



Wen Liu

Associate Professor

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EDUCATION and TRAINING

- B.S. Mechanical Engineering, Department of Mechanical Engineering, Nanchang University, China, 1982.
- M.S. Mechanical Engineering, Dept. of Mechanical Engineering, Beijing University of Aeronautics and Astronautics, China, 1986.
- Ph.D. Biomedical Engineering, Institute of Biomedical Science and Engineering, Drexel University, Philadelphia, 1997.
- Post-doctoral research fellow, Faculty of Kinesiology, University of Calgary, 1997 – 1998.
- Research Associate (post-doctoral), Department of Biomedical Engineering, Boston University, 1999.

ACADEMIC / CLINICAL APPOINTMENTS

- Assistant Professor, Department of Physical Therapy and Rehabilitation Sciences, University of Kansas Medical Center, 1999 - present.
- Assistant Scientist, Center on Aging, University of Kansas Medical Center, 1999 - present.
- Adjunct Assistant Professor, Department of Mechanical Engineering, University of Kansas, 1999 - present.
- Research Assistant, Gait Study Center, Pennsylvania College of Podiatric Medicine, Philadelphia, 1995 - 1997.
- Research Engineer Biomechanics Laboratory, Yale University School of Medicine, New Haven, 1991 - 1994.
- Lecturer, Department of Mechanical Engineering, Nanchang University, China 1986 - 1991.

TEACHING RESPONSIBILITIES

- PTRS 750 - Research in Evidence-Based Physical Therapy Practice.
- PTRS 860 - Evidence-based Research Practicum I.
- PTRS 861 - Evidence-based Research Practicum II.

- PTRS 970 - Instrumental Analysis of Human Function.

RESEARCH INTERESTS

Posture and gait disorders due to age-related diseases including stroke and Parkinson's disease; exercise training to improve postural control and gait for aged people and people with age-related diseases using feedback approach; sensory-enhanced and robot-aided motor training to improve motor function of hemiplegic hand/arm for stroke patients; trunk rotational strength training for management of idiopathic scoliosis; and functional instability of human ankle and knee joints.

RECENT PUBLICATIONS

- **Liu W**, Mukherjee M, Gajewski B. The effect of tactile feedback on the accuracy of hand movement while performing tracing tasks. *Neuroscience Letter* (Submitted).
- **Liu W**, McIntire K, Kim SH, Zhang J, Dascalos S, Lyons KE, Pahwa R. Quantitative assessments of the effect of bilateral sub-thalamic stimulation on multiple aspects of sensori-motor function for patients with Parkinson's Disease. *Parkinsonism & Related Disorders* (submitted).
- Santos JM, McIntire K, Foecking J, **Liu W**. Effects of ankle bracing on motions of the knee and hip joints during trunk rotational tasks. *Clinical Biomechanics* (Submitted).
- **Liu W**, Kim SH, Long JT, Pohl PS. Sensory signals that trigger the stepping response during standing balance. *Experimental Brain Research* (Submitted).
- **Liu W**, Maitland M. The influence of individual anthropometric and mechanical variations on functional instability in the ACL-deficient knee during gait: a two-dimensional modeling study. *Annals of Biomedical Engineering*, 31 (10):1-9, 2003.
- Hsiao-Wecksler ET, Katdare K, Matson J, **Liu W**, Lipsitz LA, Collins JJ. Predicting the dynamic postural control response from quiet-stance behavior in elderly adults. *Journal of Biomechanic*, 36: 1327-1333, 2003.
- **Liu W**, Kim SH, Long JT, Pohl PS, Duncan PW. Anticipatory postural adjustments and the onset of compensatory stepping reactions. *Neuroscience Letter*, 336(1):1-4, 2003.
- Pohl, P. S., Duncan, P. W., Perera, S., Long, J., **Liu, W.**, Zhou, J., & Kautz, S. A. Rate of isometric knee extension strength development and walking speed after stroke. *Journal of Rehabilitation Research and development*, 39:651-658, 2002.
- Pohl, P. S., Duncan, P. W., Perera, S., **Liu, W.**, Lai, S. M., Studenski, S., & Long, J. Influence of stroke-related impairments on performance in 6-minute walk test. *Journal of Rehabilitation and Research*, 39:439-444, 2002.
- **Liu W**, Maitland, M, Bell, GD: A modeling study of partial ACL injury: simulated Lachman's test using an arthrometer. *Journal of Biomechanical Engineering* 124:1-8, 2002.
- Schollhorn WI, Nigg BM, Stefanyshyn DJ, **Liu W**. Identification of individual walking patterns using time discrete and time continuous data sets. *Gait & Posture*, 15:180-6, 2002.
- **Liu W**, Lipsitz L, Montero-Odasso M, Bean J, Kerrigan C, Collins JJ: Overcoming age-related sensory loss with mechanical noise. *Archives of Physical Medicine and Rehabilitation*, 83:171-176, 2002.
- **Liu W**, Siegler S, and Techner L: Quantitative measurement of ankle passive flexibility using an arthrometer on sprained ankles. *Clinical Biomechanics*, 16(3):237-44, 2001.
- Miller JE, Nigg BM, **Liu W**, Stefanyshyn DJ, Nurse MA. Influence of foot, leg and shoe characteristics on subjective comfort. *Foot & Ankle International*, 21:759-67, 2000.
- **Liu W**, Maitland, M: The effect of hamstring muscle forces on functional instability of the ACL-deficient knee during gait. *Journal of Biomechanics*, 33:871-879, 2000.
- Ahlgren BD, **Liu W**, Herkowitz HN, Panjabi MM, Guiboux J. Effect of anular repair on the healing strength of the intervertebral disc. *Spine*, 25:2165-2170, 2000.
- **Liu W**, Maitland M, Nigg BM: The effect of axial load on the anterior drawer test of ankle joint complex. *Foot & Ankle International*, 21:420-426, 2000.
- **Liu W**, Nigg BM: A mechanical model to determine the influence of masses and mass distribution on the impact force during running. *Journal of Biomechanics*, 33:219-224, 2000.

