Jennifer Hicks
Deputy Director, Wu Tsai Human Performance Alliance

Bio

Jennifer Hicks is Deputy Director of the Wu Tsai Human Performance Alliance at Stanford, with a focus on collaborative research projects and programs to advance our understanding of the biological principles underlying human performance. Dr. Hicks also serves as the Director of Research for the Mobilize Center, an NIH Biomedical Technology Resource Center at Stanford University and the Restore Center, an NIH-funded center that brings state-of-the-art engineering tools to rehabilitation scientists. Her research is focused on interfacing biomechanical modeling with statistical and machine learning methods to predict the effects of surgery and other interventions on human movement. She is also using data from mobile phones and other novel sources to understand physical activity and performance. Dr. Hicks helps run the multi-faceted training and outreach programs of the Human Performance Alliance, the Mobilize Center and the Restore Center. In addition, as the Research and Development Manager for the OpenSim software project, she guides the project’s development team and serves as the voice of the software user/researcher.

Current Role at Stanford

Deputy Director, Wu Tsai Human Performance Alliance at Stanford
Director of Research, Mobilize Center
Directory of Research, Restore Center
Research and Development Manager, OpenSim Project

Links

- OpenSim Project: http://opensim.stanford.edu
- Mobilize Center: http://mobilize.stanford.edu
- Neuromuscular Biomechanics Lab: http://nmbl.stanford.edu

Publications

Publications

- Independently ambulatory children with spina bifida experience near-typical knee and ankle joint moments and forces during walking. *Gait & posture* 2022; 99: 1-8

- Mindset is associated with future physical activity and management strategies in individuals with knee osteoarthritis. *Annals of physical and rehabilitation medicine* 2022; 65 (6): 101634
• **Running in the wild: Energetics explain ecological running speeds.** *Current biology : CB*
  Selinger, J. C., Hicks, J. L., Jackson, R. W., Wall-Scheffler, C. M., Chang, D., Delp, S. L.
  2022

• **OpenSense: An open-source toolbox for inertial-measurement-unit-based measurement of lower extremity kinematics over long durations.** *Journal of neuroengineering and rehabilitation*
  2022; 19 (1): 22

• **Coupled exoskeleton assistance simplifies control and maintains metabolic benefits: A simulation study.** *PloS one*
  Bianco, N. A., Franks, P. W., Hicks, J. L., Delp, S. L.
  1800; 17 (1): e0261318

• **Deep reinforcement learning for modeling human locomotion control in neuromechanical simulation.** *Journal of neuroengineering and rehabilitation*
  Song, S., Kidzinski, L., Peng, X. B., Ong, C., Hicks, J., Levine, S., Atkeson, C. G., Delp, S. L.
  2021; 18 (1): 126

• **An open-source and wearable system for measuring 3D human motion in real-time.** *IEEE transactions on bio-medical engineering*
  Slade, P., Habib, A., Hicks, J. L., Delp, S. L.
  2021; PP

• **An ecosystem service perspective on urban nature, physical activity, and health.** *Proceedings of the National Academy of Sciences of the United States of America*
  2021; 118 (22)

• **Wearable sensors enable personalized predictions of clinical laboratory measurements.** *Nature medicine*
  Dunn, J., Kidzinski, L., Runge, R., Witt, D., Hicks, J. L., Schussler-Fiorenza Rose, S. M., Li, X., Bahmani, A., Delp, S. L., Hastie, T., Snyder, M. P.
  2021

• **The effects of motor modularity on performance, learning and generalizability in upper-extremity reaching: a computational analysis.** *Journal of the Royal Society, Interface*
  Al Borno, M., Hicks, J. L., Delp, S. L.
  2020; 17 (167): 20200011

• **Pre-operative gastrocnemius lengths in gait predict outcomes following gastrocnemius lengthening surgery in children with cerebral palsy.** *PloS one*
  Rajagopal, A., Kidzinski, L., McGlaughlin, A. S., Hicks, J. L., Delp, S. L., Schwartz, M. H.
  2020; 15 (6): e0233706

