex and Warp.
- Real-to-sim transfer techniques using non-rigid perception, registration, and tracking.
- Closed-loop controller design, motion planning and validation using field robots, such as da Vinci Research Kit (DVRK), 7-dof Baxter Robotic Arm, 7-dof Franka Panda Arm, a catheter robot, a non-holonomic mobile robot, a hydraulic-driven underwater robotic arm, haptic device etc.
- **Continuum Robot Project:** Shape reconstruction using projection of geometrical primitives (cylinders, circles etc.), differentiable rendering and perform visual servoing control.

Biorobotics Institute, Scuola Superiore Sant'Anna

Apr. 2019 – Nov. 2019

Senior Research Engineer, [Assistive Robotics Lab](#)

Pisa, Italy

- Simultaneous localization and mapping (SLAM) of mobile robotic platform under ROS.
- Autonomous initialization through computer vision approaches using aruco markers (QR codes).
- Autonomous navigation of the mobile robot including path planning, obstacle avoidance.
- Shared control theory development and implementation of the mobile platform.
- Design of PHP/HTML-based web user interface.
- Experimental tests in Verona, Italy.

Center for Micro-BioRobotics IIT@SSSA

Mar. 2018 – Apr. 2019

Research Engineer/Postdoc, [Istituto Italiano di Tecnologia](#)

Pisa, Italy

- Modeling and control KUKA LWR4+ robotic arm using ROS and Gazebo: motion control, trajectory planning, master-slave
- Modeling and control of flexible continuum surgical tool: static tension-deflection model, Euler-Lagrange dynamics, port-Hamiltonian based control.
- Analysis of several continuum structure prototypes: variation of design (notches, single-backbone, articulated).
- Develop teleoperation framework using haptic devices (Sigma.7).
- Preliminary study of simulation platform for flexible surgical tools using SOFA ([Simulation Open Framework Architecture](#)).

Senior Control Engineer & Project Director

Oct. 2016 – Feb. 2018

[ROBO Medical Technology Co., Ltd](#)

Shenzhen, China

- Develop teleoperation of a single-port abdominal robotics surgical system using haptic devices (i.e., PHANTOM Omni, Novint Falcon, Omega.3) and joysticks (i.e., Logitech G Extreme 3D, Microsoft Xbox).
- Modeling and control of a tendon-driven articulated end-effector: kinematics, motion control, master-slave.
- Model-based uncertainties identification and compensation: hysteresis, friction.

- Modeling and control of a 4 DOFs positioning arm (parallel mechanisms) : kinematics, motion control, master-slave.
- Calculation of the RCM point of positioning arm.
- Modeling and control (based on gait analysis) of a powered lower limb orthosis for rehabilitation.
- SLAM algorithm (build on ROS) of autonomous mobile robots for medical transportation in hospitals.

PHD Thesis : Dual-user Haptic Training System

Sep. 2012 – Sep. 2016

Advisors: Prof. Tanneguy Redarce, Prof. Arnaud Lelevé, Dr. Damien Eberard

INSA de Lyon, France

- Focused on modeling and control aspects with/without time delays.
- Developed real-time experiments both with Matlab/Simulink, ROS and Chai3D.
- Published three international conference papers, and two journal papers.

Group Leader : DJI RoboMasters Mobile Manipulation Challenge

Aug. 2014

Design of Autonomous Mobile Robot Using SLAM and Computer Vision Approach.

Shenzhen, China

Dajiang Innovations Technology Co., Ltd (DJI)

- Developed SLAM framework for mobile robots (chariots) u on ROS.
- Implemented fast on-board object tracking and recognition algorithms.
- Developed multi-robot coordination and searching algorithms.

Master Thesis : Cooperative Haptic Hands-on MIS Trainer

Sep. 2012 – Aug. 2013

Master Internship at Ampère Laboratory

INSA de Lyon, France

- Designed teleoperation system using port-Hamiltonian approach.
- Implemented control algorithms with haptic devices (PHANTOM Omni).
- Developed real-time experiments using Matlab/Simulink.

