JINGPEI LU

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EDUCATION

University of California San Diego, CA, USA

Ph.D. in Electrical and Computer Engineering 2021 -
Area of focus: Computer Vision and Robotics

M.S. in Electrical and Computer Engineering 2020
Area of focus: Intelligent System, Robotics and Control

B.S. in Electrical and Computer Engineering 2018
Area of focus: Machine Learning

FIELD OF INTERESTS

Robotic Perception; Machine Learning; Surgical Robotics

RESEARCH PROJECTS

Keypoint Detection and Pose Estimation on Robot Manipulators April 2020 - Present
UCSD Advanced Robotics and Control Lab

- Proposed a general keypoint optimization algorithm which solves for the locations of the set of keypoints to maximize their detectibility on robotic manipulators
- Utilized robot simulator CoppeliaSim to generate synthetic dataset for sim-to-real transfer
- Submitted a paper to **IEEE RA-L** as first author

Semi-autonomous Telesurgery System September 2019 - Present
UCSD Advanced Robotics and Control Lab

- Collaborated with scientists at SRI International on testing the remote robotic teleoperation
- Contributed to the development of the tool tracking module for the semi-autonomous telesurgery system

The Surgical Perception Framework April 2019 - March 2020
UCSD Advanced Robotics and Control Lab

- Efficiently integrated a surgical tool tracker and a deformable tissue tracker into the perception framework for autonomous robotic manipulation
- Utilized the deep neural networks for feature extraction, which improved the state-of-the-art tool tracking accuracy by **10%**, and significantly improved the tissue reconstruction performance of the surgical perception framework
- Experimented the framework on the da Vinci Surgical® System for real-time tissue manipulation tasks
- Published a paper at **IEEE RA-L** and submitted a paper to **ICRA 2021** as first author

Image Retrieval System for Biological Images January 2018 - September 2018
The Statistical Visual Computing Laboratory

- Developed a content-based image retrieval system for plankton images using a deep convolutional neural network which assisted biological oceanographers in researching and labeling the plankton images
- Researched on different machine learning and deep learning methods, which accelerated the searching process and improved the precision of the baseline retrieval system by about **30%**
- Presented our work on UC San Diego's Summer Research Conference (SRC 2018)

PUBLICATIONS

F. Richter, **J. Lu**, R. K. Orosco, M.C. Yip, "Robotic Tool Tracking under Partially Visible Kinematic Chain: A Unified Approach," arXiv:2102.06235, 2021.

J. Lu, F. Richter and M. C. Yip, "Robust Keypoint Detection and Pose Estimation of Robot Manipulators with Self-Occlusions via Sim-to-Real Transfer," arXiv:2010.08054, 2020.

F. Liu, Z. Li, Y. Han, **J. Lu**, F. Richter, M. C. Yip, "Real-to-Sim Registration of Deformable Soft Tissue with Position-Based Dynamics for Surgical Robot Autonomy," in *IEEE Conference on Robotics and Automation* (ICRA), 2021.

J. Lu, A. Jayakumari, F. Richter, Y. Li and M. C. Yip, "SuPer Deep: A Surgical Perception Framework for Robotic Tissue Manipulation using Deep Learning for Feature Extraction," in *IEEE Conference on Robotics and Automation* (ICRA), 2021.

Y. Li, F. Richter, **J. Lu**, E. K. Funk, R. K. Orosco, J. Zhu and M. C. Yip, "SuPer: A Surgical Perception Framework for Endoscopic Tissue Manipulation with Surgical Robotics," in *IEEE Robotics and Automation Letters* (RA-L), vol. 5, no. 2, pp. 2294-2301, April 2020.

PROFESSIONAL EXPERIENCE

Educational Vision Technologies, Inc. July 2019 - December 2019
Machine Learning Engineer *La Jolla, CA, USA*

- Developed and maintained several key functions of the learning platform, including automated slides video segmentation, student face blurring and speech recognition
- Mentored and supported interns on Machine Learning projects
- Built the testing frameworks to ensure the algorithms function properly on NVIDIA Jetson TX2

TEACHING EXPERIENCE

University of California, San Diego January 2019 - December 2019
Teaching Assistant, Jacob School of Engineering

- Course: Introduction to Digital Design

TECHNICAL SKILLS

Programming	Python, C/C++, Matlab, Cuda
Tools	Tensorflow, Pytorch, ROS, Git, Docker, LaTeX
Language	Proficient in English and Chinese

SERVICES

Reviewer	IEEE Robotics and Automation Letters
Mentor	Engineering Group Design Project (ECE 191)