



**Exponent<sup>®</sup>**  
Engineering & Scientific Consulting

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## Professional Profile

Dr. Hyun Gu Kang is a specialist who has helped clients navigate the complex world of new technology-market fit, data-based decision support, human-centered design and real-world participant studies. He brings over 20 years of experience and expertise in novel technology evaluation, usability and UX, aging and health, statistics and epidemiology, biomechanics and ergonomics, and mathematical modeling. With his expertise, he has guided local and federal governments as well as corporate clients in healthcare delivery IT, logistics, EHS and robotics. He solved problems in product development and adoption, program development and launch, community health, occupational health, data science, enterprise performance, and logistics engineering.

Dr. Kang is known for his deep knowledge of human participant studies of novel experiences and technology, which he leverages to help clients build and iterate on products that perform in even the most challenging usage scenarios. His experience in health data, user studies, program and product launches, and technology launch decisions make him an invaluable resource for leaders seeking to stay ahead of the curve. He is also known for systems and mathematical modeling with applications in behavior prediction, health outcomes, music and the brain, failure modes, recommendation systems, and decision support.

Employing expertise in statistics, machine learning, and system modeling, Dr. Kang can assist clients with developing and executing data strategies, modeling and taming complex systems, predict the efficacy and cost of an intervention, and understanding user experience for the next product iteration. He is skilled in protocol development, human subjects compliance, clinical trial design, risk factor identification, process automation, data visualization, ergonomic evaluations, user studies, and usability studies of novel technology.

Before joining Exponent, Dr. Kang helped numerous government and corporate clients in healthcare, logistics, robotics, and maintenance industries. These clients improved their employee engagement, enterprise performance, and data strategy and made investment decisions of nascent technology.

## Academic Credentials & Professional Honors

Ph.D., Kinesiology, University of Texas, Austin, 2007

M.S., Biomedical Engineering, University of Virginia, 2003

B.S., Chemical Engineering, University of Illinois, Urbana-Champaign, 2001

## Academic Appointments

Assistant Professor, Kinesiology, California State University San Marcos, 2014-2020

Assistant Professor, Kinesiology and Health Promotion, California State Polytechnic University, Pomona, 2009-2014

Research Fellow, Medicine, Harvard Medical School, 2007-2009

## Prior Experience

Healthcare Analyst, Alaka'ina Foundation for Defense Health Agency, 2023

Senior Product Manager – Technical, Amazon Robotics, 2021-2022

Senior Human Factors Engineer, Amazon Robotics, 2021

Data Scientist, TEKsystems for Defense Health Agency, 2020

Assistant Professor, California State University San Marcos, 2014-202

Assistant Professor, California State Polytechnic University, Pomona, 2009-2014

Research Assistant Scientist, Marcus Institute for Aging Research and Harvard Medical School, 2007-2009

## Professional Affiliations

2004 - American Society of Biomechanics, Member

2004 - International Society of Biomechanics, Member

2007 - American Geriatrics Society, Member

2007 - The Gerontological Society of America, Member

2008 - Gait and Clinical Movement Analysis Society, Member

2014 - International Society of Posture and Gait Research, Member

## Languages

Korean

Japanese

## Publications

Abel MF, Damiano DL, Gilgannon M, Carmines D, Kang HG, Bennett BC, Laws ER. Biomechanical changes in gait following selective dorsal rhizotomy. J Neurosurg. 2005;102(2 Suppl):157-62.

Kang HG, Dingwell JB. A direct comparison of local dynamic stability during unperturbed standing and walking. Exp Brain Res. 2006;172(1):35-48.

Kang HG, Dingwell JB. Intra-session reliability of local dynamic stability of walking. Gait Posture.

2006;24(3):386-90. Dingwell JB, Kang HG, Marin LC. The effects of sensory loss and walking speed on the orbital dynamic stability of human walking. *J Biomech*. 2007;40(8):1723-30.

Dingwell JB, Kang HG. Differences between local and orbital dynamic stability during human walking. *J Biomech Eng*. 2007;129(4):586-93.

Kang HG, Dingwell JB. Separating the effects of age and walking speed on gait variability. *Gait Posture*. 2008;27(4):572-7. Leveille SG, Kiel DP, Jones RN, Roman A, Hannan MT, Sorond FA, Kang HG, Samelson EJ, Gagnon M, Freeman M, Lipsitz LA. The MOBILIZE Boston Study: design and methods of a prospective cohort study of novel risk factors for falls in an older population. *BMC Geriatr*. 2008;8:16.

