Fei Liu

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Research Interests

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 optimization.
- **Advanced Control and AI**: model-based and data-driven control, inverse problems, perception, human-in-the-loop.
- **Integrated Embedded and Real-Time System** : accelerated computing, cyber-physical systems, mechatronics.

Appointments

University of California San Diego (UCSD) — San Diego, US
Postdoctoral Scholar — Dec. 2019 – present

- Advanced Robotics and Controls Lab
- **Supervisor**: Prof. Michael Yip

Biorobotics Institute, Scuola Superiore Sant'Anna (SSSA) — Pisa, Italy
Senior Research Associate/Postdoc — Apr. 2019 – Nov. 2019

- Assistive Robotics Laboratory
- **Supervisor**: Prof. Filippo Cavallo

Bioinspired Soft Robotics, Italian Institute of Technology (IIT) — Pisa, Italy
Research Associate/Postdoc — Mar. 2018 – Mar. 2019

ROBO Medical Technology Co., Ltd — Shenzhen, China
Senior Control Engineer & Project Director — Oct. 2016 – Feb. 2018

Education

Institut National des Sciences Appliquées de Lyon (INSA de Lyon) — Lyon, France
Ph.D. in Robotics — Sep. 2013 – Sep. 2016
Top Engineering school in France (Grande école)
Top 51-75 worldwide in Mechnical Engineering based on ARWU Ranking

- **Thesis**: 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) — Lyon, France
Master of Science in Control System and Automation Engineering — Sep. 2012 – Aug. 2013

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

Northwestern Polytechnical University (🏛 NWPU) Xi'An, China
Bachelor of Science in Control System and Automation Engineering Sep. 2008 – Jul. 2012
Top 22nd worldwide in Mechnical Engineering in ARWU Ranking
Top 51-75 worldwide in Automation and Control based on ARWU Ranking

- **Speciality**: Automation and Inertial Navigation

Publications

Preprints & Submitted (⋆ shares the first author)

[TRO'24] **Parameter Identification and Motion Control for Articulated Rigid Body Robots Using Differential Position-based Dynamics** [arXiv]
Fei Liu, Mingen Li, Jingpei Lu, Entong Su, Michael C. Yip
IEEE Transactions on Robotics (T-RO).
In Revision (check for PDF preview)

[ICRA'24] **Achieving Autonomous Cloth Manipulation with Optimal Control via Differentiable Physics-Aware Regularization and Safety Constraints** [arXiv]
Fei Liu⋆, Yutong Zhang⋆, Xiao Liang, Michael Yip
IEEE International Conference on Robotics and Automation (ICRA), 2024.
Under Submission

[ICRA'24] **Real-to-Sim Deformable Object Manipulation: Optimizing Physics Models with Residual Mappings for Robotic Surgery** [arXiv]
Fei Liu⋆, Xiao Liang⋆, Yutong Zhang, Yuelei Li, Shan Lin, Michael Yip
IEEE International Conference on Robotics and Automation (ICRA), 2024.
Under Submission

[ICRA'24] **SuPerPM: A Large Deformation-Robust Surgical Perception Framework Based on Deep Point Matching Learned from Physical Constrained Simulation Data** [arXiv]
Shan Lin, Albert Miao, Ali Alabiad, **Fei Liu**, Kaiyuan Wang, Jingpei Lu, Florian Richter, Michael Yip
IEEE International Conference on Robotics and Automation (ICRA), 2024.
Under Submission

[ICRA'24] **Robust Surgical Tool Tracking with Pixel-based Probabilities for Projected Geometric Primitives** [pdf]
Christopher D'Ambrosia, Florian Richter, Zih-Yun Chiu, Nikhil Shinde, **Fei Liu**, Henrik Christensen, Michael C. Yip
IEEE International Conference on Robotics and Automation (ICRA), 2024.
Under Submission

[T-MECH] **An Underwater Remote Teleoperation Robot Arm with Rolling Diaphragm Actuation and End Effector Force Reconstruction** [pdf]
Zhaowei Yu, Dimitri A. Schreiber, **Fei Liu**, Alexander M. Grant, Michael Yip

IEEE/ASME Transactions on Mechatronics (T-MECH).
Under Patent Application (check for PDF preview)

Journal & Book Articles

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

[T-BME'23] **ORRN: An ODE-based Recursive Registration Network for Deformable Respiratory Motion Estimation with Lung 4DCT Images** [DOI]
Xiao Liang, Shan Lin, **Fei Liu**, Dimitri Schreiber, Michael Yip
IEEE Transactions on Biomedical Engineering (T-BME), 2023.

