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DANIEL C MCFARLAND, PHD

Biomechanics Associate

Dr. Daniel McFarland is a Biomechanics Associate at Guidance Engineering and Applied Research specializing in accident reconstruction and biomechanics. By applying the principles of engineering to the human body, Dr. McFarland determines the forces and motions experienced during an event and compares them to the forces and motions required to create an injury and those experienced during activities of daily living. He also uses injuries as evidence to determine how an accident occurred. Dr. McFarland evaluates the risk of injury using computational models, anthropometric testing devices, statistical analyses, and injury databases. Dr. McFarland conducts biomechanical analyses for injury claims related to motor vehicle accident, slip trip and falls, and recreational activities.

Dr. McFarland's research interests include upper extremity biomechanics, ergonomics, musculoskeletal disorders, and computational modeling and simulations. Prior to joining Guidance Engineering, Dr. McFarland was a Research Associate at the Shirley Ryan AbilityLab (the #1 rehabilitation hospital in the USA). As a Research Associate, he conducted research to understand the loss of grip strength that occurs following surgical salvage procedures for wrist osteoarthritis by developing a musculoskeletal model of the hand and wrist. His research included comparing simulations of functional tasks to experimental outcomes of strength, electromyography, and kinematics. Dr. McFarland's Ph.D. research at North Carolina State University, focused on optimizing workspace design to prevent shoulder musculoskeletal disorders.

Academic Credentials

Ph.D. Mechanical Engineering, North Carolina State University, 2018
B.S. Mechanical Engineering, Northwestern University, 2013

Certifications

Certified XL Tribometrist, CXLT, for floor slip resistance measurements

Prior Experience and Academic Appointments

Research Associate, Shirley Ryan AbilityLab, 2018-2021
T32 Post-Doctoral Fellow, Northwestern University, 2019-2021
Staff Lecturer, Northwestern University, 2020
Staff Lecturer, North Carolina State University, 2018

Professional Affiliations

American Society of Biomechanics (member)
Biomedical Engineering Society (member)
Society of Automotive Engineers (member)

Publications

McFarland DC, Binder-Markey BI, Nichols JA, Wohlman SJ, de Bruin M, Murray WM. A musculoskeletal model of the hand and wrist capable of simulating functional tasks. *IEEE Trans Biomed Eng*. 2022. PP. doi: 10.1109/TBME.2022.3217722.

McFarland DC, Nichols JA, Bednar MS, Wohlman SJ, Murray WM. Corrigendum to "Connecting the wrist to the hand: A simulation study exploring changes in thumb-tip endpoint force following wrist surgery" [J. Biomech. 58 (2017) 97-104]. *J Biomech.* 2021. doi: 10.1016/j.jbiomech.2021.110859.

McFarland DC, Wohlman SJ, Murray WM. Corrigendum to "Bridging the gap between cadaveric and in vivo experiments: A biomechanical model evaluating thumb-tip endpoint forces" [J. Biomech. 46(5) (2013) 1014-1020]. *J Biomech,* 2021. doi: 10.1016/j.jbiomech.2021.110858.

McFarland DC, Brynildsen AG, Saul KR. Sensitivity of neuromechanical predictions to choice of glenohumeral stability modeling approach. *J Appl Biomech*. 2020. 1-10. doi: 10.1123/jab.2019-0088

Dixit NN, McFarland DC, Fisher MB, Cole JH, Saul KR. Integrated iterative musculoskeletal modeling predicts bone morphology following brachial plexus birth injury (BPBI). *J Biomech*. 2020. 103, 109658. doi: 10.1016/j.jbiomech.2020.109658.

Dixit NN, McFarland DC, Saul KR. Computational analysis of glenohumeral joint growth and morphology following neonatal brachial plexus injury. *J Biomech*. 2019. 86, 48-54. doi: 10.1016/j.jbiomech.2019.01.040.

McFarland DC, McCain EM, Poppo MN, Saul KR. Spatial dependency of glenohumeral joint stability during dynamic unimanual and bimanual pushing and pulling. *J Biomech Eng-T*. 2019. 141(5), 051006-1. doi: 10.1115/1.4043035

McFarland DC, Poppo MN, McCain EM, Saul KR. Spatial dependency of shoulder muscle demand during dynamic unimanual and bimanual pushing and pulling. *Appl Ergon*. 2018. 73, 199-205. doi: 10.1016/j.apergo.2018.07.011.

Published Abstracts and Conference Proceedings

McFarland DC, Bednar MS, Murray WM. 2020. Sensitivity of simulated grip strength to wrist posture. American Society of Biomechanics 2020 Annual Meeting. Atlanta, GA.

McFarland DC, Bednar MS, Murray WM. 2020. Alter axes of rotation and mechanical action of wrist muscles explains reduced grip strength following proximal row carpectomy, but not scaphoid-excision four-corner fusion. Federation of European Societies for the Surgery of the Hand 2020 Annual Meeting. Basel, Switzerland.

McFarland DC, Murray WM. 2019. Predicting maximal grip strength of health adults through forward–dynamic optimization. Biomedical Engineering Society 2019 Annual Meeting, Philadelphia, PA.

McFarland DC, McCain EM, Poppo MN, Saul KR. 2018. Glenohumeral joint stability during dynamic pushing and pulling. American Society of Biomechanics 2018 Annual Meeting. Rochester, MN. (Journal of Biomechanics Award Finalist)

Dixit NN, McFarland DC, Cole JH, Fisher MB, Saul KR 2018. Integrated iterative musculoskeletal modeling reveals muscular contributions to glenohumeral deformity after brachial plexus birth injury. World Congress of Biomechanics 2018 Annual Meeting. Dublin, Ireland.

McFarland DC, Poppo MN, McCain EM, Saul KR. 2017. Spatial dependency of shoulder muscle demand during dynamic unimanual pushing and pulling. American Society of Biomechanics 2017 Annual Meeting. Boulder, CO.

Dixit NN, McFarland DC, Saul KR. 2017. Finite element analysis prediction of glenohumeral joint growth following neonatal brachial plexus injury. American Society of Biomechanics 2017 Annual Meeting. Boulder, CO.

McFarland DC, Saul KR. 2016. Evaluation of task-space neuromuscular control applied to upper limb reaching. American Society of Biomechanics 2016 Annual Meeting. Raleigh, NC.