Kang HG and Dingwell JB. Effects of Walking Speed, Strength and Range of Motion on Gait Stability in Healthy Older Adults. *J Biomech*. 2008; 41(14):2899-905.

Kang HG and Dingwell JB. Dynamic Stability of Superior vs. Inferior Segments during Walking in Young and Older Adults. *Gait and Posture*, 2009 Aug;30(2):260-3.

Kang HG and Dingwell JB. Dynamics and stability of muscle activations during walking in healthy young and older adults. *J Biomech*, 2009 Oct 16;42(14):2231-7.

Kang HG\*, Costa MD\*, Priplata AA, Goldberger AL, Peng CK, Starobinets OV, Kiely DK, Cupples LA, Lipsitz LA. Frailty and the Degradation of Complex Balance Dynamics during a Dual Task Protocol. *J Gerontology*, 2009 Dec;64(12):1304-11. \*co-first authorship

Galica AM, Kang HG, Priplata AA, D'Andrea SE, Starobinets OV, Sorond FA, Cupples LA, Lipsitz LA. Subsensory Vibrations to the Feet Reduce Gait Variability in Elderly Fallers: The MOBILIZE Boston Study. *Gait and Posture*, 2009 Oct;30(3):383-7.

Kang HG, Mahoney DF, Hoenig HM, Hirth VA, Bonato P, Hajjar I, Lipsitz LA. In-situ Monitoring of Health in Older Adults: Technologies and Issues. *J Am Ger Soc*, 2010 Aug 58(8): 1579-86.

Kang HG, Lipsitz LA. Stiffness Control of Balance during Quiet Standing and Dual task in Older Adults: The MOBILIZE Boston Study. *J. Neurophysiology*, 2010 Dec; 104(6): 3510-7.

Manor B, Costa MD, Hu K, Newton, E, Starobinets OV, Kang HG, Peng C-K, Novak V, and Lipsitz LA. Physiological complexity and system adaptability: Evidence from postural control dynamics of older adults. *J. Applied Physiology*, 2010 Dec; 109(6): 1786-91.

Nguyen US, Kiel DP, Li W, Galica AM, Kang HG, Hannan MT. Correlations of Clinical and Laboratory Measures of Balance in Older Men and Women: The MOBILIZE Boston Study. *Arthritis Care and Research*. 2012 Dec;64(12):1895-902. doi: 10.1002/acr.21783.

Kang HG, Quach L, Li W, Lipsitz LA. Stiffness Control of Balance during Dual Task and Prospective Falls in Older Adults: The MOBILIZE Boston Study. *Gait Posture*, 2013 Sep; 38(4):757-63. doi: 10.1016/j.gaitpost.2013.03.022

Fish KB and Kang HG. Learning Outcomes in a Stress Management Course: Online versus Face-to-Face. *MERLOT Journal of Online Learning and Teaching*. 10 (2), 2014.

Fish KB and Kang HG. Student Preferences for “Live”, Recorded, and Text-Based Lectures in a Stress Management Course. *Journal of Online Education*, 2014.

Nout-Lomas Y, Page K, Kang HG, Greene H. Objective Assessment of Gait in Xylazine-induced Ataxic Horses. *Equine Veterinary Journal*, July 2016 in press. DOI: 10.1111/evj.12602

Kang HG, Dingwell JB. Multiscale Entropy of EMG Dynamics during Walking in Young and Older Adults.

Kang HG, Velazquez V, Hino S, Rosario ER. Dalcroze Eurhythmics based Music and Movement Training in Transitional Care Brain Injury Patients: A Feasibility Study Approaches: An Interdisciplinary Journal of Music Therapy. 8(2), 2016.

Beaulieu R, Kang HG, Hino S. An action research approach to introduce Dalcroze Eurhythmics Method in a community of older adults as a promising strategy for fall prevention, injury recovery and socialization, International Journal of Action Research, 3-2017. 276-299. <https://doi.org/10.3224/ijar.v13i3.06>

## **Presentations**

Kang, H.G. and Dingwell, J.B., "Directly Comparing Standing and Walking Stabilities," Proceedings of the 28th Annual Meeting of the American Society of Biomechanics, Portland, OR. 2004.