- **Liu W**, Miller J, Stefanyshyn D, Nigg BM: Accuracy and reliability of a technique for quantifying foot shape, dimensions and structural characteristics. *Ergonomics*, 42:346-358, 1999.
- Nigg BM, **Liu W**: The effect of muscle stiffness and damping on simulated impact force peaks during running. *Journal of Biomechanics*, 32:849-856, 1999.
- Panjabi MM, Kifune M, **Liu W**, Arand M, Vasavada A, Oxland TR: Graded Thoracolumbar Spinal Injuries of Multidirectional Instability. *Eur Spine J*, 7:332-339, 1998.
- Siegler S, **Liu W**, Sennitt B, Nobilini RJ, and Dunbar D: The three-dimensional passive support characteristics of ankle braces. *The Journal of Orthopaedic and Sports Physical Therapy*, 26:299-309, 1997.
- Kothe R, Panjabi MM, **Liu W**: Multidirectional instability of the thoracic spine due to iatrogenic pedicle injuries during transpedicular fixation: A biomechanical investigation. *Spine*, 22(16):1836-1842, 1997.
- **Liu W**, Siegler S, Hillstrom H, and Whitney K: Three dimensional, six-degrees-of-freedom kinematics of the human hindfoot during the stance phase of level walking. *Human Movement Science*, 16:283-298, 1997.
- Kifune M, Panjabi MM, **Liu W**, Arand M, Vasavada A, and Oxland TR: Functional morphology of the spinal canal after endplate, wedge, and burst fracture. *J. Spinal Disorder*, 10:457-466, 1997.

