Rei (Wen-Ying) Lee

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I am a highly experienced Robot Designer with a strong skill set of prototyping, designing and developing interactive systems. I obtained my Ph.D. in Mechanical and Aerospace Engineering Department at Cornell University. My research focuses on redefining the relationship between humans and robots in everyday environments. The core of my work is a novel character-driven approach, envisioning robots not just as mindless machines but as independent agents with unique purposes. By weaving narratives around their perceived characters, I aim to establish emotional connections, paving the way for meaningful, long-term interactions between humans and robots.

With a robust skill set in prototyping, design, and interactive system development, I bring theoretical concepts to life. My hands-on experience complements my academic prowess, making me adept at translating ideas from the drawing board to functional, engaging robotic systems.

SUMMARY OF QUALIFICATIONS

Self-motivated researcher with expertise in Robotics, Interaction Design, and Human-Robot Interaction.

- 10+ years of experience in hands-on prototyping with 3D CAD modeling and programming mechatronic systems for robots, demonstrated by several robotic platforms implemented for research projects' use.
- 10+ years of experience in academic robotics research, knowledgeable in Applied AI and Machine Learning, demonstrated by publications, work experience, and contributions to online open-source libraries.
- 6+ years of experience in conducting lab and field testing and performing evaluations through data analysis, demonstrated by the achievement in research projects and the teaching assistant experience.
- 6+ years of experience in managing and organizing projects and graduate-level courses, demonstrated by leading research projects to publication and receiving awards as outstanding researcher/teaching assistant.

EDUCATION

Cornell University, Ithaca, United States	Aug. 2017 – May 2023
Ph.D., Mechanical Engineering, minor in Information Science	
Cornell University, Ithaca, United States	Aug. 2017 – Jul. 2021
M.S., Mechanical Engineering, minor in Information Science	
National Taiwan University, Taipei, Taiwan	Aug. 2013 – Jul. 2017
B.S., Mechanical Engineering	

PROFESSIONAL SKILLS

Software: C/C++, Python, PyTorch, TensorFlow, C# (Unity), R, JavaScript (Processing), Java, SQL, ROS, Git, GitHub, html, CSS, MATLAB, Simulink, LabVIEW, ArduinoIDE, Illustrator, PhotoShop, Adobe Premiere
 Hardware: CNC equipments, 3D printers, laser cutters, machine tools, hand tools, microcontrollers, microprocessors

- CAD Tool: SolidWorks, AutoCAD, Fusion360, Rhino, Creo
- Research:lab & field experimental study design, survey, interviews, focus groups, video coding, data analysis,
Qualtrics, Prolific, Amazon MTurk
- Languages: Taiwanese (Native), Mandarin, English, Japanese (Basic)

WORK EXPERIENCE

Test and Reliability Consultant, Aescape, Inc.

- Consulting on automating testing systems and data acquisition for the startup company's robotic product to offer insights on reliability and business budgets.
- Coordinating internal teams and third-party facilities to schedule and execute reliability tests aligned with product launching timeline.
- Lead Creative Technologist, Malamute, Inc.
- Collaborating with cross-functional teams to conceptualize, develop, and implement innovative and creative emerging technological solutions that align with the startup company's business goals.
- Leading the ideation and execution of interactive digital projects, ensuring they are on-brand and meet user experience standards.
- Conducting research and development to enhance the company's technical capabilities and creative offerings.
- Mechatronics and Robotics Scientist, Exponent Data Science Practice
- Consulted on robotic systems design and data acquisition for the clients' products
- Planned and performed UX research through large-scale (N >= 1000) global data collection and analysis to gain user insights and improve the stability and performance of commercial products and services for clients.

Mechatronics Intern, Universal Studio - Advanced Technology Interactives/R&D

- Interactive Systems Development: Collaborated with interdisciplinary teams to conduct research, development, mock-up, and play-testing for the implementation of interactive systems in Universal Studio Parks.

Teaching Assistant, Cornell University Dept. of Mechanical and Aerospace Engineering Fall 2018

- *Mechatronics:* An undergraduate junior-level course for designing, programming, and building mechatronic systems with CAD tools and micro-controllers. Helped design the lectures, homework, and lab sessions.

Teaching Assistant, Cornell University Dept. of Information Science

- *Human-Robot Interaction Design and Research:* An undergraduate course for designing and exploring HRI by building robotic prototypes and conducting user studies.
- Teaching Assistant, Cornell University Dept. of Information Science
- *Teams and Technology:* An undergraduate course for understanding how teams function with technology. Helped design the lectures, homework, and exams and lead group discussions.