Kang, H.G. and Dingwell, J.B., "Local Dynamic Stability of Standing Vs. Walking," Proceedings of the Progress in Motor Control V Meeting, State College, PA. 2005:pg. 4-4.

Dingwell, J.B., Kang H.G. and Marin L.C. "The Effects of Walking Speed on Orbital Stability of Human Walking". Proceedings of the 5th World Congress of Biomechanics, Munich, Germany. 2006.

Dingwell, J.B. and Kang, H.G., "Effects of Sensory Loss on Orbital Stability of Walking". Proceedings of the 5th World Congress of Biomechanics, Munich, Germany. 2006.

Kang, H.G. and Dingwell, J.B., "Orbital Stability of Overground vs. Treadmill Walking". Proceedings of the 5th World Congress of Biomechanics, Munich, Germany. 2006.

Kang, H.G. and Dingwell, J.B., "Reliability of Local Dynamic Stability of Human Walking". Proceedings of the 5th World Congress of Biomechanics, Munich, Germany. 2006.

Kang, H.G. and Dingwell, J.B., "Postural Local Dynamic Stability is Not Predictive of That During Locomotion," Proceedings of the XXth Congress of the International Society of Biomechanics, Cleveland, OH. 2006:pg. 39.

Marin, L.C., Kang, H.G. and Dingwell, J.B., "Changes in the Orbital Stability of Walking Across Speeds". Proceedings of the 30th Annual Meeting of the American Society of Biomechanics, Blacksburg, VA. 2006.

Dingwell, J.B. and Kang, H.G., "Effects of Sensory Loss on Orbital Stability of Walking". Proceedings of the 30th Annual Meeting of the American Society of Biomechanics, Blacksburg, VA. 2006.

Kang, H.G. and Dingwell, J.B., "Orbital Stability of Overground vs. Treadmill Walking". Proceedings of the 30th Annual Meeting of the American Society of Biomechanics, Blacksburg, VA. 2006.

Kang, H.G. and Dingwell, J.B., "Do Slower Walking Speeds in Healthy Older Adults explain their higher gait variability?". Gait and Clinical Movement Analysis Society 12th Annual Meeting, Springfield, MA. 2007.

Kang, H.G. and Dingwell, J.B., "Speed Controlled Comparison of Gait Variability in Healthy Young and Older Adults". XXlth Congress of Int. Society of Biomechanics, Taipei, Taiwan. 2007.

Kang, H.G. and Dingwell, J.B., "Separating the Effects of Age and Speed on Gait Variability in Healthy Young and Older Adults". Proceedings of the 31st Annual Meeting of the American Society of Biomechanics, Palo Alto, CA. 2007.

Kang, H.G. and Dingwell, J.B., "Segment Height and Dynamic Gait Stability in Young and Older Adults". 60th Annual Meeting of the Gerontological Society of America, San Francisco, CA. 2007.

Galica, A.M., Priplata, A.A., D'Andrea, S.E., Kang, H.G., Starobinets, O.V., Collins, J.J., Lipsitz, L.A. "Sub-threshold vibrations to the feet improve gait variability in the elderly". 60th Annual Meeting of the Gerontological Society of America, San Francisco, CA. 2007.

Kang, H.G. and Dingwell, J.B., "Walking Slower Improves Dynamic Gait Stability in the Elderly". 60th Annual Meeting of the Gerontological Society of America, San Francisco, CA. 2007.

Kang, H.G. and Dingwell, J.B., "Stabilization of Superior Segments during Gait". Gait and Clinical Movement Analysis Society Meeting, Richmond, VA. 2008.

Kang, H.G. and Dingwell, J.B., "Speed, Leg Strength and Walking Stability in Healthy Elderly". Gait and Clinical Movement Analysis Society Meeting, Richmond, VA. 2008.

Kang, H.G., Costa, M., Starobinets, O.V., Goldberger, A.L., Peng, C.K., Kiely, D.K., Lipsitz, L.A., "Complexity of Postural Dynamics and Frailty". American Geriatrics Society Annual Scientific Meeting, Washington, DC. 2008.

Kang, H.G., Galica, A.M., Priplata, A.A., D'Andrea, S.E., Starobinets, O.V., Collins, J.J., Lipsitz, L.A. "Sub-threshold vibrations to the feet reduce gait variability in the elderly". American Geriatrics Society Annual Scientific Meeting, Washington, DC. 2008.

