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RESEARCH INTEREST Postural Control, Sport Biomechanics, Biomechanical Modeling

EDUCATION

PhD in Biomedical Engineering – Biomechanics <u>Sahand University of Technology</u> , Tabriz, Iran <i>Thesis Title:</i> Modeling of Human Standing Strategies to Evaluate the Roles of Joint Mechanisms in Stability Provision Advisor: M. R. Azghani, PhD	2012 – 2017 Total GPA: 18.35 / 20
MSc in Biomedical Engineering – Biomechanics <u>Amirkabir University of Technology</u> , Tehran, Iran <i>Thesis Title:</i> Biomechanical Analysis of Effects of TSF External Fixator on Fracture Healing and Deformity Correction of the Lower Limb Bones (scored 20/20) Advisors: A. R. Arshi, PhD – G. Rouhi, PhD	2009 – 2011 Total GPA: 17.15 / 20
BSc in Biomedical Engineering – Biomechanics <u>Amirkabir University of Technology</u> , Tehran, Iran <i>Thesis Title:</i> Biomechanical Analysis of Inhaled Drug Delivery using Computational Fluid Dynamics Approach (scored 20/20) Advisor: M. Tafazzoli-Shadpour, PhD	2005 – 2009 Total GPA: 16.43 / 20
High School Diploma – Mathematics and Physics National Organization of Development of Exceptional Talents (NODET), Allameh Helli Center, Tehran, Iran	2001 – 2005 Total GPA: 17.76 / 20

LIST OF
PUBLICATION

Published Journal Articles

Hosseini I, Ashtiani MN, Bahrpeyma F. Postural stability in patients with moderate knee osteoarthritis: roles of the visual feedback and dynamic perturbations. *J Rehabil Sci Res*. 2021; *In Press*.

Ashtiani MN, Mortazavi SM. Dynamic stress and strain analysis of the hip bone-implant interface during human gait [in Farsi]. *Iran J Orthop Surg*. 2021; 19(3): *In Press*.

Ravanbod R, Eslami N, Ashtiani MN. Immediate effects of footwear with vibration applied to the swing phase of the gait cycle on dynamic balance in patients with diabetic peripheral neuropathy. *J Biomech*. 2021; 128: 110710.

Najafi-Ashtiani M, Ashtiani MN, Oskoei MA. Cognitive perturbations affect brain cortical activity and postural control: an investigation of human EEG and motion data. *Biomed Signal Process Control*. 2021; 69: 102955.

Ravanbod R, Eslami N, Ashtiani MN. Assessment of the lower extremity muscle strength in diabetic peripheral neuropathy patients measured by handheld dynamometer and its association with falling. *Health Edu Health Promot*. 2020; 8(4), 203-208.

Ashtiani MN. Physical and sensory perturbations changed joint regulations in control of posture: a power spectral analysis. *J Rehabil Sci Res*. 2021; 8(3), 115-120.

Ashtiani MN, Azghani MR, Parnianpour M, Khalaf K. Effects of human stature and muscle strength on the standing strategies: A computational biomechanical study. *Proc Inst Mech Eng H*. 2020; 234(7), 674–685.

Błaszczuk JW, Fredyk A, Błaszczuk PM, Ashtiani MN. Step Response of Human Motor System as a Measure of Postural Stability in Children. *IEEE Trans Neural Syst Rehabil Eng*. 2020;28(4): 895-903.

Shahbad R, Mortazavi M, Alizadeh-Fard F, Mohammadi Z, Alavi F, Ashtiani MN. An investigation of the effects of osteoporosis, impact intensity and orientation on human femur injuries: a parametric finite element study. *J Emerg Pract Trauma*. 2020;6(1):28-32.

Najafi-Ashtiani M, Oskoei MA, Ashtiani MN. Effects of cognitive interference and type of support surface on postural stability: a biomechanical analysis [in Farsi]. *Iran J Bio Med Eng*. 2019; 12(4): 331-340.

