Mengyu FU

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EDUCATION

University of North Carolina at Chapel Hill, NC   Aug. 2017 - May 2022
Ph.D. in Computer Science

Harbin Institute of Technology, Harbin, China   Sep. 2011 - Jul. 2015, Sep. 2015 - Jul. 2017
M.Eng. in Control Science and Engineering   GPA 95.49%, rank 1/182
B.Eng. in Automation, Honors School (top 5%)   GPA 94.43%, rank 2/192

PUBLICATIONS

[18] A. Kuntz, M. Emerson, T. E. Ertop, I. Fried, **M. Fu**, J. Hoelscher, M. Rox, J. Akulian, E. A. Gillaspie, Y. Z. Lee, F. Maldonado, R. J. Webster, and R. Alterovitz. "Autonomous Medical Needle Steering In Vivo." (**Under review**)

[17] **M. Fu**, K. Solovey, O. Salzman, and R. Alterovitz. "Toward Certifiable and Optimal Motion Planning for Medical Steerable Needles." submitted to *The International Journal of Robotics Research (IJRR)* (**Under review**)

[16] **M. Fu**, A. Kuntz, O.Salzman, and R. Alterovitz. "Asymptotically-optimal inspection planning via efficient near-optimal search on sampled roadmaps." submitted to *The International Journal of Robotics Research (IJRR)* (**Under review**)

[15] J. Hoelscher, I. Fried, **M. Fu**, M. Patwardhan, M. Christman, J. Akulian, R. J. Webster, and R. Alterovitz. "A Metric for Finding Robust Start Positions for Medical Steerable Needle Automation." in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 9526-9533, Kyoto, Japan, October 2022.

[14] **M. Fu**, K. Solovey, O. Salzman, and R. Alterovitz. "Resolution-Optimal Motion Planning for Steerable Needles." in *IEEE/RSJ Int. Conf. on Robotics and Automation (ICRA)*, pp. 9652-9659, Philadelphia, US, May 2022.

[13] **M. Fu**, O. Salzman, and R. Alterovitz. "Toward Certifiable Motion Planning for Medical Steerable Needles." in *Robotics: Science and Systems (RSS)*, held virtually, July 2021. **[Best Paper Finalist]**

[12] **M. Fu**, O. Salzman, and R. Alterovitz. "Computationally-Efficient Roadmap-based Inspection Planning via Incremental Lazy Search." in *IEEE/RSJ Int. Conf. on Robotics and Automation (ICRA)*, pp. 7449-7456, Xian, CN, May 2021.

[11] I. Fried, J. Hoelscher, **M. Fu**, M. Emerson, T. Efe Ertop, M. Rox, J. Granna, A. Kuntz, J. A. Akulian, R. J Webster III, and R. Alterovitz. "Design Considerations for a Steerable Needle Robot to Maximize Reachable Lung Volume." in *IEEE/RSJ Int. Conf. on Robotics and Automation (ICRA)*, pp. 1418-1425, Xian, CN, May 2021.

[10] J. Hoelscher, **M. Fu**, I. Fried, M. Emerson, T. Efe Ertop, M. Rox, A. Kuntz, J. A. Akulian, R. J Webster III, and R. Alterovitz. "Backward Planning for a Multi-Stage Steerable Needle Lung Robot." in *IEEE Robotics and Automation Letters (RAL)*, vol. 6, no. 2, pp. 3987-3994, April 2021.

[9] M. Rox, M. Emerson, T. Efe Ertop, I. Fried, **M. Fu**, J. Hoelscher, A. Kuntz, J. Granna, J. Mitchell, M. Lester, F. Maldonado, E. A. Gillaspie, J. Akulian, R. Alterovitz, and R. J Webster III. "Decoupling Steerability from Diameter: Helical Dovetail Laser Patterning for Steerable Needles." in *IEEE Access* 8 (2020): 181411-181419.

[8] T. Efe Ertop, M. Emerson, M. Rox, J. Granna, F. Maldonado, E. Gillaspie, M. Lester, A. Kuntz, C. Rucker, **M. Fu**, J. Hoelscher, I. Fried, R. Alterovitz, and R. J Webster III. "Steerable Needle Trajectory Following In The Lung: Torsional Deadband Compensation And Full Pose Estimation With 5DOF Feedback For Needles Passing Through Flexible Endoscopes." in *ASME Dynamic Systems and Control Conference (DSCC)*, held virtually, October 2020. **[Best student paper finalist]**

[7] A. Kuntz, **M. Fu**, et al. "Planning High-Quality Motions for Concentric Tube Robots in Point Clouds via Parallel Sampling and Optimization." in *IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, pp. 2205-2212, Macau, CN, November 2019.