Kang, H.G. and Dingwell, J.B., "Slower Walking and the Dynamic Stability of Gait in Healthy Elderly". American Geriatrics Society Annual Scientific Meeting, Washington, DC. 2008.

Kang, H.G. and Dingwell, J.B., "Fluctuations of EMG Patterns at Multiple Walking Speeds". North American Congress of Biomechanics, Ann Arbor, MI. 2008.

Kang, H.G., Costa, M., Starobinets, O.V., Goldberger, A.L., Peng, C.K., Kiely, D.K., Lipsitz, L.A., "Loss of Complexity in Balance Dynamics during Quiet Standing and Dual-task: a Marker of Frailty in Elderly People". North American Congress of Biomechanics, Ann Arbor, MI. 2008.

Kang, H.G. and Dingwell, J.B., "Stability of Superior Segments during Gait in Older Adults". North American Congress of Biomechanics, Ann Arbor, MI. 2008.

Kang, H.G. and Dingwell, J.B., "Walking Speed, Leg Strength, Range of Motion, and Dynamic Stability in the Gait of Healthy Older Adults". North American Congress of Biomechanics, Ann Arbor, MI. 2008.

Kang, H.G., Galica, A.M., Priplata, A.A., D'Andrea, S.E., Starobinets, O.V., Collins, J.J., Lipsitz, L.A. "Gait Variability is Reduced by Sub-threshold Vibrations to the Feet". North American Congress of Biomechanics, Ann Arbor, MI. 2008.

Kang, H.G. and Dingwell, J.B., "Local and Orbital Dynamic Stability of Walking in Healthy Young and Older Adults," Society of Engineering Science annual technical meeting. Urbana, IL. 2008.

Kang HG, Dingwell JB. Changes in the Dynamic Stability of Walking in Active Healthy Older Adults Independent of Changes in Walking Speed. Proceedings of International Mechanical Engineering Congress and Exposition, Boston, MA. 2008.

Kang HG, Costa M, Priplata AA, Goldberger AL, Peng CK, Starobinets OV, Kiely DK, Cupples LA, Lipsitz LA. Complexity and Frailty: Multiscale Entropy of Balance Dynamics during Quiet Standing and Dual-Task. Proceedings of International Mechanical Engineering Congress and Exposition, Boston, MA. 2008.

Kang, H.G., Costa, M., Starobinets, O.V., Goldberger, A.L., Peng, C.K., Kiely, D.K., Lipsitz, L.A., "Complexity of Balance Dynamics during Quiet Standing and Dual-task: a Marker of Frailty in Elderly People". The Gerontological Society of America, 61st Annual Meeting, National Harbor, MD. 2008.

Kang, H.G., Costa, M., Starobinets, O.V., Goldberger, A.L., Peng, C.K., Kiely, D.K., Lipsitz, L.A., "Complexity of Balance Dynamics during Quiet Standing and Dual-Task: Multiscale Entropy", part of Measurement, Statistics, and Research Methods Symposium. The Gerontological Society of America, 61st Annual Meeting, National Harbor, MD. 2008.

Lipsitz, L.A., Hajjar, I., Kang, H.G., "Symposium: Approaches to Physiologic and Behavior Monitoring of Seniors in their Home Environment". The Gerontological Society of America, 61st Annual Meeting, National Harbor, MD. 2008.

Kang HG, Lipsitz LA. "Dual task and stiffness control of posture: MOBILIZE Boston Study" International Society of Biomechanics, 22nd Congress, Cape Town, South Africa, 2009.

Kang HG, Quach L, Lipsitz LA. "Postural stiffness model and future falls in older adults: MOBILIZE Boston Study" International Society of Biomechanics, 22nd Congress, Cape Town, South Africa, 2009. Young Investigator Award Finalist

Kang HG, Quach L, Li W, Lipsitz LA. "Postural Stiffness, Distractions, and Prospective Falls: The MOBILIZE Boston Study." 3rd Int. Congress of Gait and Mental Function. Washington DC, Feb 2010.

Kang HG, Lipsitz LA. "Postural Stiffness, Damping, and Dual Task in Older Adults: The MOBILIZE Boston Study" The 6th World Congress of Biomechanics, Singapore, 2010.

Kang HG, Quach L, Li W, Lipsitz LA. "Postural Stiffness, Damping, and Outdoor Falls in Older Adults: the MOBILIZE Boston Study" The 6th World Congress of Biomechanics, Singapore, 2010.

