

CURRICULUM VITAE

Personal Data

Name: Terry Kwok Keung, KOO
 Gender: Male
 Permanent Residency: Hong Kong
 Home Address: 69 Troy Street, Seneca Falls, NY 13148
 Office Address: New York Chiropractic College, 2360 State Route 89, Seneca Falls, NY 13148-0800
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Education

1999 – 2002 **Doctor of Philosophy (Biomechanics)**
The Hong Kong Polytechnic University
Thesis title: Neuromusculoskeletal modeling of the elbow joint in subjects with and without spasticity

1993 – 1995 **Master of Philosophy (Rehabilitation Engineering)**
The Hong Kong Polytechnic University
Thesis title: Effects of sitting posture on interface pressure – Biomechanical evaluation of passive and active seating systems

1989 – 1992 **Bachelor of Engineering (Manufacturing Engineering)**
The Hong Kong Polytechnic University
Final year project title: Design and manufacture of an active seating cushion for pressure relief

Honors

2010 **Who's who in America**
Marquis who's who

2010 **Excellence in Research and Scholarly Activity Award**
New York Chiropractic College

2008 **Nominated for Excellence in Research and Scholarly Activity Award**
New York Chiropractic College

Dec 03 – Apr 05 &
 May 02 – Nov 02 **PolyU Post-Doctoral Fellowship**
The Hong Kong Polytechnic University

Dec 02 – Nov 03 **The Croucher Foundation Post-Doctoral Fellowship**
The Croucher Foundation

Dec 98 – Apr 02 **Ph.D. Study Research Studentship**
The Hong Kong Polytechnic University

Dec 98 – Apr 02 **Tuition Scholarship for Ph.D. Study**
The Hong Kong Polytechnic University

- Oct 93 – Sep 95* **M.Phil. Study Research Studentship**
The Hong Kong Polytechnic University
- Oct 93 – Sep 95* **Tuition Scholarship for M.Phil. Study**
The Hong Kong Polytechnic University
- 1994* **Sir Edward Youde Memorial Fellowship**
Sir Edward Youde Memorial Fellowship Council
- 1992* **The Most Innovative Award**
Final Year Project Work Competition 1991/1992 (Degree Level), The Hong Kong Institution of Engineers - Production Industrial Engineering Division
- 1992* **Graduated with first class honor in Manufacturing Engineering**
The Hong Kong Polytechnic University

Position Held

- Jan 2006 – present* **Assistant Professor**
Basic Sciences & Research Departments, New York Chiropractic College
- Jan 2006 – present* **Director**
Foot Levelers Biomechanics Research Laboratory, New York Chiropractic College
- Apr 2005 – Dec 2005* **Research Fellow**
Department of Health Technology and Informatics, The Hong Kong Polytechnic University
Project title: A computer-aided bone deformity correction system for knowledge-based applications of fracture reduction, dynamization, limb lengthening, and deformity correction
- Jul 2005 – June 2006* **Overseas Faculty Core Member**
Research Center for Musculoskeletal Bioengineering (RCMBE), The Hong Kong Polytechnic University
- Dec 2003 – Apr 2005* **Post-doctoral Fellow**
Jockey Club Rehabilitation Engineering Centre, The Hong Kong Polytechnic University
Project title: Developing the knowledge-based external fixator applications for bone fracture fixation and deformity correction using computational simulation
- Jun 2002 – Nov 2003* **Post-doctoral Fellow**
Orthopaedic Biomechanics Laboratory, Johns Hopkins University
Project title: Developing the knowledge-based external fixator applications for bone fracture fixation and deformity correction using computational simulation
- Jun 1997 – Nov 1998* **Research Associate**
Jockey Club Rehabilitation Engineering Centre, The Hong Kong Polytechnic University
Duties: Manage and maintain the human locomotion laboratory and the seating mobility laboratory, conduct equipment training, involve in research proposal writing, research and teaching activities etc.
- Feb 1996 - May 1997* **Product Manager**

Medical Technology Ltd.