[RA-L'21] **Autonomous Robotic Suction to Clear the Surgical Field for Hemostasis Using Image-Based Blood Flow Detection** [DOI]
Florian Richter, Shihao Shen, **Fei Liu**, Jingbin Huang, Emily K. Funk, Ryan K. Orosco, Michael Yip
IEEE Robotics and Automation Letters (RA-L), 2023.
Best Paper Award Nomination at ICRA 2021

[App.Sci.'20] **Review of Advanced Medical Telerobots** [DOI]
Fei Liu[⋆], Sarmad Mehrdad[⋆], Minh Tu Pham, Arnaud Lelevé, S. Farokh Atashzar
Applied Sciences, 2020.
Invited Article

[Robotica'19] **An Energy-Based Approach for n-dof Passive Dual-user Haptic Training Systems** [DOI]
Fei Liu, Angel Ricardo Licona, Arnaud Lelevé, Damien Eberard, Minh Tu Pham, Tanneguy Redarce
Robotica, 2019.

[Hap.Int.'19] **Applications of Haptics in Medicine** [DOI]
Angel R. Licona, **Fei Liu**, David Pinzon, Ali Torabi, Pierre Boulanger, Arnaud Lelevé
Haptic Interfaces for Accessibility, Health, and Enhanced Quality of Life, 2019.

Conference Proceedings & Workshops

[ICRA'23] **Image-based Pose Estimation and Shape Reconstruction for Robot Manipulators and Soft, Continuum Robots via Differentiable Rendering** [DOI]
Fei Liu[⋆], Jingpei Lu[⋆], Michael Yip
IEEE International Conference on Robotics and Automation (ICRA), 2023.

[ICRA'23] **Suture Thread Spline Reconstruction from Endoscopic Images for Robotic Surgery with Reliability-driven Keypoint DetectionRendering** [DOI]
Neelay Joglekar, **Fei Liu**, Ryan Orosco, Michael Yip

IEEE International Conference on Robotics and Automation (ICRA), 2023.

[IROS IPPC'23] **Shape Reconstruction of Soft, Continuum Robots using Differentiable Rendering with Geometrical Shape Primitive** [LINK]
Fei Liu, Michael Yip
IROS Workshop on Integrated Perception, Planning, and Control for Physically and Contextually-Aware Robot Autonomy, 2023.

[IROS IPPC'23] **Bridging Real-to-Sim Gaps through Online Material Property Optimization with Perception-Enabled Residual Mapping** [LINK]
Fei Liu*, Xiao Liang*, Yutong Zhang, Yuelei Li, Michael Yip
IROS Workshop on Integrated Perception, Planning, and Control for Physically and Contextually-Aware Robot Autonomy, 2023.

[ICRA'21] **Real-to-Sim Registration of Deformable Soft-Tissue with Position-Based Dynamics for Surgical Robot Autonomy** [DOI]
Fei Liu*, Zihan Li*, Yuhai Han, Jingpei Lu, Florian Richter, Michael Yip
IEEE International Conference on Robotics and Automation (ICRA), 2021.

[ICRA'21] **Model-Predictive Control of Blood Suction for Surgical Hemostasis using Differentiable Fluid Simulations** [DOI]
Fei Liu*, Jingbin Huang*, Florian Richter, Michael Yip
IEEE International Conference on Robotics and Automation (ICRA), 2021.