Team Leader : International Aerial Robotics Competition (IARC)

Aug. 2012

A Low Cost Autonomous Quadrotor UAV-Icarus

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 algorithm (wall and window detection using point cloud analysis).
- Awarded **Innovative Design**.

Undergraduate Internship

Sep. 2011 – Jun. 2012

Image Meta-data Feature Extraction for Content-Context Based Image Retrieval

NPU, Xi'an, China

- Implemented image processing and classification algorithms.

Team Leader : International Mathematical Contest in Modeling (MCM)

Feb. 2012

Optimal Design of U-shaped Snowboard Course

NPU, Xi'an, China

- Awarded **Meritorious Winner** (First Prize Mention).

Team Leader : Robocup 3D Simulation Group

Sep. 2010 – Jun. 2012

Robocup Soccer Center of NPU, Simulation Robots of Robocup Soccer

NPU, Xi'an, China

- Designed gait algorithm of NAO (Humanoid) robot.
- Developed control strategies for simulated soccer competition under linux platform.
- Awarded **Third Prize** in China Open 2011.

Project Leader : Student Project of Chinese Ministry of Education <i>Mining Methods for Gene Expression Profile Classification</i> <ul style="list-style-type: none"> Implemented statistical and computing algorithms related to data mining. 	Nov. 2011 – Jun. 2012 <i>NPU, Xi'an, China</i>
Project Leader : Student Project of Chinese Ministry of Education <i>Path Planning of Mobile Robot</i> <ul style="list-style-type: none"> Implemented path planning algorithms of mobile robot (A^*, genetic algorithm, fuzzy control etc. 	Nov. 2010 – Jun. 2011 <i>NPU, Xi'an, China</i>
“Freescale Cup” National Smart Car Design Competition <i>Design and Control of an Intelligent Car for Path Following</i> <ul style="list-style-type: none"> Awarded Third Prize in NPU Open 2011. 	Dec. 2010 – May. 2011 <i>NPU, Xi'an, China</i>
Laboratory Research Assistant <i>Supervisor: Prof. Suilao Li, College of Automation</i> <ul style="list-style-type: none"> Navigation of Unmanned Aerial Vehicle (UAV) Based on Digital Map Design of Intelligent Vehicle and Autonomous Navigation 	Sep. 2009 – Jun. 2011 <i>NPU, Xi'an, China</i>

SUPERVISION & MENTORING ACTIVITIES

PhD Students

Yu Huan , BioRobotics Institute, Scuola Superiore Sant’Anna <ul style="list-style-type: none"> Topic: Design and control of flexible miniature surgical tools (continuum robot) Achievement: Published papers at TBME/TMECH 	Mar. 2018 - Mar. 2019
Xiao Liang , CSE, UCSD <ul style="list-style-type: none"> Topic: Reconstruction of 4D lung motion using neural-ODE integration Achievement: Published papers at TBME/IROS 2023, and submitted papers for ICRA 2024 	Sep. 2021 – present

Master Students

Chung-Pang (Ben) Wang , CSE, UCSD <ul style="list-style-type: none"> Topic: SE(3)-Equivariant Mappings for Data-efficient Learning of Robot Trajectory Planning 	Sept. 2023 – present
Yutong Zhang , CSE, UCSD <ul style="list-style-type: none"> Topic: Simulator using position-based dynamics for different objects (rigid, cloth, deformable), and rendering with libIGL/openGL Achievement: Submitted papers for ICRA 2024 	Jan. 2021 – present
Wangyi Liu , ECE, UCSD <ul style="list-style-type: none"> Topic: SE(3)-Equivariant Mappings for Data-efficient Learning of Robot Trajectory Planning Achievement: Working on a paper for IEEE RAL 	July 2022 – Aug 2023
Alexander Luke , MAE, UCSD <ul style="list-style-type: none"> Topic: Motion control and calibration of a steerable continuum robotic catheter with clinical trials Achievement: Demos with animals trails 	Sep. 2021 – Jun 2023
Junming Wu , ECE, UCSD <ul style="list-style-type: none"> Topic: Bi-manual close-loop control of dual-arm suturing using physical-based simulation Achievement: Demos on the dVRK robot 	Sep. 2021 – Dec. 2022
Haaris Rahman , CSE, UCSD	Sep. 2021 – Mar. 2022