Teaching Assistant, Cornell Tech

- *Developing and Designing Interactive Devices:* A graduate-level course for designing and building interactive device with microprocessors based on Python. Helped develop the course materials and incorporated the use of PyTorch

Nov. 2023 – present

Oct. 2023 – present

Feb. 2023 – Aug. 2023

Summer 2019

Spring 2019

Fall 2021

Fall 2019 & Fall 2020

and TensorFlow for student projects.

Research Experience

Researcher, Cornell University | Robots in Group Lab

- Robots Who Live for Themselves: Exploring Ludic HRI through Character-Driven Robot Design

- Thesis project, exploring the ludic interaction design space for robots through character-driven design
- Designed and built physical robots (3D modeling, rapid prototyping, mechatronics design)
- Framed, planned, executed lab and field studies with mixed-methods research approaches
- The research furthered our understanding of robots' social role in the future
- The project has resulted in several successful paper-publications

Researcher, Cornell Tech | Future Automation Research Lab

- Van Life: Understanding How People Set up Personal Space for Adventure

- Set up agendas and objectives for exploring the design space for van life
- Conduct research on the popular van life styles in the US
- Planned and execute user studies with mixed-methods approaches to discover vanlifers' needs and values
- The project has resulted in a successful paper-publication

Researcher, Cornell University | Robots in Group Lab

- Robotic Toaster: Exploring and Developing Interaction Paradigm for One to Multiple Users

- · Mentored a team of undergraduate research assistants to work collaboratively
- Formed visions, strategies, and roadmaps and set up timeline and deliverable milestones
- Kept track on progress and deal with changes along with execution
- The project has resulted in two successful paper-publications

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Research Engineer w/ Yale University | Implicit Social Cognition Lab
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- Perceptions toward the Competence of Robots

- Applied and programmed in Unity to implement a testing WebGL platform for online studies
- Designed and animated robot's behaviors based on needed study conditions
- The project has resulted in a paper-submission that is under review

Researcher, Cornell University | Prof. Guimbretière

- Integrating Robotic and AI Technologies to Support Embodied Collaborative Design

- Managed the team to explore the design space of robots assisting remote embodied design collaboration
- Designed and built a novel telepresence robotic system to perform physical sketching
- Applied Unity and WebGL to implement virtual iterative design platform and enable iterative design process
- Performed large-scale online studies to evaluate the design features of the telepresence robotic system
- Analyzed collected survey data with R to inform data-driven design recommendations
- The project has resulted in a successful paper-publication on the developed system

Research Engineer w/ Northeastern University | Advancing Teams, Leaders, and Systems Lab Fall 2019 - Exploring Robotic and AI Systems as Teammates

- Designed and built robot prototypes for user studies (3D modeling, rapid prototyping, mechatronics design)
- The research provided a look into how people perceived AI/robots as teammates
- The project has resulted in a successful paper-publication

Aug. 2017 - May 2023

Jul. 2021 - May 2023

Jul. 2022 – Jan. 2023

Sep. 2019 – Jul. 2021

Jun. 2021 – Jan. 2023

Researcher, Cornell University

Aug. 2018 – Jan. 2019

Sep. 2015 – Jun. 2017

- Visual Illusions as Human Interactive Proofs

- Conducted literature reviews on Visual Illusions in context to Human Interactive Proofs or CAPTCHAs.
- Designed and conducted user studies to evaluate the performance of Visual Illusions as CAPTCHAs
- Researcher, National Taiwan University

- "Blind Grasping" with Multi-fingered Robotic Hand using Tactile Sensors

- Proposed, designed, and conducted the experiments for the project
- Published 2 papers with the results of developed algorithms and proposed innovative methods
- Won the 2016 Ministry of Science and Technology Undergraduate Student Research Project Scholarship

Undergraduate Research Assistant, National Taiwan University	Jan. 2016 – Jul. 2016
- Formula Air: Propeller-Powered Racing Vehicle	
 Designed and built robot prototypes and mechatronics system 	
Undergraduate Research Assistant, National Taiwan University	Aug. 2015 – Jan. 2016
- Shaft-Climbing and Ball-Gripping Robot	
 Designed and built robot prototypes and mechatronics system 	
Undergraduate Research Assistant, National Taiwan University	Jan. 2014 – Jul. 2014
- Automatic Tracking Electro-Motion Vehicle, design and building	

