JESSICA EN SHIUAN LEU

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EDUCATION

University of California, Berkeley　　　　　　　　　　　　　　　*Aug. 2017 - Present*
Ph.D. program, Mechanical Engineering　　　　　　　　　　　　　　*(Expected May 2022)*

 – Major: Control (GPA : 3.93/4.0)

 – Minor: Optimization (GPA : 4.0/4.0), Design (GPA : 4.0/4.0)

National Taiwan University (NTU), Taipei, Taiwan　　　　*Sep. 2013 - Jun. 2017*
Bachelor of Science, Mechanical Engineering
School Year cumulative ranking in class: 1st/205 (GPA : 4.22/4.3)

WORK EXPERIENCES

Research Intern at Mitsubishi Electric Research Laboratories　　　Cambridge, MA
Host: Yebin Wang　　　　　　　　　Jan. 2021 - May. 2021, Sep. 2021 - Present

Advanced Robotics Eng. Intern at Amazon Robotics　　　　North Reading, MA
Manager: Yuri Ivanov　　　　　　　　　　　　　　　　　　　May. 2021 - Aug. 2021

RESEARCH INTERESTS

Robotics, human robot interactions, control and motion planning, optimization and optimal control, exoskeleton and mechanical design.

SELECTED RESEARCH PROJECTS

University of California, Berkeley　　　　　　　　　　　　　　　　　Berkeley,CA
Graduate Student Researcher　　　　　　　　　　　　　　　　　Aug. 2017 - Present

 – **Motion Planning for Robots in Uncertain Environments**　　*Aug. 2018 - Present*
 This research aims to utilize sensor signals to adapt the environment model when exploring uncertainties in the environment and take advantage of the agility of the mobile manipulator to conduct efficient motion planning.
 A hierarchical receding horizon control algorithm (HRHC) is proposed to assure safety and efficiency in robots surrounded by time-varying environments.
 A POMDP model is proposed to formulate the the uncertainty-exploring motion planning problem and is solved in a Model Predictive Control (MPC) manner.

 – **Analysis of Motion Planning Algorithms**　　　　　　　　　*Aug. 2017 - Present*

   – **Comparison and Combination of Motion Planning Algorithms** *Aug. 2019 - Present*
   This work presents a benchmark which implements and compares existing planning algorithms on a variety of problems. We also propose a hybrid planning algorithm, RRT*-CFS, that combines the merits of sampling-based and optimization-based methods.

   – **Motion Planning Stability in Time-varying Environments**　*Aug. 2017 - Oct. 2019*
   This work considers planning problems in time-varying environments using the framework of MPC. Necessary conditions of closed-loop stability in the sense of Lyapunov are identified.

– **Mitten Prosthesis for Spinal Cord Injury (SCI) Subjects** *Aug. 2018 - Oct. 2019*
A novel orthotic is designed to improve hand functionality while facilitating independent daily use for individuals with cervical SCI: the Single-size Semi-soft Assistive Mitten (SSAM). This device utilizes a slim dorsal leaf spring and underactuated cable drive to passively open and actively close the hand, in a way that is robust to variations in hand size. This mitten is intended to improve ease of donning and doffing, as the device is attached to all fingers at once.

National Taiwan University (NTU) Taipei, Taiwan
Undergraduate Student Researcher Sep. 2015 - Jun. 2017

– **Walking Strategy for Biped Robots with Artificial Muscles** *Sep. 2015 - Jun. 2017*
In this project, a biped robot is designed and modeled. A PID and feed-forward combined controller is used to control the robot gait cycle. Pressure sensors are used to detect the connect surface profile and improve the compatibility of the biped.

– **Pneumatic tube Capsule Opening Device in Hospitals** *Jan. 2017 - Jun. 2017*
To protect clinical scientists from occupational injuries, an automatic capsule opening device is designed, built, and installed in a hospital medical laboratory. This device locates the capsule, rotates the capsule to the right angle, opens it, and notifies the scientists.

PUBLICATIONS

1. **J. Leu**, Y. Wang, and S. D. Cairano, "Autonomous vehicle parking in dynamic environments: An integrated system with prediction and motion planning," in *Proc. 2022 IEEEInternational Conference on Robotics and Automation (ICRA), submitted*, May. 2022

2. **J. Leu**, G. Zhang, L. Sun, and M. Tomizuka, "Efficient robot motion planning via sampling and optimization," in *2021 American Control Conference (ACC)*. IEEE, 2021, pp. 4196–4202

3. **J. Leu**, R. Lim, and M. Tomizuka, "Safe and coordinated hierarchical receding horizon control for mobile manipulators," in *2020 American Control Conference (ACC)*. IEEE, 2020, pp. 2143–2149

4. **J. Leu** and M. Tomizuka, "Motion planning for industrial mobile robots with closed-loop stability enhanced prediction," in *Dynamic Systems and Control Conference*, vol. 59162. American Society of Mechanical Engineers, 2019, p. V003T19A009

5. D. Kaneishi, **J. Leu**, J. O'Donnell, C. Affleck, R. P. Matthew, A. McPherson, M. Tomizuka, and H. S. Stuart, "Design and assessment of a single-size semi-soft assistive mitten for people with cervical spinal cord injuries," in *2019 IEEE-RAS 19th International Conference on Humanoid Robots (Humanoids)*. IEEE, 2019, pp. 614–621

6. D. Kaneishi, R. P. Matthew, **J. Leu**, J. O'Donnell, B. Zhang, M. Tomizuka, and H. Stuart, "Hybrid control interface of a semi-soft assistive glove for people with spinal cord injuries," in *2019 IEEE 16th International Conference on Rehabilitation Robotics (ICORR)*. IEEE, 2019, pp. 132–138

7. **J. Leu**, S.-T. Liu, Y.-H. Chen, and W.-P. Shih, "Development of a humanoid robot foot with distributive force sensors," in *2017 3rd International Conference on Control, Automation and Robotics (ICCAR)*. IEEE, 2017, pp. 134–137

TECHNICAL STRENGTHS

Software & Tools	Matlab, C++ , Python, Linux, ROS, LabVIEW, SolidWorks, COMSOL
Language skills	Mandarin Chinese (native), English, Japanese