Kang HG, Quach L, Li W, Lipsitz LA. "Postural Stiffness Model and Outdoor Falls in Older Adults: The Mobilize Boston Study" The 34th American Society of Biomechanics Meeting, Providence, Rhode Island, 2010.

Kang HG, Lipsitz LA. "Postural Stiffness Model and Dual Task in Older Adults: The Mobilize Boston Study." The 34th American Society of Biomechanics Meeting, Providence, Rhode Island, 2010.

Hur P, Kang HG, Lipsitz L, Hsiao-Wecksler E. Fall Risk Estimation of Community-Dwelling Elderly Using Invariant Density Analysis. The 34th American Society of Biomechanics Meeting, Providence, Rhode Island, 2010.

Dela, MD, Dingwell, JB, Kang, HG. Multiscale Entropy of EMG during Walking in Young and Older Adults. The 35th American Society of Biomechanics Meeting, Long Beach, California, 2011.

Kang HG and Murdock G. Flexible Framework for Testing Postural Control Models: Evidence for Intermittent Control? The 36th American Society of Biomechanics Meeting, Gainesville Florida, 2012

Kang HG. Designing Biomechanics Courses for Significant Learning: Fink Model Applied at Cal Poly Pomona. The 36th American Society of Biomechanics Meeting, Gainesville Florida, 2012. Invited Symposium.

Kang HG and Thap DB. Does Slower Walking Speed in Older Adults Protect against Distractions?. The 37th American Society of Biomechanics meeting, Omaha, Nebraska, 2013.

Kang HG and Thap DB. Slow Gait does not protect against distractions. International Society of Posture and Gait Research, Vancouver, BC, Canada, July 2014.

Kang HG, Li W, Hur P, Lipsitz LA. Fall Risk in Older adults: Posture, distractions, and statistics in multidisciplinary teams. The Seventh International Symposium on Biomathematics and Ecology: Education and Research, Claremont, CA, October 2014

Faramarzi B, Nout-Lomas YS, Stowe R, Greene HM, Kang HG. Diagnosis Of Distal Phalanx Palmar Process Fractures In Foals: Challenges And Solutions. 8th International Symposium on Veterinary Rehabilitation/Physical Therapy and Sports Medicine, August 2014, Corvallis, OR.

Kang HG, Velazquez V, Hino S, Rosario E. Feasibility of Music-based Multitask Training in Brain Injury Patients. Southwest Chapter of the American Society of Sports Medicine, Costa Mesa CA, 2014

Kang HG, Beaulieu R, Hino S, Brandt L, Saidro J. Participant Attitudes toward Dalcroze Eurhythmics as a Community Fall Prevention Program in Older Adults. International Conference of Music Perception and Cognition. San Francisco CA, 2016

Beaulieu R, Kang HG. An Action Research Approach to Adapting Jaques-Dalcroze Eurythmics as Community Fall Prevention Program for American Older Adults. Gerontological Society of America. New Orleans, LA, 2016

Hino S, Kang HG, Beaulieu R. A New Model of Community Fall Prevention: Eurhythmics for Older Adults and Kinesiology Students. International Conference of Dalcroze Studies. Presentation and workshop in Quebec City, Canada, July 2017

Kang HG, Beaulieu R, Hino S. A New Model of Community Fall Prevention: Music-based Multitasking Older Adults and Kinesiology Students. International Society of Posture and Gait Research, Ft. Lauderdale, Florida, 2017.

Kang HG, Hsu J. Postural Control, Trips and Slips in Community Dwelling Older Adults: the MOBILIZE Boston Study. International Society of Posture and Gait Research, Ft. Lauderdale, Florida, 2017.

Kang HG, Hsu J. Moving beyond Trips and Slips with Proximal Determinants of Falls in Older Adults: the MOBILIZE Boston Study. American Society of Biomechanics, Rochester MN, 2018.

## Peer Reviews

Gait and Posture

Human Movement Science

Annals of Biomedical Engineering

Journal of Applied Physiology

Journal of Gerontology: Medical Sciences

Archives of Physical Medicine and Rehabilitation

IEEE Transactions on Neural Systems and Rehabilitation Engineering

Journal of Biomechanics

Journal of NeuroEngineering and Rehabilitation

Experimental Brain Research