• Designed and built robot prototypes and mechatronics system

OTHERS

Program Committee, recruiting reviewers for the design track paper submissions at the 19th Annual ACM/IEEE International Conference on Human-Robot-Interaction (HRI'24), initiating and moderating discussions between reviewers, writing a meta-review, and participating in the PC meeting where the final decisions on the program will be made.

https://humanrobotinteraction.org/2024/

Book Publication, contributed to the publication of *Media Architecture Compendium Vol. 2* on the method chapter of Annotated Portfolios. The book explores current and emerging concepts in media architecture (including urban robots and more-than-human participation) and documents methods for implementing media architecture projects.

https://mac2.mediaarchitecture.org/

Media Coverage, the collaboration project on *Robotic Trash Barrel* with Future Automation Research Lab at Cornell Tech was featured on several well-known media outlets (e.g. <u>NPR</u>, <u>CNN</u>, <u>USA TODAY</u>, etc.) and shared on popular social media (e.g. Twitter, TikTok, Instagram, etc.).

https://dl.acm.org/doi/10.1145/3568294.3580206

Robotic Platform for Course, created and developed the robotic platform, ConeBot. The system was adopted as main class material for the graduate-level course, Mobile Human-Robot Interactio, at Cornell Tech.

https://github.com/FAR-Lab/Mobile_HRI_Lab_Hub/blob/main/Lab1/Readme.md

Open-Source Motor Library, created and developed the Dynamixel_XL330_Servo_Library on GitHub. The library

can be used on microcontroller (Arduino or ESP32) to directly control the motors without additional converter. https://github.com/rei039474/Dynamixel XL330 Servo Library

Art Exhibition, robot designer/choreographer for the Art Exhibition, LAMINATED EARTH, at the ZAZ10TS Gallery @ NYC. The project is a site-specific, multimedia installation that reconciles architectural representations of housing while drawing from land art practices of raw soils and synthetic matter.

https://www.zaz10ts.com/laminated-earth

Workshop Lead, co-organizer of the 1st international workshop on Research through Design in HRI in conjunction with the 16th international conference on Human-Robot Interaction (HRI'21). This workshop set out to bring researchers across the HRI, HCI, and Design fields that use, or are interested in using Research through Design (RtD) in their work.

https://rtdxhri.com/

Reading Group Lead, organizer of a semester-long (Fall 2020) reading group on design research and design epistemology, which led to the graduate-level seminar course, Info6309 Design Research, offered at Cornell Information Science Department during Spring 2021.

https://classes.cornell.edu/browse/roster/SP21/class/INFO/6309

HONORS AND AWARDS

- 2022 2021-22 Cornell Tech Outstanding Teaching Assistant Award
- 2021 \Art (Backslash Art) Microgrant Award for Combining Art Works and Emerging Digital Technologies.
- 2020 Human-Robot Interaction Conference Pioneer as Outstanding Graduate Researcher in the Field
- 2018 The Walt Disney Company Award at 2018 Bits On Our Minds (Boom) Student Design Competition.
- 2016 The Best Undergraduate Research Paper Award at 24th Conference on Automation Technology
- 2016 Taiwan's Ministry of Science and Technology Undergraduate Student Research Project Scholarship
- 2015 Third Place in The 3rd Freescale (NXP) Cup in Taiwan

PUBLICATIONS

- W. Lee, I. Mandel, W. Ju, and M. Jung, "Robots Who Live for Themselves: Exploring Ludic HRI through Character-Driven Robot Design." (to be re-submitted)
- N. Surdel, Y. Bigman, X. Shen, W. Lee, M. Jung, and M. Ferguson, "Judging Robot Ability: How People Form Implicit and Explicit Impressions of Robot Competence," *Journal of Experimental Psychology*. (Accepted)
- S. Suzuki, I. Mandel, S. Li, W. Lee, M. Colley, and W. Ju, "AdVANcing Design: Customizing Spaces for Vanlife," In *Proceedings of the 15th ACM International Conference on Automotive User Interfaces and Interactive Vehicular Applications (AUTO-UI'23)* (pp. 256-266). ACM.
- M. Ye, E. Schneiders, W. Lee, and M. Jung, "The Future of Home Appliances: A Study on the Robotic Toaster as a

Domestic Social Robot," In Proceedings of the 32th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN'23). IEEE.