- **Topic:** Reconstruction of deformable soft tissue using occupancy flow
 - **Achievement:** Demos in our PBD simulator
- Chong He**, MAE, UCSD Sep. 2021 – Aug. 2022
- **Topic:** Shape reconstruction of catheter robot using monocular images
 - **Achievement:** Drafted a paper for IEEE RAL
- Yunhai Han**, MAE, UCSD Jan. 2021 – Jan. 2022
- **Topic:** Deformable objects simulation framework using constraints-based solver
 - **Achievement:** Published paper at ICRA 2021/IROS 2021
- Mingen Li**, ECE, UCSD Jan. 2021 – Jan. 2022
- **Topic:** Simulation and control of articulated robots using position-based dynamics
 - **Achievement:** Submitted a paper to IEEE TRO
- Entong Su**, ECE, UCSD Jan. 2021 – Jan. 2022
- **Topic:** Simulation and control of rope-like objects using position-based dynamics
 - **Achievement:** Published a paper at IEEE RAL
- Harleen Singh**, ECE, UCSD Jan. 2020 – Jul. 2021
- **Topic:** Modeling of the catheter continuum robot for position and orientation motor control
 - **Achievement:** Demos with live animals trials
- Zihan Li**, ECE, UCSD Jan. 2020 – Nov. 2020
- **Topic:** Registration method for real-to-sim transfer applications of deformable tissue manipulation
 - **Achievement:** Published a paper at ICRA 2021
- Jingbin Huang**, ECE, UCSD Mar. 2020 – Nov. 2020
- **Topic:** Modeling and control of surgical tool for suction based simulation of blood fluid
 - **Achievement:** Published a paper at ICRA 2021
- Sean Liu**, ECE, UCSD Jun. 2020 – Sep. 2020
- **Topic:** Reconstruction of a catheter robot shape using projection of geometrical primitives
 - **Achievement:** Demos with simulation in Blender

Undergraduate Students

- Yuelel (Tina) Li**, Mathematics, UCSD Apr. 2023 – present
- **Topic:** Learning an intrinsic neural mappings from mesh to point cloud for registration of soft tissue
 - **Achievement:** Submitted a paper at ICRA 2024
- Neelay Joglekar**, ECE, UCSD Jan. 2021 – present
- **Topic:** Dynamic model of rope-like objects using cosserat rod theory and surgical thread reconstruction
 - **Achievement:** Published a paper at ICRA 2023
- Bryan Yuan**, ECE, UCSD Jan. 2021 – May 2022
- **Topic:** Backward gradients computation and validation for position-based dynamics constraints
 - **Achievement:** Integration in our PBD simulator
- Nemanja Babic**, Research Internship, University of Ottawa & INSA de Lyon Jan. 2021 – May 2022
- **Topic:** Simulation of haptic systems using CHAI3D
 - **Achievement:** Demos with simulation in CHAI3D

High School Student

- Ayaan Haque**, Saratoga High School, California Jan. 2021 – Jul. 2021
- **Topic:** Simulated data generation through algorithmic force coefficient estimation
 - **Achievement:** Published a paper at IEEE ACIRS 2021
- Sajiv Shah**, Saratoga High School, California Jan. 2021 – Jul. 2021
- **Topic:** Simulated data generation through algorithmic force coefficient estimation
 - **Achievement:** Published a paper at IEEE ACIRS 2021