[ACIRS'21] **Simulated Data Generation Through Algorithmic Force Coefficient Estimation for AI-Based Robotic Projectile Launch Modeling** [DOI]
Sajiv Shah, Ayaan Haque, **Fei Liu**
IEEE 6th Asia-Pacific Conference on Intelligent Robot Systems (ACIRS), 2021.

[IROS'20] **Dynamically Constrained Motion Planning Networks for Non-Holonomic Robots** [DOI]
Jacob J. Johnson, Linjun Li, **Fei Liu**, Ahmed H. Qureshi, Michael Yip
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.

[IROS CRS'20] **A 2D Surgical Simulation Framework for Tool-Tissue Interaction** [ARXIV]
Yunhai Han, **Fei Liu**, Michael Yip
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) Workshop on Cognitive Robotic Surgery, 2020.

[ICMCE'18] **Collaborative Hands-on Training on Haptic Simulators** [DOI]
Angel Ricardo Licona Rodriguez, **Fei Liu**, Arnaud Lelevé, Damien Eberard, Minh Tu Pham
7th International Conference on Mechatronics and Control Engineering, Nov. 2018.

[IROS'16] **An Energy Based Approach for Passive Dual-user Haptic Training Systems** [DOI]
Fei Liu, Arnaud Lelevé, Damien Eberard, Tanneguy Redarce
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Oct. 2016.

[EBMC'15] **A Dual-user Teleoperation System with Online Authority Adjustment for Haptic Training** [DOI]

Fei Liu, Arnaud Lelevé, Damien Eberard, Tanneguy Redarce
37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Aug. 2015.

[MESROB'15] **A Dual-user Teleoperation System with Adaptive Authority Adjustment for Haptic Training** [DOI]
Fei Liu, Arnaud Lelevé, Damien Eberard, Tanneguy Redarce
4th International Workshop on Medical and Service Robots, Jul. 2015.

In-Preparation (with results)

[RAL] **Continuum Robot Shape Reconstruction and Tracking from Monocular Endoscopic Image Sequences**
Fei Liu, Florian Richter, Michael Yip
IEEE Robotics and Automation Letters (RAL). to submit

[T-RO] **SuPer-Robust: A Robust Long-term Deformation Tracking and Reconstruction Framework for Endoscopic Videos**
Kaiyuan Wang, Shan Lin, Jingpei Lu, **Fei Liu**, Florian Richter, and Michael Yip
IEEE Transactions on Robotics (TRO). to submit

[RAL] **Deformation Tracking-based Online Jacobian Estimation for Deformable Object Manipulation**
Shan Lin, Jingpei Lu, **Fei Liu**, Florian Richter, and Michael Yip
IEEE Robotics and Automation Letters (RAL). to submit

Dissertations and Technical Papers

[PHD'16] **Dual-user Haptic Training System** [LINK]
Fei Liu, PhD Dissertation, INSA de Lyon, 2016.

[Master'13] **Teleoperation System Using Port-Hamiltonian Approach**
Fei Liu, MSc Thesis, INSA de Lyon, 2013.

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

[MCM'11] **Modeling of the Snowboard Course** [PDF]
Fei Liu, Haoyu Li, Li Li
International Mathematical Contest in Modeling (MCM) Symposium, Apr. 2011
Meritorious Winner Award

Patents

[PCT/US22/22820] **Real-to-Simulation Matching of Deformable Soft Tissue and Other Objects with Position-based Dynamics for Robot Control** [PATENT]
Fei Liu, Michael C. Yip, Florian Richter, 2022.

[CN215651505U] **Flexible Mechanical Arm and Surgical Equipment** [PATENT]
Jialin Yang, Qinghao Hu, Jianxiao Chen, **Fei Liu**, Fei Long, 2021.

[CN216603056U] **Main Hand Control Unit and Auxiliary Robot for Digestive Tract Operation** [PATENT]
Jialin Yang, Qinghao Hu, Jianxiao Chen, **Fei Liu**, Fei Long, Luchen Shen, Liyang Lin, 2021.

[CN215273291U] **Main Operator and Force Feedback Device** [PATENT]
Jialin Yang, Qinghao Hu, Jianxiao Chen, **Fei Liu**, Fei Long, Luchen Shen, Liyang Lin, 2021.