Ashtiani MN, Azghani MR, Shakouri SK. Biomechanical modeling of hip abduction exercise using optimized inverse dynamics. *Zahedan J Res Med Sci*. 2019; 21(1): e68977.

Ashtiani MN, Azghani MR, Parnianpour M. Initial balance in human standing postures: Roles of the joint mechanisms. *Proc Inst Mech Eng H*, 2018; 232(12): 1255-1260.

Oliaei S, Ashtiani MN, Azma K, Saidi S, Azghani MR. Effects of postural and cognitive difficulty levels on the standing of healthy young males on an unstable support, *Acta Neurobiol Exp*, 2018; 78(1): 60-68.

Ashtiani MN, Azghani MR. Open- and closed-loop responses of joint mechanisms in perturbed stance under visual and cognitive interference, *Biomed Signal Process Control*, 2018; 42: 1-8.

Babayi M, Ashtiani MN. Effects of cyclic thermal loads on bone-implant interface in dental prostheses, *Zahedan J Med Res Sci*, 2017;19(12): e12081.

Ashtiani MN, Azghani MR. Effects of visual and cognitive interference on joint contributions in perturbed standing: a temporal and spectral analysis. *Australas Phys Eng Sci Med*, 2017; 41(1): 21-30.

Ashtiani MN, Azghani MR. Predictive models for estimation of the human stance equilibrium parameters using inverse dynamics and response surface method. *J Musculoskel Res*. 2017; 20(3): 1750016.

Ashtiani MN, Azghani MR. Nonlinear dynamics analysis of the human balance control subjected to physical and sensory perturbations. *Acta Neurobiol Exp*. 2017; 77(2): 168-175.

Ashtiani MN, Azghani MR. Effect of aging on feasibility and contribution of joint mechanisms in balanced standing using biomechanical modeling. *Zahedan J Res Med Sci*. 2017; 19(8): e11786.

Mirak M, Alizadeh M, Ghaffari M, Ashtiani MN. Characterization, mechanical properties and corrosion resistance of biocompatible Zn-HA/TiO₂ nanocomposite coatings. *J Mech Behav Biomed Mater*. 2016; 62: 282-290.

Najafi-Ashtiani H, Ashtiani MN. Comparative evaluation between rigid and dynamic spinal fixation systems: a three-dimensional finite element analysis. *Zahedan J Med Res Sci*. 2015; 17(8): e1021.

Bahrami B, ShahrbaF S, Mirzakouchaki B, Ghalichi F, Ashtiani MN, Martin N. Effect of surface treatment on stress distribution in

immediately loaded dental implants – A 3D finite element analysis. *Dental Mater*, 2014; 30(4), e89-e97.

Oskui IZ, Ashtiani MN, Hashemi A, Jafarzadeh H. Effect of thermal stresses on the mechanism of tooth pain. *J Endodon*. 2014; 40(11): 1835-1839.

Najafi H, Ashtiani MN. Finite element analysis on iliosacral screw insertion in fixation of sacral stress fracture: a comparison between three systems. *Zahedan J Med Res Sci*, 2014; 16(1): 59-63.

Oskui IZ, Ashtiani MN, Hashemi A, Jafarzade M. Thermal analysis of the intact mandibular premolar: a finite element analysis. *Int Endod J*, 2013; 46(9): 841-846.

Bahrami B, Ghalichi F, Mirzakouchaki B, Ashtiani MN, Marghoub A. Finite element analysis of stress distribution in immediately loaded dental implant. In *Biomedical Engineering (ICBME), 19th Iranian Conference of*, 2012, December, (pp. 179-182). IEEE.

Ashtiani MN, Tafazzoli-Shadpour M, Najafi H. Evaluation of the droplet collapsibility in inhalation drug delivery: a 3D computational study. *J Biomed Phys Eng*, 2012; 2(3): 83-92.

Ashtiani MN, Imani R. Transient heat transfer in a dental prosthesis implanted in mandibular bone, in: Herold KE, Vossoughi J, Bentley WE, SBEC 2010, IFMBE Proceedings, Vol. 32, pp. 376-379, 2010.