Duties: Involve in sales and marketing, answer technical enquiries, conduct product training and negotiate dealership with manufacturers etc. Responsible products include: Peak motion analysis system, Tekscan pressure mapping system, Hologic X-ray bone densitometer, P&G electrogoniometer, and many other biomechanical/ rehabilitation products etc.

Nov 1995 - Jan 1996

Development Manager**Anchor Medical Services Ltd.**

Duties: Product development, marketing, technical support and product training.

Oct 1994 - Oct 1995

Research Assistant**Jockey Club Rehabilitation Engineering Centre****The Hong Kong Polytechnic University**

Duties: Responsible for setting up and facilitating a newly developed Interdisciplinary Centre for Musculoskeletal Bioengineering and Rehabilitation Technology.

Jul 1992 - Oct 1992

Quality Assurance Engineer**Stelex Industrial. Ltd.**

Duties: Responsible for implementing ISO 9001 in a watch manufacturing company.

Publications**Thesis**

1. **T.K.K. Koo.** Neuromusculoskeletal modeling of the elbow joint in subjects with and without spasticity. Ph.D. Thesis, The Hong Kong Polytechnic University, Hong Kong; 2002, 205pp.
2. **T.K.K. Koo.** Effects of sitting posture on interface pressure – biomechanical evaluation of passive and active seating systems. M.Phil Thesis, The Hong Kong Polytechnic University, Hong Kong; 1995, 183pp.

Book Chapter

1. E.Y.S. Chao, **T.K.K. Koo.** From CAD/CAM to VIMS/CAOS – A true renaissance of musculoskeletal biomechanics. In: N.H.C. Hwang, S.L.Y. Woo, editors. *Frontiers in Biomedical Engineering*. Hardbound, Kluwer Academic/Plenum Publishers; December 2003, p. 71-82.

Peer-Reviewed Journal

1. **T.K. Koo,** J.H. Cohen, Y.P. Zheng. Reliability of a mechano-acoustic indenter system for in-vivo measurement of hyperelastic properties of soft tissues. (Submitted to *Medical Engineering & Physics* in Oct, 2010)
2. M. DiMond, **T.K. Koo.** Reliability of a new method of shank wand placement for routine clinical gait analysis. (In preparation, to be submitted to *Clinical Biomechanics* before Dec, 2010)
3. **T.K. Koo,** C.W. Wong, Y.P. Zheng. Reliability of sonomyography for the measurement of pectorialis major muscle thickness. *Journal Manipulative & Physiological Therapeutics* 2010; 33:386-394.
4. **T.K. Koo,** M.O. Papuga. A computer-aided method for closed reduction of diaphyseal tibial fracture using projection images: a feasibility study. *Comp Aided Surgery* 2009; 14(1):1-13.
5. **T.K. Koo.** Devices and methods for closed reduction of diaphyseal fracture. *Recent Patents Biomed. Eng.* 2009 June; 2(2): 85-96.