[CN114129228A] **Operation Executor** [PATENT]
Jialin Yang, Qinghao Hu, Jianxiao Chen, **Fei Liu**, Fei Long, Luchen Shen, Liyang Lin, 2021.

[CN209713128U] **A Kind of Flexible Joint Mechanism** [PATENT]
Junjie Gao, **Fei Liu**, Shunzheng Meng, Sihao Zuo, Jialin Yang, 2018.

[CN209574762U] **Lifting Operation Instrument** [PATENT]
Jialin Yang, Xilong Hou, Lijuan Yao, **Fei Liu**, 2018.

Research Experiences

Advanced Robotics and Controls Lab, UCSD **Dec. 2019 – present**

Postdoc Scholar, ARCLab San Diego, USA

- Spearheading the development of a comprehensive framework for modeling, simulating, and controlling deformable, rigid, articulated, and fluid objects using position-based dynamics (PBD). Focus areas include articulated manipulation (impedance control, trajectory optimization, rope shape control, etc.) and applications in surgery (soft tissue, membrane, blood, and tools).
- Employing the adjoint method based on chain-rule and Autodiff tools to establish differentiability for the PBD simulation.
- Collaborating on the creation of a constrained-based solver and software architecture, integrating with NVIDIA Flex and Warp technologies.
- Implementing real-to-sim transfer techniques involving non-rigid perception, registration, and tracking.
- Designing closed-loop controllers, developing motion plans, and validating them using diverse field robots like the da Vinci Research Kit (DVRK), 7-dof Baxter Robotic Arm, 7-dof Franka Panda Arm, catheter robot, non-holonomic mobile robot, hydraulic-driven underwater robotic arm, haptic device, etc.
- Leading the **Continuum Robot Project**, which involves shape reconstruction through the projection of geometrical primitives (cylinders, circles, etc.), differentiable rendering, and executing visual servoing control.

Biorobotics Institute, Scuola Superiore Sant'Anna **Apr. 2019 – Nov. 2019**
Senior Research Associate/Postdoc, Assistive Robotics Lab Pisa, Italy

- Conducted Simultaneous Localization and Mapping (SLAM) for a mobile robotic platform under ROS.
- Implemented autonomous initialization using computer vision approaches with aruco markers (QR codes).
- Executed autonomous navigation for the mobile robot, incorporating path planning and obstacle avoidance.
- Developed and implemented shared control theory for the mobile platform.
- Designed a PHP/HTML-based web user interface.
- Conducted experimental tests with field robots at a hospital in Verona, Italy.

Bioinspired Soft Robotics@SSSA **Mar. 2018 – Apr. 2019**
Research Associate/Postdoc, Istituto Italiano di Tecnologia Pisa, Italy

- Implemented modeling and control for the KUKA LWR4+ robotic arm using ROS and Gazebo, covering motion control, trajectory planning, and master-slave operations.
- Conducted modeling and control of a flexible continuum surgical tool, involving a static tension-deflection model, Euler-Lagrange dynamics, and port-Hamiltonian-based control.
- Analyzed various continuum structure prototypes, exploring design variations such as notches, single-backbone configurations, and articulated structures.
- Developed a teleoperation framework using haptic devices (Sigma.7).
- Conducted a preliminary study of a 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

- Led the development of teleoperation for a single-port abdominal robotics surgical system using haptic devices (PHANTOM Omni, Novint Falcon, Omega.3) and joysticks (Logitech G Extreme 3D, Microsoft Xbox).
- Modeled and controlled a tendon-driven articulated end-effector, addressing kinematics, motion control, and master-slave operations.
- Identified and compensated model-based uncertainties, including hysteresis and friction.
- Managed the modeling and control of a 4 DOFs positioning arm (parallel mechanisms) covering kinematics, motion control, and master-slave operations.
- Calculated the Remote Center of Motion (RCM) point for the positioning arm.
- Oversaw the modeling and control (based on gait analysis) of a powered lower limb orthosis for rehabilitation.
- Implemented a SLAM algorithm (built on ROS) for autonomous mobile robots used in medical transportation within hospitals.

