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Education

University of Utah

Major in **Mechanical Engineering | Ph.D.**

Salt Lake City, USA

Jan. 2025 – Present

- **GPA: 4/4 (as of Dec 2025)**
- **Core Courses:** Biomechanics of Movement; Modeling and Simulation of Human Movement; Introduction to Tissue Biomechanics; Design and Analysis I; Design and Analysis II.

The Hong Kong Polytechnic University

Hong Kong, China

Major in **Biomedical Engineering (Rehabilitation Engineering) | Master of Science**

Sep. 2022 – Jan. 2024

Dissertation (with Award) | Supervisor: Dr. Toshiki Kobayashi

Title: Gait Classification and Center of Pressure Dynamic Trajectory in Individuals with Unilateral Transfemoral Amputation

- **GPA: 3.84/4.3 (with Distinction)**
- **Core Courses:** Digital Design and Manufacturing for Biomedical Engineering; Biomaterials and Tissue Engineering; Nanobiotechnology; Advanced Prosthetics and Orthotics; Research Methods & Biostatics; Clinical and Sports Biomechanics; Modern Rehabilitation Engineering and Robotics; Dissertation.

Capital Medical University

Beijing, China

Major in **Prosthetics and Orthotics Engineering | Bachelor of Engineering**

Sep. 2018 – Jun. 2022

- **Scores: 82/100**
- **Core Courses:** Mechanics of Materials; Theoretical Mechanics; Computer-Aided Design and Computer-Aided Manufacturing; Kinesiology Biomechanics; Human Kinesiology; Lower Limb Prosthetic; Upper Limb Prosthetics; Lower Limb Orthotics; Upper Limb Orthotic; Spinal Orthotics.

Publications

- Jor, A. Kobayashi T., Lai, C. H., **He, Y.**, Opu, S. H., Lam, W., Winser, S. J., Gao, F., Zhang, M. (2025). Enhancing postural stability and gait in older adults: The role of somatosensory foot orthoses on varied inclined terrains. *Assistive Technology*. <https://doi.org/10.1080/10400435.2025.2582062>
- **He, Y.**, Hu, M., Lai, A. C. H., Koh, M. W. P., Hobara, H., Gao, F., & Kobayashi, T. (2025). Gait classification in individuals with unilateral transfemoral amputation using random forest and k-means clustering. *Journal of Biomechanics*. <https://doi.org/10.1016/j.jbiomech.2025.112920>
- Pollen, T. N., Jor, A., Munim, F., **He, Y.**, Daryabor, A., Gao, F., ... & Kobayashi, T. (2025). Effects of 3D-printed ankle-foot orthoses on gait: a systematic review. *Assistive Technology*. <https://doi.org/10.1080/10400435.2024.2411563>
- Jor, A., Lau, N. W., **He, Y.**, Daryabor, A., Lam, W. K., Hobara, H., ... & Kobayashi, T. (2025). Effects of foot orthoses on lower extremity joint kinematics and kinetics in runners with asymptomatic flatfeet: A systematic review and meta-analysis. *Gait & Posture*. <https://doi.org/10.1016/j.gaitpost.2025.06.003>
- Jor, A., Lai, C. H., Khan, M. J., **He, Y.**, Lam, W. K., Winser, S. J., ... & Kobayashi, T. (2025). Effects of somatosensory-stimulating foot orthoses on postural balance in older adults: A computerized dynamic posturography analysis. *Gait & Posture*. <https://doi.org/10.1016/j.gaitpost.2025.03.016>

- He, Y., Koh, M. W., Wong, C. L., Gao, F., & Kobayashi, T. (2025). Effects of articulated ankle-foot orthosis dorsiflexion range of motion on lower-limb joint kinematics during gait in individuals post-stroke. *Journal of Biomechanics*. <https://doi.org/10.1016/j.jbiomech.2025.112755>
- LeCursi, N. A., Janka, B. M., Gao, F., Orendurff, M. S., He, Y., & Kobayashi, T. (2024). A proposed evidence-guided algorithm for the adjustment and optimization of multi-function articulated ankle-foot orthoses in the clinical setting. *Frontiers in Rehabilitation Sciences*. <https://doi.org/10.3389/fresc.2024.1353303>
- Kobayashi, T., Jor, A., He, Y., Hu, M., Koh, M. W., Hisano, G., ... & Hobara, H. (2024). Transfemoral prosthetic simulators versus amputees: ground reaction forces and spatio-temporal parameters in gait. *Royal Society open science*. <https://doi.org/10.1098/rsos.231854>
- He, Y., Hu, M., Jor, A., Hobara, H., Gao, F., & Kobayashi, T. (2024). Dynamics of Center of Pressure Trajectory in Gait: Unilateral Transfemoral Amputees Versus Non-Disabled Individuals. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*. <https://doi.org/10.1109/tnsre.2024.3381046>
- Hu, M., He, Y., Hisano, G., Hobara, H., & Kobayashi, T. (2023). Coordination of lower limb during gait in individuals with unilateral transfemoral amputation. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*. <https://doi.org/10.1109/tnsre.2023.3316749>