• **Testing Simulated Assistance Strategies on a Hip-Knee-Ankle Exoskeleton: a Case Study**
  IEEE.2020: 700-707

• **OpenSim Moco: Musculoskeletal optimal control.** *PLoS computational biology*
  Dembia, C. L., Bianco, N. A., Falisse, A. n., Hicks, J. L., Delp, S. L.
  2020; 16 (12): e1008493

• **Deep neural networks enable quantitative movement analysis using single-camera videos.** *Nature communications*
  Kidziński, #. n., Yang, B. n., Hicks, J. L., Rajagopal, A. n., Delp, S. L., Schwartz, M. H.
  2020; 11 (1): 4054

• **Best practices for analyzing large-scale health data from wearables and smartphone apps** *NPJ DIGITAL MEDICINE*
  Hicks, J. L., Althoff, T., Sosic, R., Kuhar, P., Bostjancic, B., King, A. C., Leskovec, J., Delp, S. L.
  2019; 2

• **Best practices for analyzing large-scale health data from wearables and smartphone apps.** *NPJ digital medicine*
  Hicks, J. L., Althoff, T., Sosic, R., Kuhar, P., Bostjancic, B., King, A. C., Leskovec, J., Delp, S. L.
  2019; 2: 45
• Predicting gait adaptations due to ankle plantarflexor muscle weakness and contracture using physics-based musculoskeletal simulations. *PLoS computational biology*
  Ong, C. F., Geijtenbeek, T. n., Hicks, J. L., Delp, S. L.
  2019; 15 (10): e1006993

• Machine learning in human movement biomechanics: Best practices, common pitfalls, and new opportunities *JOURNAL OF BIOMECHANICS*
  Hallaj, E., Rajagopal, A., Fiterau, M., Hicks, J. L., Hastie, T. J., Delp, S. L.
  2018; 81: 1–11

• Estimating the effect size of surgery to improve walking in children with cerebral palsy from retrospective observational clinical data. *Scientific reports*
  Rajagopal, A., Kidzinski, L., McLaughlin, A. S., Hicks, J. L., Delp, S. L., Schwartz, M. H.
  2018; 8 (1): 16344

• Estimating the effect size of surgery to improve walking in children with cerebral palsy from retrospective observational clinical data *SCIENTIFIC REPORTS*
  Rajagopal, A., Kidzinski, L., McLaughlin, A. S., Hicks, J. L., Delp, S. L., Schwartz, M. H.
  2018; 8

• Machine learning in human movement biomechanics: Best practices, common pitfalls, and new opportunities. *Journal of biomechanics*
  Hallaj, E., Rajagopal, A., Fiterau, M., Hicks, J. L., Hastie, T. J., Delp, S. L.
  2018

• OpenSim: Simulating musculoskeletal dynamics and neuromuscular control to study human and animal movement *PLoS computational biology*
  2018; 14 (7)

• OpenSim: Simulating musculoskeletal dynamics and neuromuscular control to study human and animal movement. *PLoS computational biology*
  2018; 14 (7): e1006223

• Perspectives on Sharing Models and Related Resources in Computational Biomechanics Research *JOURNAL OF BIOMECHANICAL ENGINEERING-TRANSACTIONS OF THE ASME*
  2018; 140 (2)

• Introduction to NIPS 2017 Competition Track *NIPS’17 COMPETITION: BUILDING INTELLIGENT SYSTEMS*
  2018: 1–23

• Learning to Run Challenge: Synthesizing Physiologically Accurate Motion Using Deep Reinforcement Learning *NIPS’17 COMPETITION: BUILDING INTELLIGENT SYSTEMS*
  Kidzinski, L., Mohanty, S. P., Ong, C. F., Hicks, J. L., Carroll, S. F., Levine, S., Salathe, M., Delp, S. L., Escalera, S., Weimer, M.
  2018: 101–20

• Learning to Run Challenge Solutions: Adapting Reinforcement Learning Methods for Neuromusculoskeletal Environments *NIPS’17 COMPETITION: BUILDING INTELLIGENT SYSTEMS*
  2018: 121–53