6. L. Li, K.Y. Tong, X.L. Hu, L.K. Hung, **T.K. Koo**. Incorporating ultrasound-measured musculotendon parameters to subject-specific EMG-driven model to simulate voluntary elbow flexion for persons after stroke. *Clin Biomech*. 2009 Jan;24(1):101-9.
7. L. Li, K.Y. Tong, R. Song, **T.K. Koo**. Is maximum isometric muscle stress the same among prime elbow flexors? *Clin Biomech*. 2007; 22(8):874-83.
8. **T.K. Koo**, A.F. Mak. A knowledge-based computer-aided system for closed diaphyseal fracture reduction. *Clin Biomech*. 2007; 22(8):884-893.
9. **T.K. Koo**, E.Y. Chao, A.F. Mak. Development and validation of a new approach for computer-aided long bone fracture reduction using unilateral external fixator. *Journal of Biomechanics* 2006; 39: 2104-12.
10. **T.K. Koo**, A.F. Mak. A neuromusculoskeletal model to simulate the constant angular velocity elbow extension test of spasticity. *Med Eng Phys*. 2006; 28(1):60-9.
11. **T.K. Koo**, E.Y. Chao, A.F. Mak. Fixation stiffness of Dynafix unilateral external fixator in neutral and non-neutral configurations. *Bio-Medical Materials and Engineering* 2005; 15(6):433-44.
12. **T.K. Koo**, A.F. Mak. Feasibility of using EMG driven neuromusculoskeletal model for prediction of dynamic movement. *J Electromyography & Kinesiology* 2005, 15:12-26.
13. R.W. Liu, Y.H. Kim, D.C. Lee, N. Inoue, **T.K. Koo**, E.Y.S. Chao. Computational simulation of axial dynamization on long bone fractures. *Clin Biomech* 2005; 20: 83-90.
14. E.Y. Chao, N Inoue, **T.K. Koo**, Y.H. Kim. Biomechanical consideration of fracture treatment and bone quality maintenance in elderly patients and patients with osteoporosis. *Clinical Orthopaedics and Related Research* 2004; 425:12-25.
15. E.Y. Chao, N Inoue, Y.H. Kim, **T.K. Koo**. Application of simulation technology in external fixator adjustment for fracture reduction, deformity correction, & dynamization. *Japanese Journal of Bone Fracture* 2003; 25(1): 16-29.
16. **T.K. Koo**, A.F. Mak, L.K. Hung, J.P. Dewald. Joint position-dependence of weakness during maximum isometric voluntary contractions in subjects with hemiparesis. *Arch Phys Med Rehabil* 2003; 84:1380-6.
17. **T.K. Koo**, A.F. Mak, L.K. Hung. In-vivo determination of subject-specific musculotendon parameters: applications to the prime elbow muscles in normal and hemiparetic subjects. *Clinical Biomechanics* 2002; 17:390-399.
18. J. Feng, A.F. Mak, **T.K. Koo**. A surface EMG driven musculoskeletal model of the elbow flexion-extension movement in normal subjects and in subjects with spasticity. *J Musculoskeletal Research* 1999; 3(2), 109-123.
19. **T.K. Koo**, A.F. Mak., Y.L. Lee. Posture effect on seating interface biomechanics: comparison between two seating cushions. *Arch Phys Med Rehabil* 1996; 77(1), 40-47.
20. **T.K. Koo**, A.F. Mak, Y.L. Lee. Evaluation of an active seating system for pressure relief. *Assist Technol* 1995; 7(2), 119-128.

Patents

1. **T.K. Koo**, A.F. Mak, E.Y. Chao. Bone position device, method, and system. Chinese Patent No: ZL200610108683.8. (2010)
2. **T.K. Koo**, A.F. Mak, E.Y. Chao. Bone reposition device, method, and system. Serial No. 195852; Issued on Feb 2007; US Class: 606/058; Intl Class: A61B 17/00 20060101 A61B017/00; United States Patent Publication No: 20070043354. (Patent Pending)