Manuscripts in Review

- He, Y., Lau, N., Hobara, H., Gao, F., Lam, W., Orendurff, M. S., Kobayashi, T. Impact of social distancing measures on step activity, physical and psychological well-being of individuals with lower limb amputation during the COVID-19 pandemic in Hong Kong, *Assistive Technology*.
- Hu, M., He, Y., Lam, W., Hobara, H., Gao, F., Kobayashi, T. Connectivity between Neural Dynamics and Lower-limb Coordination during Gait in Individuals with Unilateral Transfemoral Amputation, *Journal of Biomechanics*.
- Kobayashi, T., He, Y., Wong, C. L. Y., Koh, M. W. P., Jor, A., Orendurff, M. S., Gao, F. Impact of adjustable dorsiflexion range and stiffness in articulated ankle-foot orthosis on center of pressure progression in post-stroke gait, *Journal of Biomechanics*.

Career

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| University of Utah | Salt Lake City, USA |
| Graduate Research Assistant in Sayu Lab | Jan. 2025 – Present |
| • Led turning-gait data collections with healthy and amputee participants, including motion capture, force plates, NIRS, thermistors, and thermal imaging. | |
| • Developed and refined experimental protocols (marker sets, baseline/recovery procedures, SAP setup) to ensure high-quality and reproducible datasets. | |
| • Processed multi-segment foot and lower-limb biomechanics data. | |
| • Built and validated musculoskeletal and prosthetic-ankle simulation models (OpenSim/OpenSim AD). | |
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| The Hong Kong Polytechnic University | Hong Kong, China |
| Research Assistant in the Department of Biomedical Engineering | Mar. 2024 – Sep. 2024 |
| • Study on the effects of ankle-foot orthoses on gait in individuals with post-stroke project. | |
| • Writing the first draft of the step activities in individuals with lower limb amputation project. | |
| • Helping with the experiment of the effects of foot orthoses on the balance of elderly individuals. | |
| • As a teaching assistant, explaining the structure and working principles of prostheses and orthoses. | |
| • As a teaching assistant, instructing students on how to use 3D scanning and digital CAD software for shaping sockets and orthoses. | |

Project Experience

Sayu Lab for Biomechanics & Locomotion at University of Utah

Salt Lake City, USA

Turning Gait Biomechanics

Jan 2025 – Present

- Contributed to experimental design, protocol optimization, and pilot testing for circular-path walking studies in both healthy individuals and transtibial amputees.
- Collected multi-model datasets, including Vicon kinematics, force-plate kinetics, NIRS, thermal imaging, and thermistor measurements during turning gait.
- Refined multi-segment foot marker sets and SAP-related measurement procedures to improve accuracy and reproducibility of the data-collection pipeline.

Dr. Toshiki Kobayashi's Lab at The Hong Kong Polytechnic University

Hong Kong, China

Effects of Foot Orthoses (FO) on the Balance of Elderly Individuals

Mar. 2024 – Sep. 2024

- Participated in experimental design and optimization of the experimental process, as well as recruited subjects and collected data.
- Collected kinematic and kinetic data using the Vicon System under 4 conditions (barefoot, standard shoes, standard shoes with FO, and subject's shoes), and collected balance parameters under the same 4 conditions using the Bertec Balance System.

Effects of Ankle-Foot Orthoses (AFO) on Gait in Individuals with Post-stroke

Dec. 2023 – Dec. 2024

- Provided recommendations and suggestions for experimental design and offered data analysis code.
- Completed the analysis of the experimental data and wrote the first draft.

Step Activities in Individuals with Lower Limb Amputation in Hong Kong

Sep. 2023 – May. 2024

- Completed questionnaires data collection, including Prosthesis Evaluation Questionnaire (PEQ), 36-Item Short Form Survey (SF-36), Prosthetic Limb Users Survey of Mobility (PLUS-M), and Patient Health Questionnaire-9 (PHQ-9);
- Completed a one-month follow-up on step activity data for over 10 subjects;
- Completed all data analysis including walking bout frequency, hourly step counts, and individual analysis;
- Completed the creation of all the Tables, Figures, Supplementary Tables, Supplementary Figures, and first draft writing.

Walking Coordination in Individuals with Unilateral Transfemoral Amputation

Dec. 2022 – Mar. 2023

- Calculated continuous relative phase (CRP) data;
- Completed statistical tests and assisted in creating Tables and Figures.

