Wen Wu

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Education Background

2013 – 2017	**Ph.D. of Engineering (Mechanical Engineering)**	
	The University of Melbourne	
	Melbourne International Research Scholarship	
	Melbourne International Fee Remission - 100%	

2008 – 2012 **Bachelor of Engineering (Engineering Mechanics)** *GPA 3.8/4.0*
Tianjin University (TJU)
Caterpillar Inc. Scholarship,
Samsung Co., Ltd. Scholarship,
National Scholarship

2009 – 2012 **Bachelor of Economics (Finance)**, TJU-Nankai dual degree
Nankai University

Work Experience

Postdoctoral Research Fellow	2017 – Current
Networked Society Institute,	
University of Melbourne, Australia	*9/2017 – 1/2018*
Joint Department of Biomedical Engineering,	
University of North Carolina at Chapel Hill & North Carolina State University, USA	*1/2018 – 11/2018*
Centre for Health, Exercise & Sports Medicine,	
University of Melbourne, Australia	*11/2018 – Current*

Responsibilities:
- Undertook independent and collaborative research projects in the following areas:
  - *Machine learning (reinforcement learning, computer vision)*
  - *Computational biomechanics*
  - *Human-machine interaction (wearable robotics, sensors)*
- Supervised PhD/master students and delivered lectures/tutorial sessions in programming and computational modelling related topics.

Achievements:
- Acquired extensive programming experience through a wide variety of research projects.
- Greatly improved problem-solving and analytical skills.
- Gained ability to quickly grasp and apply technical knowledge.
- Published multiple research papers in top-tier journals and presented studies in conferences.

Research Data & Equipment Specialist	2018 – Current

Centre for Health, Exercise & Sports Medicine, University of Melbourne, Australia

Responsibilities:
- Responsible for data extraction/cleaning/visualisation for scientific research projects conducted in the centre.
- Performed data mining from legacy data to discover valuable research questions.
- Developed automated data acquisition/processing pipelines for lab equipment.

Achievements:
- Known as the 'data wizard' in the centre.
- The 'data-driven' approaches opened-up multiple research opportunities.

Professional Projects

Run & Attack – An Online Multiplayer Mobile Game   2021

AWS (DynamoDB, Lambda, Cognito, GameLift, Polly), C#, Unity, JavaScript

- A self-motivated project.
- An online player-vs-player mobile game developed on Unity platform, which combines GPS-tracked running activity with board game, aiming to promote a healthier lifestyle through fun gaming.
- The backend was developed using AWS services, including DynamoDB, Lambda, Cognito, Amazon GameLift, and Amazon Polly.

Scan for demo video
https://youtu.be/pwyVY6_ytLA

3d Marker-less Motion Capturing System   2020 – 2021

Machine learning, Computer vision, Python, Matlab

- A marker-less multi-camera motion capturing system developed and validated using Python and Matlab, as an alternative to the conventional expensive and unportable system (e.g. marker-based Vicon system).
- The system is low-cost and portable, making it perfect for many applications in clinics, sports, ergonomics, etc.

Scan for demo video
https://youtu.be/l8hfi-9soHY

Musculoskeletal Modelling Research   2013 – 2021

Matlab, C++

- Developed and used a series of computational musculoskeletal models to accurately predict internal muscle and joint forces.
- Multiple research publications on this topic.

Applying Reinforcement Learning Technique to Biomechanical Modelling   2018 – 2019

Machine learning, Reinforcement learning, Python, C#, Unity,

- Developed an alternative reinforcement-learning-based technique to conventional modelling approaches to predict joint moments based on either measured kinematics or surface electromyography.
- Research paper published.

Human-Machine Interaction Research   2016 – 2018
Matlab, Robotics, Sensors

- Conducted multiple research that involved wearable robotics such as exoskeleton and robotic prosthesis.
- Developed an optimised robotic prosthesis controller.
- Investigated the influence of the exoskeleton on the human body.
- Research paper published.

Scan for demo video
https://youtu.be/1ayHAtrIhRc

Real-Time Virtual Reality System for Self-Directed Upper Limb Rehabilitation   2017
Matlab, C#, Unity, Sensors, VR

- Built computational model for real-time arm dynamic simulation using Matlab and C#, and developed VR environment in Unity.
- Designed and prototyped the sensor kit (e.g. inertial measurement unit, electromyography, wireless data acquisition system).
- Proposed and wrote all the technical and budget sections, and secured a $32,000 seed fund for the project

Research Achievements / Academic Journals

Wu, W., Saul, K. R., & Huang, H. (2021). Using reinforcement learning to estimate human joint moments from electromyography or joint kinematics: An Alternative Solution to Musculoskeletal-Based Biomechanics. Journal of Biomechanical Engineering, 143(4), 44502.

