Zhenyuan Zhang

z.zhang@2023.ljmu.ac.uk | LinkedIn | GitHub | Personal Website | Liverpool, United Kingdom

Education

PhD candidate in Human Movement Biomechanics Jul 2023 – Present
Research Institute for Sport and Exercise Science
Liverpool John Moores University, United Kingdom

Master of Science in Sport and Clinical Biomechanics Sep 2020 – Nov 2021
School of Sport and Exercise Science
Liverpool John Moores University, United Kingdom

Bachelor of Education in Human Movement Science Sep 2016 – Jun 2020
School of Exercise and Health Science
Chengdu Sport University, China

Skills

Languages: Python, Matlab, Git, Shell, LaTeX

Computer Simulations: OpenSim, Visual3D, Pyomeca, MyoSuite

Biomechanics Tools: Optical Motion Capture, Inertial Measurement Units, Force Plates, Electromyography

High-Performance Computing: Slurm, AWS, Dask

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

Technicalities

Biomechanics Laboratory Technician Sep 2025 – Present
Liverpool John Moores University, Contracted
United Kingdom

- 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.
- System1: 10 Qualysis® Arqus motion capture cameras integrated with 8 Qualysis® Miqus cameras for marker-less motion capture, 2 Kistler® force plates, 16 Delsys® Trigno EMGs.
- System2: 8 Qualysis® Arqus motion capture cameras integrated with a Treadmetrix® treadmill (AMTI® force plate embedded), 16 Delsys® Trigno EMGs and 8 Noraxon® EMGs.
- 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.

Machine Learning and Biomechanics Researcher Jul 2023 – Present
SportScientia Ltd., Contracted
Remote

- 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.

Graduate Research Assistant Nov 2021 – Jul 2023
Liverpool John Moores University, Contracted
United Kingdom

- 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

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 40th International Society of Biomechanics in Sports, Proceedings Archive, 40(1), 807, Liverpool, United Kingdom.* (2022)

Projects

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 against 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 API.

My_Website | *GitHub*

- A project to build and deploy my personal academic website from an open-source TypeScript template for fun.

Teaching

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

References available upon request.