Yefan Zhou

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EDUCATION BACKGROUND

University of California Berkeley (UCB), CA 01/2019 – 05/2019
Exchange Student | Overall GPA: 4.0/4.0

Southeast University (SEU), P.R.China 09/2016 - 06/2020
B.E. in Information Engineering | Overall GPA: 3.71/4.0

Coursework (AI and Control): CS188 Intro to Artificial Intelligence(**A**), EECS106B Robotic Manipulation and Interaction (**A**)

Coursework (Programming): CS61B Data Structures (**A+**), CS 88 Computational Structure of Data Science (**A**)

PUBLICATIONS

[1] Yefan Zhou, Yiru Shen, Yujun Yan, Chen Feng and Yaoqing Yang "Reconstruction or Recognition: Justifying Single-view 3D Reconstruction Networks", Submitted to *2021 International Conference on Computer Vision (ICCV).*

[2] Xinghao Zhu, Yongxiang Fan, **Yefan Zhou**, Changhao Wang, Shiyu Jin, Masayoshi Tomizuka "Multi-Fingered Grasp Pose Detection using Point Cloud", Submitted to IEEE Robotics and Automation Letters (*RA-L*).

[3] Xinghao Zhu, **Yefan Zhou**, Yongxiang Fan, Lingfeng Sun, Masayoshi Tomizuka "Learn to Grasp with Less Supervision: A Data-Efficient Posterior Grasp Sampling Loss", Submitted to 2021 International Conference on Intelligent Robots and Systems (*IROS*) & IEEE Robotics and Automation Letters (*RA-L*).

RESEARCH EXPERIENCES

Learn to Grasp with Less Supervision: A Data-Efficient Maximum Likelihood Grasp Sampling Loss
Mechanical Systems Control Lab, UCB | Advisor: Prof. M. Tomizuka 12/2020 - 03/2021

- Proposed and integrated spatial attention module (SAM) into fully connected grasp generation neural network, verifying its effect of reducing the action sampling complexity by providing a region of importance.
- Constructed a cluttered object dataset based on Jacquard Dataset by randomly selecting a few images from the single object dataset and combined them into a cluttered sample, including image augmentation and grasp collision pruning.
- A paper under review.

Multi-Fingered Grasp Pose Detection using Point Cloud
Mechanical Systems Control Lab, UCB | Advisor: Prof. M. Tomizuka 07/2020 - 11/2020

- Constructed a point-cloud based multi-fingered grasp dataset by rendering depth images from 3DNet object using Pyrender and Open3D library.
- Reproduced and implemented the SOTA point cloud grasp pose detection (GPD) algorithm as a baseline method.
- A paper under review.

Reconstruction or Recognition: Justifying Single-view 3D Reconstruction Networks
AI4CE Lab, NYU | Advisor: Prof. C. Feng 07/2019 - 03/2021

- Proposed and experimentally demonstrated that the behaviors of single-view 3D reconstruction Neural Networks (reconstruction or recognition) are contingent on the extent of dispersion or clustering of the training data.
- Proposed a new metric "Dispersion Score", to measure how dispersed or "unclustered" the data is, as well as the tendency of NN towards reconstruction or recognition.
- Propose data augmentation methods to alleviate the bias of NNs to recognition.
- A paper under review.

Robotic Upper Limb Exoskeleton and Humanoid Trajectory Planning
Human-Assistive Robotic Technologies Lab, UCB | Advisor: Prof. R. Bajcsy 06/2019 - 09/2019

- The aim of the project is to develop trajectory planner and low-level controller for wearable robotic upper

limb exoskeleton to assist patient's arm movement in gaze-based rehabilitation training especially reaching tasks.

- Applied Minimum Angle/Hand Jerk Algorithm to trajectory planner so as to realize Cartesian Space and Joint Space real-time humanoid trajectory planning and execution.
- Developed a PD controller for exoskeleton active assistance, allowing joint angle and end effector position/velocity control.
- Implemented the planner and controller in MATLAB and on STM32 board; enabled joint angle sensing based on encoders and motion actuation based on servo motors and linear actuators; built in MATLAB a GUI for exoskeleton system, allowing simulation and 3D visualization of planning algorithm.

COURSE PROJECT

***Robotic Manipulation and Interaction Course Projects*, UCB | Instructor: Prof. R. Bajcsy**

01/2019 - 05/2019

- Systematically studied robotic dynamics, grasping and manipulation, covering fundamentals of robot manipulators, perception guided constrained manipulation, concepts of holonomy and non-holonomy and soft robotic modeling:
- **Project I**: Implemented closed-loop PD control on Baxter for trajectory tracking, compared with the default controller (MoveIt!), covering workspace/joint-space velocity, and joint-space torque control.
- **Project II**: Grasp planning with Baxter and Sawyer, focusing on stable grasp planning based on metrics of Force Closure, Gravity Resistance and Robust Force Closure.
- **Project III**: Developed controllers for a 2nd order nonholonomic system (Modified TurtleBot) based on 1) Lie algebra and 2) steering with sinusoids method for more efficient open loop control; verified the superiority of sinusoids control.
- **Project IV**: Conducted system identification of a soft robotic finger (built by EcoFlex-30), followed by parameter fitting and optimization based on rigid/elastic manipulator model with a nonlinear least squares solver.
- **Final project:** Built and experimentally characterized a compliance-modulating fingertip-inspired tactile sensor using pneumatic sealed elastic membrane and a depth-sensing camera as an add-on to the Baxter robot for scanning a 3D terrain and measuring the distribution of stiffness:
  - Applied Point Cloud Library in C++, ROS and a RGBD camera to enable image segmentation, geometry recognition, and Baxter robot arm control.
  - Determined an empirical model of the device's force-deformation characteristics based on simplifying Hertz Contact Theory and further accomplished the derivation of stiffness estimation matrices for external contact region.
  - Built a software to enable real-time 3D visualization of point cloud registration and integration including stiffness distribution information in mapping.

***Intro. to Artificial Intelligence* Course Projects, UCB | Instructor: Prof. S. Levine & Prof. S. Russell**

01/2019 - 05/2019

- Systematically studied Markov decision processes, reinforcement learning, decision trees, HMM, particle filtering, game tree, etc, and their applications to probabilistic robotics and robotic inference.
- **Project I:** Implemented in Python multiple path search algorithms, covering DFS, BFS, UCS, A*.
- **Project II:** Implemented in Python value iteration and Q-learning, applying them to a simulated robot controller (Crawler) and simulated game Pacman.
- **Project III:** Implemented in Python Digits Classification based on MNIST dataset, Language Identification based on Recurrent Neural Network (RNN), Perceptron, Nonlinear Regression.

STANDARDIZED TESTS

GRE General: V: 162 / Q: 170 / Total: 332 | **TOEFL:** R:29 / L:27 / S:24 / W:28 / Total: 108

SKILLS

Programming Languages: C/C++ | Python | Java | MATLAB | SQL | Verilog | Assembly
Libraries: OpenCV | PyTorch | TensorFlow | Point Cloud Library | NumPy | SciPy | Panda | Scikit-Learn | Scrapy | Matplotlib
Software/Hardware: LaTex | Altium Designer | SolidWorks | Android | Arduino | ARM | Multisim | Linux | Robot Operating System