Wu, W., Fong, J., Crocher, V., Lee, P. V. S., Oetomo, D., Tan, Y., & Ackland, D. C. (2018). Modulation of shoulder muscle and joint function using a powered upper-limb exoskeleton. Journal of Biomechanics, 72, 7–16. https://doi.org/10.1016/j.jbiomech.2018.02.019

Wu, W., Lee, P. V. S., & Ackland, D. C. (2017). The sensitivity of shoulder muscle and joint force predictions to changes in joint kinematics: A Monte-Carlo analysis. Gait & Posture, 54, 87–92.

Wu, W., Lee, P. V. S., Bryant, A. L., Galea, M., & Ackland, D. C. (2016). Subject-specific musculoskeletal modeling in the evaluation of shoulder muscle and joint function. Journal of Biomechanics, 49(15), 3626–3634.

Wu, W., Bryant, A. L., Hinman, R. S., Bennell, K. L., Metcalf, B. R., Hall M., Campbell, P. K., & Paterson, K., Walking-related knee contact forces and associations with knee pain across people with mild, moderate and severe radiographic knee osteoarthritis: a cross-sectional study. Osteoarthritis and Cartilage **(Under review)**

Williams, C., Kolic, J., **Wu, W.,** & Paterson, K. (2021). Soft soled footwear has limited impact on toddler gait. Plos One, 16(5), e0251175.

McManus, F., Pranata, A., Simpson, J. A., Farragher, J., Crofts, S., **Wu, W.,** & Bryant, A. (2021). Does pain self-efficacy influence initial bending following exercise in adults with chronic low back pain? International Journal of Epidemiology (Vol. 50, p. 152).

Ackland, D. C., **Wu, W.,** Thomas, R., Patel, M., Page, R., Sangeux, M., & Richardson, M. (2019). Muscle and Joint Function After Anatomic and Reverse Total Shoulder Arthroplasty Using a Modular Shoulder Prosthesis. Journal of Orthopaedic Research®.

Ackland, D. C., Robinson, D. L., Wilkosz, A., **Wu, W.,** Richardson, M., Lee, P., & Tse, K. M. (2018). The influence of rotator cuff tears on muscle and joint-contact loading after reverse total shoulder arthroplasty. Journal of Orthopaedic Research®, 37(1), 211–219.

Ackland, D., Griggs, I., Hislop, P., **Wu, W.,** Patel, M., & Richardson, M. (2017). An intramedullary Echidna pin for fixation of comminuted clavicle fractures: a biomechanical study. Journal of Orthopaedic Surgery and Research, 12(1), 122.

Hall, D. A., Snelling, S. R., Ackland, D. C., **Wu, W.,** & Morton, J. M. (2015). Bending Strength and Stiffness of Canine Cadaver Spines After Fixation of a Lumbar Spinal Fracture-Luxation Using a Novel Unilateral Stabilization Technique Compared to Traditional Dorsal Stabilization. Veterinary Surgery, 44(1), 94–102.

Wu, W., Lee, P. V. S., Bryant, A. L., Ackland, D. C. (2016). The reliability of generic and scaled-generic musculotendon parameters in shoulder musculoskeletal modelling. Study presented at *Annual Australian & New Zealand Orthopaedic Research Society Conference (ANZORS)*, Melbourne, Australia.

Wu, W., Lee, P. V. S., Ackland, D. C. (2016). The sensitivity of model predictions of muscle function to changes in shoulder girdle kinematics. Study presented at *ANZORS*, Melbourne, Australia.

Wu, W., Fong, J., Oetomo, D., Lloyd, D., Besier, T., Halaki, M., Ginn, K., Lee, P.V.S. and Ackland, D.C., (2015). Muscle and joint contact loading during assisted upper-extremity movements performed with a robotic exoskeleton. Study presented at *25th International Society of Biomechanics Conference*, Glasgow, UK.

Wu, W., Lee, P. V. S., Ackland, D. C. (2015). The influence of an assistive robotic exoskeleton on upper-limb muscle and joint function. Study presented at *ANZORS*, Auckland.

Wu, W., Ginn, K., Halaki, M., Bryant, A. L., Lloyd, D., Besier, T., Lee, P. V. S, Ackland, D. C. (2014). A musculoskeletal model for the evaluation of shoulder muscle and joint function. Study presented at *ANZORS*, Adelaide, Australia.