• Large-scale physical activity data reveal worldwide activity inequality *NATURE*
  Althoff, T., Sosic, R., Hicks, J. L., King, A. C., Delp, S. L., Leskovec, J.
  2017; 547 (7663): 336–+

• Preparatory co-activation of the ankle muscles may prevent ankle inversion injuries. *Journal of biomechanics*
  Demers, M. S., Hicks, J. L., Delp, S. L.
  2017; 52: 17-23
Fallen, M., Delp, S. L., Hicks, J. L.
2016; 63 (10): 2068-2079

- Simulating Ideal Assistive Devices to Reduce the Metabolic Cost of Running. *PLOS ONE*
  Uchida, T. K., Sith, A., Pouya, S., Dembia, C. L., Hicks, J. L., Delp, S. L.
  2016; 11 (9)

- Simulation-Based Design for Wearable Robotic Systems: An Optimization Framework for Enhancing a Standing Long Jump. *IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING*
  Ong, C. F., Hicks, J. L., Delp, S. L.
  2016; 63 (5): 894-903

- Stretching Your Energetic Budget: How Tendon Compliance Affects the Metabolic Cost of Running. *PloS one*
  Uchida, T. K., Seth, A., Pouya, S., Dembia, C. L., Hicks, J. L., Delp, S. L.
  2016; 11 (3)

- The mobilize center: an NIH big data to knowledge center to advance human movement research and improve mobility. *Journal of the American Medical Informatics Association*
  Ku, J. P., Hicks, J. L., Hastie, T., Leskovec, J., Rê, C., Delp, S. L.
  2015; 22 (6): 1120-1125

- Predictive Simulation Generates Human Adaptations during Loaded and Inclined Walking. *PLOS ONE*
  Dorn, T. W., Wang, J. M., Hicks, J. L., Delp, S. L.
  2015; 10 (4)

  Hicks, J. L., Uchida, T. K., Seth, A., Rajagopal, A., Delp, S. L.
  2015; 137 (2)

- Musculoskeletal modelling deconstructs the paradoxical effects of elastic ankle exoskeletons on plantar-flexor mechanics and energetics during hopping. *JOURNAL OF EXPERIMENTAL BIOLOGY*
  Farris, D. J., Hicks, J. L., Delp, S. L., Sawicki, G. S.
  2014; 217 (22): 4018-4028

- Muscle contributions to vertical and fore-aft accelerations are altered in subjects with crouch gait. *Gait & posture*
  Steele, K. M., Seth, A., Hicks, J. L., Schwartz, M. H., Delp, S. L.
  2013; 38 (1): 86-91

- Can biomechanical variables predict improvement in crouch gait? *GAIT & POSTURE*
  Hicks, J. L., Delp, S. L., Schwartz, M. H.
  2011; 34 (2): 197-201

- Muscle contributions to support and progression during single-limb stance in crouch gait. *JOURNAL OF BIOMECHANICS*
  Steele, K. M., Seth, A., Hicks, J. L., Schwartz, M. S., Delp, S. L.
  2010; 43 (11): 2099-2105
• CROUCH GAIT REPRESENTS A SIMPLIFIED MUSCULAR SUPPORT STRATEGY DURING SINGLE-LIMB STANCE COMPARED TO UNIMPAIRED GAIT ASME Summer Bioengineering Conference
  Steele, K. M., Seth, A., Hicks, J. L., Schwartz, M., Delp, S. L.
  AMER SOC MECHANICAL ENGINEERS. 2009: 1093–1094

• Crouched postures reduce the capacity of muscles to extend the hip and knee during the single-limb stance phase of gait JOURNAL OF BIOMECHANICS
  Hicks, J. L., Schwartz, M. H., Arnold, A. S., Delp, S. L.
  2008; 41 (5): 960-967

• The effect of excessive tibial torsion on the capacity of muscles to extend the hip and knee during single-limb stance GAIT & POSTURE
  Hicks, J., Arnold, A., Anderson, F., Schwartz, M., Delp, S.
  2007; 26 (4): 546-552

• Clinical applicability of using spherical fitting to find hip joint centers GAIT & POSTURE
  Hicks, J. L., Richards, J. G.
  2005; 22 (2): 138-145