Conference Proceedings

1. **T.K. Koo**, J.H. Cohen, L. Papenbrock, Y.P. Zheng. A mechano-acoustic indenter System for In-vivo measurement of non-linear elasticity of soft tissues: Its Development, Reliability, and Application. (Submitted to WFC 2011 in November, 2010)
2. **T.K. Koo**, J.H. Cohen, L. Papenbrock, Y.P. Zheng. A mechano-acoustic indenter system for in-vivo measurement of non-linear elastic properties of soft tissues. (Accepted by ACC-RAC 2011)
3. **T.K. Koo**, Y.P. Zheng. Identification of hyperelastic properties of lumbar multifidus. The 34th Annual Meeting of the American Society of Biomechanics. August 18 -21, Providence, RI, p.848-849 (2010).
4. **T.K. Koo**, Y.P. Zheng; Andrea A. Nalli, Edward F. Owens, Jr. Feasibility of using the Tissue Ultrasound Palpation System (TUPS) to measure elasticity of segmental lumbar multifidus. ACC conference proceedings, March 18-20, 2010, In: J Chiropractic Education, 24(1): 133, 2010.
5. **T.K. Koo**, Y.P. Zheng, X. Chen, A. Wong, L. Ford, M. Zumpano. Continuous measurement of muscle morphology using sonomyography: a new technique to quantify chiropractic treatment efficacy. ACC conference proceedings, March 12-14, 2009, In: J Chiropractic Education, 23(1): 76, 2009.
6. **T.K. Koo**, M.O. Papuga, J.A. Taylor, A.F. Mak. X-ray based computer-aided correction of fracture deformity. International Society of Biomechanics XXI Congress Taipei, July 1-5, 2007. In: J Biomech, 40 Suppl 2: S563, 2007.
7. **T.K. Koo**, A.F. Mak. A bone reposition device for execution of CT-based diaphyseal fracture reduction. International Society of Biomechanics XXI Congress Taipei, July 1-5, 2007. In: J Biomech, 40 Suppl 2: S283, 2007.
8. **T.K. Koo**, E.Y. Chao, A.F. Mak. Biomechanical performance of the standard Dynafix external fixator in different configurations. The 4th CSOS Scientific Congress, Beijing, PR China September 22 - 26, 2004.
9. **T.K. Koo**, E.Y. Chao, A.F. Mak. Determination of spatial relationship between fracture fragments: a critical step towards computer aided long bone fracture reduction using external fixator. The 2nd Annual World Congress of Chinese Biomedical Engineers, Beijing, China September 27-29, 2004.
10. **T.K. Koo**, A.F. Mak. Quantification of spasticity in the elbow flexor muscles using constant angular velocity elbow extension perturbation. BME 2004 Conference On Biomedical Engineering, Hong Kong. PRC, September 23-25, 2004, p. 82-86.
11. **T.K. Koo**, E.Y. Chao, A.F. Mak. Determination of fixator configuration to facilitate controlled axial dynamization on long bone fractures. The 11th World Congress of the International Society for Prosthetics and Orthotics, Hong Kong, PRC, August 1-6, 2004, p.218-219.
12. **T.K. Koo**, B.T. Leong, E.Y. Chao, A.F. Mak. A new approach for computer-aided long bone fracture reduction using unilateral external fixator. The Fourth Annual Conference of the International Society for Computer Assisted Orthopaedic Surgery, Chicago, USA, June 16-19, 2004, p.376-377.
13. **T.K. Koo**, Y.H. Kim, A.F. Mak, E.Y. Chao. Effects of external fixator configurations and joint properties on fracture stiffness: a finite element analysis. First Asia Pacific Conference on Biomechanics, Osaka, Japan, March 25-28, 2004.
14. E.Y. Chao, B.T. Liong, **T.K. Koo**, K.G. Hua, J. Fetto. Hip contact area & pressure distribution in activities of daily living. The American Hip Society 2003 Summer Meeting. Sept 11-13, 2003.
15. H.T. Lin, F.C. Su, **T.K. Koo**, A. Yokota, J. Hashimoto, N. Inoue, M. Nakamura, K. Nobuhara, E.Y.S. Chao. Biomechanical functions of latissimus dorsi muscle in baseball pitching. 2003 ASME Summer Bioengineering Conference, Miami, USA, June 25-29, 2003.
16. **T.K. Koo**, Y.H. Kim, D.B. Choi, K.G. Hua, J. Lim, N. Inoue, E.Y. Chao. Stiffness analysis of Dynafix external fixator system. 2003 ASME Summer Bioengineering Conference, Miami, USA, June 25-29, 2003.