[6] **M. Fu**, A. Kuntz, O. Salzman, and R. Alterovitz. "Toward Asymptotically-Optimal Inspection Planning via Efficient Near-Optimal Graph Search." in *Robotics: Science and Systems (RSS)*, Freiburg im Breisgau, DE, June 2019.

[5] **M. Fu**, A. Kuntz, R. J. Webster III, and R. Alterovitz. "Safe Motion Planning for Steerable Needles using Cost Maps Automatically Extracted from Pulmonary Images." in *IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, pp. 4942-4949, Madrid, ES, October 2018.

[4] Z. Qu, S. Yu, and **M. Fu**. "Motion Background Modeling Based on Context-Encoder." in *International Conference on Artificial Intelligence and Pattern Recognition (AIPR)*, pp. 32-36, Lodz, PL, September 2016.

[3] Z. Qu, X. Chu, **M. Fu**, X. Liu, W. Xie, and C. Wang. "Design of Real-Time Measurement System with Vision/IMU for Close-Range Semi-Physical Rendezvous and Docking Simulation." in *IEEE Chinese Guidance, Navigation and Control Conference (CGNCC)*, pp. 2292-2298, Nanjing, CN, August 2016.

[2] **M. Fu**, Y. Tian, and F. Wu. "Step-Wise Support Vector Machines for Classification of Overlapping Samples." in *Neurocomputing*, Vol 155, pp. 159-166, May 2015.

[1] Y. Tian, **M. Fu**, and F. Wu. "Steel Plates Fault Diagnosis on The Basis of Support Vector Machines." in *Neurocomputing* Vol 151, pp. 296-303, March 2015.

EXPERIENCES

Software Engineer, Google   Mountain View, CA
Team: YouTube Shorts Discovery   June 2022 - present
Develop the recommendation system for short videos, focusing on video ranking and packing.

Graduate Research Assistant, Computational Robotics Research Group   Chapel Hill, NC
Advisor: Prof. Ron Alterovitz   2017 - 2022
Thesis: Efficient Motion and Inspection Planning for Medical Robots with Theoretical Guarantees
Designed and implemented robot **motion planning** and **inspection planning** algorithms with theoretical guarantees for surgical robots (**C++** and **templates**). These algorithms allow the robots to successfully navigate around complex environments or patient anatomy using multimodal sensor data. Experimented with both simulation and physical robot systems (**ROS**, medical-image segmentation, registration). Played major role in writing an NSF-funded proposal.
Journal and Conference Reviewer: TRO, RAL, IROS 2019-2022, ICRA 2019-2022, ISER 2018

Machine Learning Intern, Nuro Inc.   Mountain View, CA
Manager: Wei Liu, Qiuyu Peng   Summer 2021, Summer 2020, Summer 2019
Applied deep learning techniques (**C++**, **Python**, **TensorFlow**, **GCP**, **k8s**) to solve problems related to autonomous vehicles, focused on **behavior prediction** and **ego-vehicle planning**.

Graduate Research Assistant, Space Control and Inertial Technology Center   Harbin, China
Advisor: Prof. Changhong Wang and Prof. Zhenshen Qu   2015 - 2017
Master thesis: deep-learning-based video action recognition (**Caffe**).
Bachlor thesis (outstanding thesis, top 2%): semi-physical simulation system with vision & IMU data fusion (**LabVIEW**).

Undergrad Research Assistant, Research Institute of Intelligent Control and System   Harbin, China
Advisor: Prof. Huijun Gao   2014 - 2015
Studied data-driven classification and fault diagnosis based on Support Vector Machines (SVMs).

AWARDS

Best Paper Finalist, Robotics: Science and Systems (RSS)   2021

Best Student Paper Finalist, ASME Dynamic Systems and Control Conference (DSCC)   2020

First Class Scholarship, China Aerospace Science and Technology Corporation   2016

Outstanding Undergraduate Thesis (top 2%), Harbin Institute of Technology   2015

National Scholarship (top 1.5%), Ministry of Education of China   2012-2013, 2013-2014

SKILLS

Languages & Operating systems	C++ (Advanced), Python, C, and Java. Linux and macOS.
Tools	TensorFlow, Google Could Platform (GCP), Kubernetes (k8s), MATLAB (& Simulink), CMake, Robot Operating System(ROS), Caffe, LabVIEW, Git, Vim, and LaTeX.
Libraries	The Open Motion Planning Library (OMPL), OpenCV, Flexible Collision Library (FCL), and Insight Toolkit (ITK).