RECENT ABSTRACTS

- **Liu W**, McIntire K, Kim SH, Zhang J, Dascalos KE, Lyons KE, Pawha R. Quantitative assessment of functional improvement of deep brain stimulation for patients with Parkinson's disease. XV International Congress on Parkinson's Disease, Beijing, China, January, 2004.
- **Liu W**, McIntire K, Bowman K, Noland S, Spourlock S, Thompson C. Movement synergy between the ankle and hip joints during single leg stance. Proceedings of the IV World Congress of Biomechanics, Calgary, Canada, August, 2002.
- **Liu W**, Maitland, M. Individual variation in anthropometric and mechanical parameters may affect functional instability of the ACL-deficient knee. Banff Symposium on Skeletal Muscle. Banff, Canada, August, 2002.
- Hsiao-Wecksler ET, Katdare K, Matson J, **Liu W**, Lipsitz LA, Collins JJ. Predicting dynamic postural control response from quiet-stance behavior. Proceedings of the 78th Annual Assembly of the American Congress of Rehabilitation Medicine, Tucson, AZ, October 25-28, 2001.
- Hsiao-Wecksler ET, Katadare K, McKillop J, **Liu W**, Lipsitz LA, Collins JJ. Quiet-stance behavior can predict the dynamic postural control response. Proceedings of the 24th Annual meeting of the American Society of Biomechanics, San Diego, August, 2001.
- **Liu W**, Maitland, M: The influence of individual anthropometric and mechanical variations on functional instability in the ACL-deficient knee during gait. XVIII International Symposium of Biomechanics in Sports, Hong Kong, June, 2000.
- **Liu W**, Richardson K, Lipsitz LA, and Collins JJ: Using electrical noise to reduce vibrotactile thresholds in human. Proceedings of the 23rd Annual meeting of the American Society of Biomechanics, Pittsburgh, October, 1999.
- **Liu W**, Maitland, M: Assessment of methods to diagnose ACL-injuries using simulated knee arthrometer tests. Proceedings of the 17th Congress of the International Society of Biomechanics, Calgary, Canada, August, 1999.
- Maitland M, **Liu W**: The effect of hamstring muscle forces on instability of the ACL-deficient knee during gait. Proceedings of the 13th International Congress of the World Confederation of Physical Therapists, Yokohama, Japan. p. 175, 1999.
- **Liu W**, Siegler S, Hillstrom H: Increased translations in the injured ankle joint complex during human gait. Fifth International Symposium on 3-D Analysis of Human Movement, Chattanooga, Tennessee, 1998.
- **Liu W**, Siegler S, Whitney K, Hillstrom H: Six-degree-of-freedom hindfoot kinematics of rectus and planus foot types during gait. 2nd Annual Conference of the Podiatric Research Society, Palm Springs, California, 1997.

RECENT GRANTS

- **07/03-07/06**
Development of a robot-aided motor training with enhanced sensory inputs for stroke rehabilitation. National Science Foundation (NSF), Division of Bioengineering & Environ Systems (BES-0302466), direct cost \$326,598 (PI. Liu).
- **04/03-06/04**
Electro-acupuncture and strengthening exercise for hemiplegic elbow and wrist joints. Clinical Pilot Award, Research Institute of University of Kansas Medical Center, direct cost \$25,000 (PI. Liu).
- **01/03-12/04**
Sensory-enhanced motor training for paretic arm/hand. National Institute of Health (NIH), NINDS (R21 NS043331-01 A1), direct cost \$237,500 (PI. Liu).
- **09/02-06/04**
Quantified torsional strength training for management of idiopathic scoliosis. Scoliosis Research Foundation, direct cost \$84,095 (PI. Liu).
- **07/01-06/03**
A novel feedback training program to improve postural control of chronic stroke patients. American Heart Association, direct cost \$110,000 (PI. Liu).
- **2001-2002**
Sensory enhanced motor training for stroke patients. Bridge grant, Research Institute of University of Kansas Medical Center, direct cost \$25,000 (PI. Liu).
- **2000-2001**
The effect of subthalamic stimulation for Parkinson's disease using quantitative gait analysis. Clinical Program Enhancement Award, Research Institute of University of Kansas Medical Center, direct cost \$34,998 (co-PI).
- **2000-2001**
Shared equipment award for biomedical research. Research Institute of University of Kansas Medical Center, direct cost \$19,900 (PI. Liu).
- **1999-2000**
A combined neuro-functional posture feedback training program to improve postural control in stroke patients. Kansas Claude D. Pepper Center Pilot Award (NIH), direct cost \$29,202 (PI. Liu).

PROFESSIONAL & SCIENTIFIC MEMBERSHIPS

- American Society of Biomechanics, 1995-present.
- Orthopedic Research Society, 2000-present.

PROFESSIONAL ACTIVITIES

- **2002 to Present**
Rehabilitation Engineering Research Centers Program Grand Review Panel, Department of Education, Washington, DC,
- **2001 to Present**
Reviewer for Journal of Orthopaedic & Sports Physical Therapy
- **2000 to Present**
Reviewer for Computer Methods in Biomechanics and Biomedical Engineering
- **2000 to Present**
Reviewer for Journal of Biomechanics
- **1999 to Present**
Reviewer for Journal of Biomechanical Engineering
- **1997 to Present**
Reviewer for Journal of Clinical Biomechanics