- F. Bu, I. Mandel, **W. Lee**, W. Ju, "Trash barrel robots in the city," In *Companion of the 2023 ACM/IEEE international conference on Human-robot interaction (HRI'23)* (pp. 875-877). ACM.
- M. Ye, **W. Lee**, J. Michalove, and J. Wong, "Toaster Bot: Designing for Utility and Enjoyability in the Kitchen Space," In *Companion of the 2023 ACM/IEEE international conference on Human-robot interaction (HRI'23)* (pp. 875-877). ACM.
- T. Hou, W. Lee, and M. Jung, ""Should I Follow the Human, or Follow the Robot?" Robots in Power Can Have More Influence Than Humans on Decision-Making," In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI'23)* (pp. 1-13). ACM.
- A. Schecter, J. Hohenstein, L. Larson, A. Harris, T. Hou, **W. Lee**, N. Lauharatanahirun, L. DeChurch, N. Contractor, and M. Jung, "Vero: An accessible method for studying human–AI teamwork," *Computers in Human Behavior* 141 (2023): 107606.
- A. Della, A. Bremers, **W. Lee**, and W. Ju, ""Ah! He wants to win!": Social responses to playing Tic-Tac-Toe against a physical drawing robot," In *Proceedings of 16th International Conference on Tangible, Embedded, and Embodied Interaction (TEI'22)* (Article 67, pp. 1-6). ACM.
- W. Lee, M. Sakashita, E. Ricci, H. Claure, F. Guimbretière, and M. Jung. "Interactive Vignettes: Enabling Large-Scale Interactive HRI Research," In *Proceedings of the 30th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN'21)* (pp. 1289-1296). IEEE.
- M. Luria, M. Hoggenmüller, **W. Lee**, L. Hespanhol, M. Jung, and J. Forlizzi, "Research through Design Approaches in Human-Robot Interaction," In *Companion of the 2021 ACM/IEEE International Conference on Human-Robot Interaction (HRI'21)* (pp. 685-687). ACM.
- M. Hoggenmueller*, W. Lee*, L. Hespanhol, M. Jung, and M. Tomitsch, "Eliciting New Perspectives in RtD Studies through Annotated Portfolios: A Case Study of Robotic Artefacts.," In *Proceedings of the 2021 ACM Designing Interactive Systems Conference (DIS'21)*. ACM. *Co-First Authors
- M. Hoggenmueller, W. Lee, L. Hespanhol, M. Tomitsch, and M. Jung, "Beyond the Robotic Artefact: Capturing Designerly HRI Knowledge through Annotated Portfolios," In 1st First international workshop on Designerly HRI Knowledge. Held in conjunction with the 29th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN'20).
- W. Lee, and M. Jung, "Ludic-HRI: Designing Playful Experiences with Robots," In *Companion of the 2020 ACM/IEEE international conference on Human-robot interaction (HRI'20)* (pp. 582-584). ACM.
- W. Lee, T. Hou, C. Zaga, and M. Jung, "Design for Serendipitous Interaction: BubbleBot Bringing People Together

with Bubbles," In Proceedings of the 2019 ACM/IEEE international conference on Human-robot interaction (HRI'19) (pp. 759-760). ACM.

- W. Lee, and M. Jung, "Design Framework for Joyful Human-Robot Interaction," In Proceedings of the 2019 ACM/IEEE international conference on Human-robot interaction (HRI'19). ACM, Workshop for Expressivity.
- H. Tennent, **W. Lee**, T. Hou, I. Mandel, and M. Jung, (2018, October). "PAPERINO: Remote Wizard-Of-Oz Puppeteering for Social Robot Behaviour Design." *In Companion of the 2018 ACM Conference on Computer Supported Cooperative Work and Social Computing (CSCW'18),* (pp. 29-32). ACM.
- W. Lee, M. Huang, and H. Huang, "Learning Robot Tactile Sensing of Object for Shape Recognition Using Multi-Finger Robot Hands," In *Proceedings of 26th International Symposium on Robot and Human Interactive Communication (RO-MAN'17)* (pp. 1311-1316). IEEE.
- W. Lee, M. Huang, and H. Huang, ""Blind Touching" for Stable Grasping and Dexterous Manipulation by Multifingered Robot Hands," In *Proceedings of 24th Conference on Automation Technology*, Taichung, Taiwan, pp. 67-72, 04-05 Nov. 2016. (Best Paper Award)