ACADEMIC SERVICES

Journal/Conference Reviewer

2016 – present

- *IEEE Transactions on Robotics (T-RO)*
- *IEEE Transactions on Mechatronics (T-MECH)*
- *IEEE Robotics and Automation Letters (RAL)*
- *IEEE Transactions on Medical Robotics and Bionics*
- *The International Journal of Robotics Research (IJRR)*
- *Control Engineering Practice*
- *Robotica*
- *Journal of Mechanisms and Robotics (JMR)*

Conference Reviewer

2015 – present

- *International Conference on Robotics and Automation (ICRA)*
- *International Conference on Intelligent Robots and Systems (IROS)*
- *American Control Conference (ACC)*
- *International Conference on Learning Representations (ICLR)*
- *IFAC Workshop on Lagrangian and Hamiltonian Methods for Nonlinear Control (LHMNC)*
- *IEEE RAS/EMBS Conference on Biomedical Robotics and Biomechatronics (BioRob)*

Volunteer

- *20th World Olympic Collectors Fair, Lausanne, Switzerland. May. 2014*
- *Heart++ : High School Student Course Assistance, Xi'an, Northwestern Polytechnical University. 2018-2012*

TALKS AND PRESENTATION

- “Shape Reconstruction of Soft, Continuum Robots using Differentiable Rendering with Geometrical Shape Primitive”, *IEEE IROS, Detroit, US, 2023.*
- “Image-based Pose Estimation and Shape Reconstruction for Robot Manipulators and Soft, Continuum Robots via Differentiable Rendering”, *IEEE ICRA, London, UK, 2023.*
- “Real-to-Sim Registration of Deformable Soft-Tissue with Position-Based Dynamics for Surgical Robot Autonomy”, *IEEE ICRA, Xi'An, China, 2021.*
- “Continuum Robot Shape Reconstruction and Tracking from Monocular Endoscopic Images”, *Emerging Frontiers in Research and Innovation (EFRI), US, 2021.*
- “A Dual-user Teleoperation System with Online Authority Adjustment for Haptic Training”, *IEEE EMBC, Milano, Italy, 2015.*
- *37th EMBS Ignite Sessions, Milano, Italy, 2015*
- “Dual-user Haptic Teleoperation System”, *7th Summer School on Surgical Robotics (SSSR), Montpellier, France, 2015.*
- “A Dual-user Teleoperation System with Adaptive Authority Adjustment for Haptic Training”, *IFTToMM MESROB, Nantes, France, 2015.*

SUPPORTED GRANTS

CAREER: Contextually Informed Autonomous Robotic Surgery

Mar. 2021 – Present, *National Science Foundation (NSF)*

Grant No. : 2045803/PI: Prof. Michael Yip

Role : Postdoc Researcher

- Topic : Modeling and simulation of soft tissue deformation and interactive robotic tool control.

EFRI C3 SoRo: Safe Medical Continuum Robots: Sensing, Control and Fabrication

Nov. 2019 – 2013, *National Science Foundation (NSF)*

Grant No. : 1935329/PI: Prof. Michael Yip

Role : Postdoc Researcher

- Topic : Shape reconstruction of catheter robots using endoscopic images and visual-servoing control.

Special Foundation for Intelligent Robots: Creation and Kinematic Model of Modular Variable Stiffness Continuum Flexible Actuator

Mar. 2019 – Nov. 2021, *Ministry of Science and Technology (MOST) of China*

Grant No. : 2018YFB1307700/PI: ROBO Medical Technology Co. Ltd

Role : Sub-Project PI

- Topic : Modeling and control of a continuum flexible ESD robot using curvature-based model.

HONORS AND AWARDS

Paper Awards

2021 Nominated for **Best Paper** at IEEE International Conference on Robotics and Automation (ICRA)

Individual Awards

2012 **Innovative Design Award** at International Aerial Robotics Competition (IARC)

2012 **First Prize** at International Mathematical Contest in Modeling (MCM)

2011 **Third Prize** in Robocup China Open 2011

2008-2012 Yearly **Distinguished Student Scholarship** of Northwestern Polytechnical University

LANGUAGES

Chinese: Native

English: Advanced, Fluent

French: Beginner A2

Italian: Beginner Classroom