PHD Thesis: Dual-user Haptic Training System **Sep. 2012 – Sep. 2016**
Advisors: Prof. Tanneguy Redarce, Prof. Arnaud Lelevé, Dr. Damien Eberard Lyon, France

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

Master Thesis: Cooperative Haptic Hands-on MIS Trainer **Sep. 2012 – Aug. 2013**
Internship at Ampère Laboratory INSA de Lyon, France

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

Undergraduate Thesis **Sep. 2011 – Jun. 2012**
Laboratory Research Assistant NPU, Xi'an, China

- Implemented image processing and classification algorithms.
- Extraction of image metadata features for retrieving images based on content and context.

Funded Student Project by Chinese Ministry of Education **Nov. 2010 – Jun. 2012**
Project Leader NPU, Xi'an, China

- Implemented statistical and computing algorithms related to data mining (SVM etc).
- Implemented path planning algorithms for a mobile robot ($A^\star$, genetic algorithm, fuzzy control, etc.).

Competitions

DJI RoboMasters Mobile Manipulation Challenge **Aug. 2014**
Team Leader Shenzhen, China
Dajiang Innovations Technology Co., Ltd (DJI)

- Design of autonomous mobile robot using SLAM and ROS.
- Implemented fast on-board object tracking and recognition algorithms.
- Developed multi-robot coordination and searching algorithms.

International Aerial Robotics Competition (IARC) **Aug. 2012**
Team Leader 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).
- Awarded **Innovative Design**.

International Mathematical Contest in Modeling (MCM) **Feb. 2012**
Team Leader NPU, Xi'an, China

- Optimal Design of U-shaped Snowboard Course
- Awarded **Meritorious Winner** (First Prize Mention).

Robocup 3D Simulation Group **Sep. 2010 – Jun. 2012**
Team Leader NPU, Xi'an, China

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

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

- Design and control of an intelligent car for path following
- Awarded **Third Prize** in NPU Open 2011.

Academic Services

Journal Reviewer

- 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

- 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)

Grants

CAREER: Contextually Informed Autonomous Robotic Surgery
National Science Foundation (NSF) Mar. 2021 – Now
Postdoc Researcher (Grant No. : 2045803)

- Modeling and simulating the deformation of soft tissue alongside interactive control of robotic tools.
- Contribute to the grant writing process, meetings and reports.

EFRI C3 SoRo: Safe Medical Continuum Robots: Sensing, Control and Fabrication
National Science Foundation (NSF) Nov. 2019 – Jun. 2023
Postdoc Researcher (Grant No. : 1935329)

- Shape reconstruction of catheter robots using endoscopic images and visual-servoing control.
- Contribute to the meetings and reports.

National Key R&D Program of China: Design and Kinematic Modeling of Modular Variable Stiffness Continuum Flexible Actuator
Ministry of Science and Technology (MOST) of China Mar. 2019 – Nov. 2022
Sub-project Leader/PI: ROBO Medical Technology Co. Ltd (Grant No. : 2018YFB1307700)

- Modeling and control of a continuum flexible endoscopic submucosal dissection (ESD) robot using curvature-based approaches.
- Contribute to the grant writing process, meetings and reports.

National College Student Innovation and Entrepreneurship Training Program
Chinese Ministry of Education Nov. 2010 – Jun. 2012
Student PI

- Implemented statistical and computing algorithms related to data mining (SVM etc).
- Implemented path planning algorithms for a mobile robot ($A^\star$, genetic algorithm, fuzzy control, etc.).
- Contribute to the grant writing process, meetings and reports.

