

# Zhenyuan Zhang

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## EDUCATION

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<b>PhD candidate in Human Movement Biomechanics</b> Research Institute for Sport and Exercise Science Liverpool John Moores University, United Kingdom	Jul 2023 – Present
<b>Master of Science in Sport and Clinical Biomechanics</b> School of Sport and Exercise Science Liverpool John Moores University, United Kingdom	Sep 2020 – Nov 2021
<b>Bachelor of Education in Human Movement Science</b> School of Exercise and Health Science Chengdu Sport University, China	Sep 2016 – Jun 2020

## SKILLS

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**Languages:** Python, Matlab, Git, Shell, L<sup>A</sup>T<sub>E</sub>X

**Computer Simulations:** OpenSim, Visual3D, Pyomeca, MyoSuite

**Biomechanics Tools:** Optical Motion Capture, Inertial Measurement Unit, Force Plates, EMG

**High-Performance Computing:** Slurm, AWS, Dask

**Machine Learning:** PyTorch, TensorFlow, Keras, Scikit-learn

## TECHNICALITIES

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<b>Biomechanics Laboratory Technician</b> Liverpool John Moores University, Contracted United Kingdom	Sep 2025 – Present
<ul style="list-style-type: none"><li>Built up and fine-tuned 3 advanced biomechanics systems with the senior technician, provided professional training for staff and students. I am also responsible for managing them for both teaching and research activities.</li><li>System1: 10 Qualysis Arqus motion capture cameras integrated with 8 Qualysis Miquus cameras for marker-less motion capture, 2 Kistler force plates, 16 Delsys Trigno EMGs.</li><li>System2: 8 Qualysis Arqus motion capture cameras integrated with a Treadmetrix treadmill (AMTI force plate embedded), 16 Delsys Trigno EMGs and 8 Noraxon EMGs.</li><li>System3: 14 Vicon Vero motion capture cameras integrated with 16 Vicon T-series cameras, 2 Kistler force plates, 8 Vicon Blue Trident IMUs and 16 Delsys Trigno EMGs.</li></ul>	

<b>Machine Learning and Biomechanics Researcher</b> SportScientia Ltd., Contracted Remote	Jul 2023 – Present
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- Developed and validated deep learning neural network models to estimate ground reaction forces from instrumented insoles for various movement tasks.
- Validated instrumented insoles with sensor fusion algorithm for measuring spatiotemporal gait parameters against optical motion capture and force plates for athletic performance and load monitoring applications.
- Assisted in developing cloud computing pipelines with AWS to automate data processing and analysis for the instrumented insoles.

<b>Graduate Research Assistant</b> Liverpool John Moores University, Contracted United Kingdom	Nov 2021 – Jul 2023
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**Assisted in commercial projects with New Balance Athletics, USA to test biomechanical interactions between soccer boots with different studs and artificial turfs using high-speed motion capture and force plates.**

**Assisted in commercial projects with New Balance Athletics, USA to test effects of different running shoes on lower limb biomechanics and muscle co-contractions during treadmill running using motion capture integrated with instrumented treadmill and EMGs.**

## PUBLICATIONS

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**Zhang, Z.**, Verhuel, J., Robinson, M., and Lake, M. Estimating ground reaction forces in dynamic sports movements using instrumented insoles and deep learning. *Oral Presentation at XXX Congress of International Society of Biomechanics, p.85033, Stockholm, Sweden.* (2025)

Yang, C., Yang, Y., Xu, Y., **Zhang, Z.**, Lake, M., and Fu, W. Whole leg compression garments influence lower limb kinematics and associated muscle synergies during running. *Frontiers in Bioengineering and Biotechnology, 12, 1310464.* (2024)

**Zhang, Z.** and Lake, M. Rate of knee flexion at the instant of landing during running can influence initial knee joint stiffness estimates due to running shoe cushioning. *Oral Presentation at XXIX Congress of International Society of Biomechanics, p.314, Fukuoka, Japan.* (2023)

**Zhang, Z.** and Lake, M. A re-examination of the measurement of foot strike mechanics during running: the immediate effect of footwear midsole thickness. *Frontiers in Sports and Active Living, 4, 824183.* (2022)

**Zhang, Z.** and Lake, M. A comparison of unmatched and matched filtering approaches for knee joint stiffness calculation during running. *Oral Presentation at 40<sup>th</sup> International Society of Biomechanics in Sports, Proceedings Archive, 40(1), 807, Liverpool, United Kingdom.* (2022)

## PROJECTS

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### **TechLayer** | [GitHub](#)

- A Python project which trained and implemented a deep learning model to predict Ground Reaction Forces (GRFs) from IMU and pressure sensor data collected from instrumented insoles during various dynamic sports movements.
- The model is trained and validated on a dataset of 32 participants using High-Performance Computing (HPC) clusters and demonstrated high accuracy in predicting vertical and anterior-posterior GRFs again force plates.

### **Wearable\_IK** | [GitHub](#)

- A Python project integrating open-source sensor fusion algorithms and OpenSim API to estimate joint kinematics from IMU data and validating the results against optical motion capture data.
- It automates the entire workflow from data loading, preprocessing, sensor fusion, sensor-to-segment calibration, inverse kinematics, to results visualization
- It also features parallelized computing to speed up processing and a calibration-free approach for IMU sensors as it does not require magnetometers.

### **Wearable\_System(Under Development)** | [GitHub](#)

- A Python project integrating **TechLayer** and **Wearable\_IK** to simulate neural-muscular dynamics from a complete set of wearable sensors (instrumented insoles + IMUs + EMGs) using optimal control framework in OpenSim.

### **My\_Website** | [GitHub](#)

- A personal academic website adapted from an open-source TypeScript template for fun.

## TEACHING

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### **Graduate Teaching Assistant**

Nov 2021 – Nov 2025

Liverpool John Moores University, Contracted  
United Kingdom

- Assisted in biomechanics lectures and practical laboratory sessions for optical motion capture cameras, force plates, IMUs and EMGs at undergraduate and master levels.
- Provided one-on-one tutorial support for students' projects and technical training of setting up and using the equipment for data collection of students' projects.

## REFERENCES

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References available upon request.