Gait Pattern Classification in Individuals with Unilateral Transfemoral Amputation

Oct. 2022 – Sep. 2023

- Experimental design and subject recruitment, as well as collecting gait data;
- Trained Decision Tree models using Python to obtain the most important gait features for individuals with unilateral transfemoral amputation;
- Used K-means clustering analysis to categorize the gait patterns of individuals with unilateral transfemoral amputation into distinct groups;
- Completed the creation of Tables and Figures, and first draft writing.

Center of Pressure (COP) in Individuals with Unilateral Transfemoral Amputation Oct. 2022 – Sep. 2023

- Completed experimental design and subject recruitment;
- Collected kinematic and kinetic data such as gait cycle and vertical ground reaction force using the Zebris treadmill;
- Completed the writing of Python code related to COP and time series analysis, as well as data analysis;
- Completed the creation of Tables and Figures, and first draft writing;
- Completed manuscript revisions and responded to reviewers.

Electroencephalogram (EEG) in Individuals with Unilateral Transfemoral Amputation Oct. 2022 – Sep. 2023

- Participated in EEG experiment design and optimized the experimental process;
- Collected kinematic data using the Vicon System and collected EEG data using an EEG cap;
- Completed kinematic and coordination data analysis as well as partial EEG data analysis, and conducted statistical tests;
- Completed the creation of Tables and Figures, as well as format and finalize the manuscript.

Internship Experience

Craig H. Neilsen Rehabilitation Hospital Amputee Clinic**Salt Lake City, USA***Shadowing*

Jan. 2025 – Present

- Shadowed physicians during transtibial and transfemoral amputee outpatient visits to understand clinical evaluation and long-term rehabilitation needs.
- Built connections with the local amputee community and gained insight into lived experiences, mobility challenges, and unmet needs that inform research and prosthetic design.

China Rehabilitation Research Center**Beijing, China***Internship*

Feb. 2022 – May. 2022

- Improved the theoretical basis as well as the practical basis for the manufacture of prostheses and orthoses;
- Learned a variety of inter-related disciplines such as material science, evaluation, and surgery;
- Passed the Comprehensive Skill Exam of Prosthetics and Orthotics and became a registered Prosthetist/Orthotist certified by International Society for Prosthetics and Orthotics (ISPO).

Guangdong Work Injury Rehabilitation Hospital**Guangzhou, China***Internship*

Jul. 2021 – Jan. 2022

- Provided consultation services to individuals with limb amputation on the fitting of prostheses, and provided consultation services to individuals with neuromuscular diseases on the fitting of orthoses;
- Offered assessment of the need for prostheses and orthoses, guidance on rehabilitation training before and after the assembly, and evaluation of their usage;
- Supplied quality tracking and maintenance services after the assembly of prostheses and orthoses;
- Researched and developed new and inexpensive assistive devices in conjunction with clinical needs;
- Explored strategies for the application of assistive devices for individuals with injuries in China and vigorously promoted the application of assistive devices in rehabilitation.

Extracurricular Experience

Adolescent Idiopathic Scoliosis (AIS) School Screening Project

Spe. 2022

As a student helper, assisted in checking the potential risk of AIS in Hong Kong junior high school students and promoted knowledge about AIS.

Beijing Children's Hospital

2018 – 2019

As a volunteer, led and helped patients and their family members with quick registration and payment.

Additional Information

Computer/Software Skills:

- **Python**, including basic code skills and libraries of NumPy, Pandas, Scikit-learn, and spm1d;
- **MATLAB**, including basic code skills and the library of EEGLAB;
- **SPSS, R** for statistical analysis;
- **Visual3D, OpenSim** for motion analysis and musculoskeletal simulation;
- **Origin, Adobe Illustrator** for Figures and Illustrations creation;
- **SolidWorks, Ansys** for finite element modeling and analysis;
- Application in **Machine Learning** and **Deep Learning**.

Hardware Skills:

- **Vicon Nexus**
- **Bertec Instrumented Treadmill**
- **Zebris GmbH Instrumented Treadmill**
- **Bertec Balance Advantage Systems**
- **ANT Neuro EEGO**
- **Artinis NIRS**

Certificates:

- **Outstanding Performance Scholarship by The Hong Kong Polytechnic University in Aug. 2024.**
- **Excellent Dissertation Award by The Hong Kong Polytechnic University in Mar. 2024.** Among more than twenty dissertations in the same period, mine was the only awarded one.
- **Supervised Machine Learning: Regression and Classification by Stanford ONLINE in Mar. 2023.** I believe the combination of prostheses and machine learning is the key to the future.
- **Registered Prosthetist/Orthotist by the International Society for Prosthetics and Orthotics in Sep. 2018.** I am very happy to become a P&O, which means I can independently help those who are suffering. However, learning never stops, and I still have a long way to go.

Self-evaluation:

- Confidence, resolute but not arbitrary;
- Creative troubleshooter, problem-solver;
- Sharp news sensitivity, prospective disciplinary view.