17. Y.H. Kim, T.S. Kang, **T.K. Koo**, B.T. Liang, K.G. Hua, N. Inoue, E.Y. Chao. Simulation of tibial osteotomy execution under unilateral external fixation. 2003 ASME Summer Bioengineering Conference, Miami, USA, June 25-29, 2003.
18. M. Kumagai, Y.H. Kim, N. Inoue, E. Genda, K. Hua, B.T. Liang, **T.K. Koo**, E.Y.S. Chao. 3-D hip contact pressure distribution in daily activities. 2003 ASME Summer Bioengineering Conference, Miami, USA, June 25-29, 2003
19. **T.K. Koo**, A.F. Mak, L.K. Hung. In-vivo estimation of muscle optimal angles using electrical stimulation. The 1st Annual World Congress of Chinese Biomedical Engineers - Taipei, Taiwan 2002, p.63.
20. Y.H. Kim, **T.K. Koo**, N. Inoue, E.Y. Chao. Computer-aided planning and execution of external fixation in osteoporotic bone. Proceedings of the 21st Southern Biomedical Engineering Conference. Sept 28-29, 2002. p.339-340.
21. **T.K. Koo**, A.F. Mak. A neuromusculoskeletal model for quantification of spasticity. Conference on biomedical engineering, Hong Kong, 2002.
22. **T.K. Koo**, A.F. Mak, L.K. Hung. A musculoskeletal model for estimation of the musculotendon parameters of the prime elbow flexors. In: Muller R, Gerber H, Stacoff A eds. Proceeding of the XVIIIth Congress of the international society of biomechanics, Zurich, Switzerland, 2001, P219.
23. A.F. Mak, W.C. Tam, C.Y. Tang, **T.K. Koo**. Joint biomechanics – tissues, structures and functions. Plenary Lecture, the 3rd National Conference in Rehabilitation Medicine for the Young, 1999.
24. **T.K. Koo**, A.F. Mak.. An interactive graphics-based model of the upper extremity. Hong Kong Orthopaedic Association 19th Annual Congress, 1999.
25. D.H. Chow, E.W. Tam, **T.K. Koo**, K. Ng, S. Naumann. A simple decomposition method for analyzing ground reaction force in gait analysis, Proceedings of RESNA'98, Minneapolis, USA, 1998.
26. **T.K. Koo**, A.F. Mak. Measurement of pelvic orientations during sitting. In: J.C.H. Goh, A. Nather, Editors. Proceedings of 8th International Conference on Biomedical Engineering. Singapore: National University of Singapore, 1994, p.357-9.
27. **T.K. Koo**, A.F. Mak. The Feasibility of using force sensing resistor (FSR) for comparative seating evaluation. Proceedings of International Conference on Biomedical Engineering, Hong Kong, 1994, p.420-423.

Invited Presentations

1. **T.K. Koo**. Effects of sitting posture on interface pressure – biomechanical evaluation of passive and active seating systems. The Second Asia-Pacific Symposium on Rehabilitation Technology, 1996.
2. **T.K. Koo**. Development and validation of a new approach for computer-aided long bone fracture reduction using unilateral external fixator. The 1st Symposium on Automation and Computer-aided Orthopaedic Surgery, November, 2004.

Research Support

Ongoing

Nimmo® Educational Foundation

5/2010 – 5/2011

“Effects of Nimmo Treatment on Hypertonic Gluteal Muscle Containing Trigger Points”

Role: Principal Investigator

Funded amount: US\$26,164

NYCC Start-up Fund, sponsored by Foot Levelers Inc.

1/2008-12/2011

“Applications of Sonomyography and Tissue Ultrasound Palpation system in

Chiropractic Research”
 Role: Principal Investigator
 Funded amount: US\$11,000

Completed

NYCC Start-up Fund sponsored by Foot Levelers Inc. 1/2006 – 12/2007

“X-ray based Computer-Aided Correction of Fracture Deformity with Novel Unilateral Fixator System”

Role: Principal Investigator
 Funded amount: US\$14,000

Industry Guided Applied Research and Development Grant, Hong Kong 6/2005-12/2005

“A Computer-Aided Bone Deformity Correction System for Knowledge-Based Applications in Fracture Reduction, Dynamization, Limb Lengthening, and Deformity Correction”

Role: Principal Investigator
 Funded amount: HK\$200,000

The Croucher Foundation 2002-2003

“Developing the knowledge-based external fixator applications for bone fracture fixation and deformity correction using computational simulation”

Role: Applicant
 Funded amount: HK\$300,000

Central research Grant, Hong Kong Polytechnic University 1998-1999

“Reference Inertial and Anthropometric Data of Hong Kong Adults for Human Movement Biomechanics”

