

# JESSICA EN SHIUAN LEU

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## EDUCATION

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**University of California, Berkeley**  
Ph.D. program, Mechanical Engineering

*Aug. 2017 - Present*  
*(Expected May 2022)*

- Major: Control (GPA : 3.93/4.0)
- Minor: Optimization, Design

**National Taiwan University (NTU), Taipei, Taiwan**

*Sep. 2013 - Jun. 2017*

Bachelor of Science, Mechanical Engineering

School Year cumulative ranking in class: 1<sup>st</sup>/205 (top 1%, GPA : 4.22/4.3)

## RESEARCH INTERESTS

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

## SELECTED RESEARCH PROJECTS

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**University of California, Berkeley**  
*Graduate Student Researcher*

Berkeley, CA  
*Aug. 2017 - Present*

- **Motion Planning for Mobile Manipulator in Dynamic and 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 probabilistic model is used to capture the environmental uncertainties and motion planning is performed using Model Predictive Control (MPC).

- **Motion Planning Performance in Time-varying Environments**

*Aug. 2017 - Apr. 2019*

This research considers planning problems in time-varying environments using the framework of MPC. An evaluation metric,  $M$ -convergence is proposed and necessary conditions of closed-loop stability in the sense of Lyapunov are identified.

- **Light-weight Finger Gripper for Mobile manipulators**

*Aug. 2019 - Present*

This project aims to build a light-weight, single-motor driven, and wire-controlled finger gripper that enables more mechanical-wise robust grasping and sensory functions comparing to parallel grippers.

- **Mitten Prosthesis for Spinal Cord Injury (SCI) Subjects**

*Aug. 2018 - Aug. 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)**  
*Undergraduate Student Researcher*

Taipei, Taiwan  
*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.
  
- **Automatic Pneumatic tube Capsule Opening Device in Hospitals** *Jan. 2017 - Jun. 2017*  
The goal of the project is to prevent clinical scientists from professional injuries as they need to open more than 100 pneumatic tube capsules, which are usually to big especially for a hand size of an Asian female scientist, every day. A capsule opening device is designed built and installed in a hospital medical laboratory.  
The device automatically locates the capsule, rotates the capsule to the right angle, opens it, and notifies the scientist.

## PUBLICATIONS

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1. **J. Leu**, R. Lim, and M. Tomizuka, “Safe and coordinated hierarchical receding horizon control for mobile manipulators,” in *Proc. American Control Conference (ACC 2020)*, accepted, Jun. 2020
2. **J. Leu** and M. Tomizuka, “Motion planning for industrial mobile robots with closed-loop stability enhanced prediction,” in *ASME 2019 Dynamic Systems and Control Conference*. American Society of Mechanical Engineers Digital Collection
3. 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
4. D. Kaneishi, **J. Leu**, J. O’Donnell, C. Affleck, R. P. Matthew, A. McPherson, M. Tomizuka, and H. Stuart, “Design and assessment of a single-size semi-soft assistive mitten for people with cervical spinal cord injuries,” in *Proc. IEEE RAS Int. Conf. on Humanoid Robots 2019 (Humanoid 2019)*, presented in Oct. 2019
5. **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

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| <b>Programming</b>           | Matlab, Python, C++                          |
| <b>Software &amp; Tools</b>  | Linux, ROS, LabVIEW, Latex                   |
| <b>Modeling and Analysis</b> | SolidWorks, AutoCAD, COMSOL                  |
| <b>Language skills</b>       | Mandarin Chinese (native), English, Japanese |

## EXTRA-CIRRUCULAR

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| <b>Student Athlete, UC, Berkeley women’s table tennis team</b>                                       | <i>Sep. 2018 – Present</i>   |
| <b>Student Volunteer, NTU International Affairs</b>  | <i>Sep. 2014 – Jun. 2017</i> |
| <i>Helping international students to adjust their life in Taiwan, introducing Taiwanese culture.</i> |                              |
| <b>Department women’s basketball team (captain, 2015-2016)</b>                                       | <i>Sep. 2014 – Jun. 2017</i> |