Yinhong (Kevin) Qin

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Education

New York University Sep 2021 - May 2023
Master of Science, Computer Engineering *New York, NY*
- GPA: 3.77/4.0

Central South University Sep 2016 - Jul 2020
Bachelor of Engineering, Tranportation equipment and control engineering *Changsha, China*
- GPA: 88.16/100

Publications

[1] M. Rao, **Y. Qin**, J. Y. Wu and D. Moyer, Contrastive Kinematics-Video Representation for Surgical Robotic Gestures, MICCAI 2024 (submitted)
[2] M. Rao, **Y. Qin**, S. Kolouri, J. Y. Wu and D. Moyer, Zero-shot Prompt-based Video Encoder for Surgical Gesture Recognition, IPCAI 2024

Technical Skills

Languages: C++/ C, Python, MATLAB
Frameworks/ Toolkits: ROS, PyTorch, Git, PCL, Qt, LaTex

Research Experience & Interests

Vanderbilt University Aug 2023 –
Advisor: Jie Ying Wu *Nashville, TN*
- Surgical skill assessment and gesture recognition using learning-based methods with multi-modal data sources.
- Derived latent space embeddings using representation learning for precise surgical robotics motions modeling.
- Intraoperative camera motion control by learning from expert trajectory with imitation learning.

Research Interests
- Robotics, Optimal Control, Planning, Learning-based methods, Safety in Robotics

Professional Experience

Intuitive Surgical May 2022 – Aug 2022
Imaging Intern, Advanced Imaging *Sunnyvale, CA*
- Evaluated the feasibility of an endoscope prototype that can provide quantitative information to surgeons.
- Designed an automation pipeline of an optical measurement system for characterizing optical properties of biological tissue and implemented using MATLAB and .NET API. Saved 30% experiment time and ensured the accuracy.
- Generated more than 500,000 data-points of optical scattering coefficient standard with Python and Numpy.
- Analyzed the experiment data using Monte Carlo Simulation for multi-layered tissue model (accelerated by CUDA). The final result has a limited difference ($\sim 10\%$) compared to the standard sample.

Mech-Mind Robotics Aug 2020 – Jun 2021
Software Intern, Camera Group *Beijing, China*
- Proposed calibration and error correction algorithm with C++ (OpenCV, Eigen) for a robot-camera-laser line scanning system. Restricted the related error $\leq 0.1\%$. Designed and implemented user interfaces with Qt.
- Developed customization and integration code based on various industrial cameras APIs in C++ and C for our Mech-Eye, a camera viewer software. (Both on Windows and Linux)
- Conducted test and deployment task of the integration code on RK3399 and Nvidia Jetson TX2 using Python.
- Managed the source code version with GitLab and the documentation file using Confluence.

Projects

Optimal control & Reinforcement learning for Robotics | *Python* Nov 2022 – Dec 2022

- Devised optimal cotroller for a 2D drone to perform specific motions based on iterative LQR with line search.
- Designed and deployed tabular Q-learning for an pendulum to autonomously learn an inverted control policy.

Foundation of Robotics - control & planning | *Python* Nov 2021 – Dec 2021

- Completed target tracking simulation on a KUKA iiwa 14 robot model with the position error $\leq$ 1cm.
- Implemented a series robotics computing infrastructure such as coordinate transformation, Jacobians, forward kinematics and iterative inverse kinematics using NumPy.
- Carried out the motion planning module with: (1). Polynomial trajectory generation; (2). Joint controller, end-effector controller and impedance controller with gravity compensation.

Robotics Software Engineer – Udacity | *C++, ROS* Jul 2021 – Nov 2021

- Developed a home service robot system and simulated the environment and its task in ROS.
- Built the 3D model of a indoor environment and a wheeled robot with lidar and camera using Gazebo.
- Utilized AMCL, ROS Navigation stack, a Dijkstra's algorithm based path planning tool and Gmapping to establish the mapping, localization and navigation module.
- Implemented Kalman filter, Monte Carlo localization, occupancy grid mapping and A* path planning in C++.

Bachelor Thesis | *C++, Pytorch* Dec 2019 – Jun 2020

- Proposed an automatic inspection system for railway fasteners with monocular camera and images.
- Built a depth estimation and prediction model based on *Fully Convolutional Residual Network (FCRN).*
- Established a dataset with > 10,000 monocular images of railway fasterners for model training and evaluation.
- Applied multiple surface reconstruction algorithms (Poisson, MLS, Marching cubes) to reconstruct the 3D model and point cloud segmentation methods (region growing, Euclidian and normals difference) for better visulization.

Awards

Best methodology report award, with J. Han, A. Acar, J. Atoum and J. Y. Wu, Surgical Tool Localization in endoscopic videos (SurgToolLoc) challenge, MICCAI 2023
NYU Tandon school of Engineering Graduate Scholarship, 2021-2023
Central South University Annual Scholarship, 2017-2019