Mentoring Experiences

PhD Students

Xiao Liang, CSE, UCSD Sep. 2021 – present

- **Topic**: Reconstruction of 4D lung motionu using neural-ODE integration
- **Achievement**: Published papers at TBME/IROS 2023, and submitted papers to ICRA 2024

Yu Huan, BioRobotics Institute, Scuola Superiore Sant'Anna Mar. 2018 - Mar. 2019

- **Topic**: Design and control of flexible miniature surgical tools (continuum robot)
- **Achievement**: Published papers at IEEE TBME/TMECH

Master Students

Yutong Zhang, CSE, UCSD Jan. 2021 – present

- **Research Topic**: Developing a simulator using position-based dynamics for various objects (rigid, cloth, deformable) and rendering with libIGL/OpenGL
- **Achievement**: Submitted papers to ICRA 2024

Chung-Pang (Ben) Wang, CSE, UCSD Sept. 2023 – present

- **Research Topic**: Investigating SE(3)-Equivariant mappings for data-efficient learning of robot trajectory planning

Wangyi Liu, ECE, UCSD July 2022 – Aug 2023

- **Research Topic**: Exploring SE(3)-Equivariant mappings for data-efficient learning of robot trajectory planning
- **Achievement**: Currently working on a paper for IEEE RAL

Alexander Luke, MAE, UCSD Sep. 2021 – Jun. 2023

- **Research Topic**: Conducting research on motion control and calibration of a steerable continuum robotic catheter with clinical trials
- **Achievement**: Successfully conducted demos with animal trials

Junming Wu, ECE, UCSD Sep. 2021 – Dec. 2022

- **Research Topic**: Investigating bi-manual close-loop control of dual-arm suturing using physical-based simulation
- **Achievement**: Successfully conducted demos on the dVRK robot

Haaris Rahman, CSE, UCSD Sep. 2021 – Mar. 2022

- **Research Topic**: Focusing on the reconstruction of deformable soft tissue using occupancy flow
- **Achievement**: Successfully conducted demos in our PBD simulator

Chong He, MAE, UCSD Sep. 2021 – Aug. 2022

- **Research Topic**: Engaged in shape reconstruction of catheter robot using monocular images
- **Achievement**: Drafted a paper for IEEE RAL

Yunhai Han, MAE, UCSD Jan. 2021 – Jan. 2022

- **Research Topic**: Developing a deformable objects simulation framework using a constraints-based solver
- **Achievement**: Published a paper at ICRA 2021/IROS 2021

Mingen Li, ECE, UCSD Jan. 2021 – Jan. 2022

- **Research Topic**: Focused on 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

- **Research Topic**: Investigating 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

- **Research Topic**: Focused on the modeling of the catheter continuum robot for position and orientation motor control
- **Achievement**: Successfully conducted demos with live animal trials

Zihan Li, ECE, UCSD Jan. 2020 – Nov. 2020

- **Research Topic**: Investigating registration methods for real-to-sim transfer applications of deformable tissue manipulation
- **Achievement**: Published a paper at ICRA 2021

Undergraduate Students

Yuelei (Tina) Li, Mathematics, UCSD Apr. 2023 – present

- **Research Topic**: Developing intrinsic neural mappings from mesh to point cloud for soft tissue registration
- **Achievement**: Submitted a paper to ICRA 2024

Neelay Joglekar, ECE, UCSD Jan. 2021 – present

- **Research Topic**: Modeling dynamic behavior 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

- **Research Topic**: Computation and validation of backward gradients for position-based dynamics constraints
- **Achievement**: Integrated into our PBD simulator

Nemanja Babic, Research Internship, University of Ottawa & INSA de Lyon 2015

- **Research Topic**: Simulating haptic systems using CHAI3D
- **Achievement**: Conducted demos with simulations in CHAI3D

High School Students

Ayaan Haque, Saratoga High School, California Jan. 2021 – Jul. 2021

- **Research Topic**: Generating simulated data through algorithmic force coefficient estimation
- **Achievement**: Published a paper at IEEE ACIRS 2021

Sajiv Shah, Saratoga High School, California Jan. 2021 – Jul. 2021

- **Research Topic**: Generating simulated data through algorithmic force coefficient estimation
- **Achievement**: Published a paper at IEEE ACIRS 2021

Languages

Chinese: Native
English: Advanced, Fluent
French: Beginner A2
Italian: Beginner Classroom