

JINGPEI LU

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EDUCATION

M.S. in Electrical and Computer Engineering

September 2018 - June 2020

University of California San Diego, CA, USA

GPA: 3.69 / 4.0

Area of focus: Intelligent System, Robotics and Control

B.S. in Electrical and Computer Engineering

September 2014 - June 2018

University of California San Diego, CA, USA

Major GPA: 3.71 / 4.0

Area of focus: Machine Learning

FIELD OF INTERESTS

Robotic Perception and Automation; State Estimation; Surgical Robotics; Machine Learning

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 detectability 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 Plankton 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. 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,” arXiv:2011.00800, 2020.

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.

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,” arXiv:2003.03472, 2020.

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*, vol. 5, no. 2, pp. 2294-2301, April 2020. (presented at ICRA 2020)

PROFESSIONAL EXPERIENCE

Educational Vision Technologies, Inc.

July 2019 - December 2019

Machine Learning Engineer

La Jolla, CA, USA

- Managed and led a group of undergraduate students in developing the speech recognition server
- Developed the prototype of the automated slides video segmentation framework, which achieves **97%** accuracy on recall and **74%** accuracy on precision compared to human labeling
- 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, Linux, Docker, L^AT_EX

Language Proficient in English and Chinese

SELECTED GRADUATE COURSES

Neural Networks for Pattern Recognition (A+); Deep Learning and Applications (A); Robot Reinforcement Learning (A+); Computer Vision I (A); Digital Image Processing (A+)

SELECTED PROJECTS

Autonomous R/C Vehicle

- Built a remote control vehicle that can autonomously run on an outdoor scaled track from scratch
- Developed the traffic signs recognition functionality and speeded up the video processing efficiency **three times** using the multi-threaded approach

Drone Integration for RF Scanner Payload

- Integrated an RF scanning payload with a drone (DJI Matrice 100) to automate the processes of detecting wireless signal's strength in open area
- Developed a mobile app to record the signal strength data and generate the heatmap which can visualize the data better