Role: Co-investigator
 Funded amount: HK\$150,000

Central Research Grant for Large Equipment/Facility, Hong Kong Polytechnic University 1997

“A new sophisticated three-dimensional motion analysis system for the human locomotion laboratory”

Role: Co-applicant
 Funded amount: HK\$1,000,000

Unfunded

National Institutes of Health 2009

“Muscle Elasticity: An objective outcome measure in Manual Therapy”

Role: Principal Investigator

Wave Manufacturing Inc. 2009

“Effective use of whole-body vibration in patients with multiple sclerosis”

Role : Principal Investigator

National Institutes of Health 2007

“Intervertebral Motion and Mechanical Load Transmission During Lumbar HVLA Manipulations”

Role: Principal Investigator

U.S. Department of Health and Human Services 2003

“Biomechanical Model of Knee Instability & Rehabilitation”

Role: Co-investigator

Teaching Experience

1998 Teaching Assistant Basic Engineering Studies

1998	Teaching Assistant	REC 85003:Biomechanics II: Movement Analysis
2004	Assistant Instructor	REC 2804: Mechanics of Tissues & Biomaterials
2004	Assistant Instructor	REC 481: Introduction to Transport Processes in Living Systems
2005	Assistant Instructor	REC 521: Mechanics of Living Tissues & Systems
2005	Guest Lecture	HTI 5123: Mechanics of Living Tissues and Systems
Spring 2006 - present	Assistant Instructor	ANA6015L: Gross Anatomy I Laboratory
Winter 2006 - present	Assistant Instructor	ANA6204L: Gross Anatomy II Laboratory
Fall 2007	Lead Instructor	PRI6550: Principles of Human Movement Analysis
Fall, 2008 - present	Lead Instructor	DIR7000: Research Project Direct Study
Fall 2010 – present	Assistant Instructor	ANA6304L: Gross Anatomy III Laboratory

Journal & Conference Reviewer

Journal of Orthopedic Research (Ad Hoc Reviewer)

Neuroscience letters (Ad Hoc Reviewer)

BioMedical Engineering OnLine (Ad Hoc Reviewer)

ACC-RAC, 2010 (Conference reviewer, 4 papers)

IEEE International Conference on Robotics and Automation, 2010 (Conference reviewer, 1 paper)

IEEE International Conference on Biomedical Robotics and Biomechatronics, 2010 (Conference reviewer, 1 paper)

International Conference on BioMedical Engineering and Informatics, 2010 (Program Committee member & reviewer)

Professional Training

May 2000 Sensory Motor Performance Program, Rehabilitation Institute of Chicago, Northwestern University (5 weeks)

Jan 2002 Orthopaedic Biomechanics Laboratory, Johns Hopkins University (6 weeks)

Jun 2002 – Nov 2003 Orthopaedic Biomechanics Laboratory, Johns Hopkins University (18 months)

Research Interests

EMG driven musculoskeletal modeling and simulation of normal and spastic subjects; neuromusculoskeletal modeling and simulation of reflex responses; quantification of spasticity and weakness; computer-aided pre-operative planning and execution of fracture reduction, knee osteotomy, and limb lengthening; biomechanical analysis of joint contact pressure distributions of the hip and knee, effects of sitting posture and cushion design on pressure sore; external fracture fixation; motion analysis; clinical gait analysis; stroke rehabilitation; biomechanics of spinal manipulation, pre- and post- treatment comparison of muscle morphology using sonomyography, quantification of spinal dysfunction using tissue ultrasound palpation system, ultrasound bioinstrumentation, quantification of trigger point, etc.

Languages

Spoken: Fluent in Cantonese, English, and Mandarin

Written: Chinese, English

Computer Knowledge

Programming languages: Matlab, LabVIEW, C++, Fortran, Basic, Bodybuilder language, Python

Finite element analysis: Abaqus

Musculoskeletal modeling: SIMM, VIMS

CAD: Solidworks, Vismodel; AutoCAD

Computer animation: Vislab

Imaging processing and reconstruction: Analyze, 3D-Doctor

Statistics: SPSS, SAS