Book Chapters

Bahrami S, Baheiraei N, Ashtiani MN, Nour S, Razavi M. *Microfluidic devices in tissue engineering*. In: Hamblin MR, Karimi M. Biomedical applications of microfluidic devices. Academic Press, London, 2021.

Tabatabaee S, Ashtiani MN, Mousavi A, Baheiraei N. *Nanobiomaterials in musculoskeletal regeneration*. In: Razavi M. Nanoengineering in musculoskeletal regeneration. Academic Press, London, 2020.

Conferences

Ashtiani MN. Particle deposition in human nasal drug delivery: a computational fluid dynamics approach. *The 2nd International Conference on Electrical, Computer, Mechanical and Mechatronics Engineering (ICE2015)*, August 2015, Istanbul, Turkey

Ashtiani MN, Azghani M, Shakouri K. Biomechanical analysis on effects of side-lying hip abduction exercise on gluteus medius muscle. *The 16th Annual Congress of Iranian Society of Physical Medicine*,

Rehabilitation and Electrodiagnosis, Dec 2012, Tehran, Iran. (in persian)

Houshmand B, Oskui IZ, Ashtiani MN, Naseri F. Effect of different designs on stress distribution of dental implants using finite element method. *The 11th meeting of Iranian academy of periodontology*, Jan 2012, Tehran, Iran.

Ashtiani MN, Abdollahi A. An impact analysis of human ribcage in a car-to-car crash: an explicit finite element study. *The 1st MEFOMP international conference of medical physics*, Nov 2011, Shiraz, Iran.

Ashtiani MN, Sherkat H, Latifottojar N, Najafi H, Najarian S. Design and fabrication of a novel wearable automated peritoneal dialysis device. *The 1st MEFOMP international conference of medical physics*, Nov 2011, Shiraz, Iran.

Ashtiani MN. Numerical prediction of particle deposition in human nasal drug delivery: a computational fluid dynamics approach. *The 4th Iranian Controlled Release Conference (ICRC 2009)*, Zanjan, Iran.

Ashtiani MN, Imani R. Biomechanical evaluation of effective parameters on inhaled drug delivery. *The 4th Iranian Controlled Release Conference (ICRC 2009)*, Zanjan, Iran.

Ashtiani MN, Hooshiar-Ahmedi SA, Soleimani KS. Dynamic stress analysis of bone-prosthesis complex during stance phase of gait: a preliminary approach to the loosening characterization. *The 15th Iranian Conference on Biomedical Engineering 2008*, Mashhad, Iran.

Oskui IZ, Ashtiani MN, Tafazzoli-Shadpour M. Developing a model of natural tooth thermography: 3D finite element analysis. *The 15th Iranian Conference on Biomedical Engineering*, Dec 2008, Mashhad, Iran.

EXPERIENCES & HONORS

Research/Executive Experiences

Head of Student Research Committee, Faculty of Medical Sciences, *Tarbiat Modares University*, March 2020 – present.

Research Executive. Mechanobiological simulation of bone apposition around an implanted dental prosthesis, *KFP Dental Co. and Research Deputy of Tarbiat Modares University*, October 2021.

Supervisor of Tarbiat Modares University Students, *National Scientific Olympiad for Medical Sciences Students*, 12th and 13th annual.

Research Executive. Implementation of a model of new methods in directing interdisciplinary research, *Research Deputy of Tarbiat Modares University*, March 2021.

Research Executive. An investigation on the effects of warship motion perturbations on standing stability of the navy personnel, *AJA University of Medical Sciences*, April 2018.

Research Assistant. Biomechanical modeling of the hip abduction exercise, *Tabriz University of Medical Sciences*, May 2019.

Industrial Experiences

Transfer technology for an automated peritoneal dialysis device (PeritoRen®) to *Avyantra Healthcare Technology Startup*, Hyderabad, India, 2019.

Mechanical engineer and designer, *Iranian Research Organization for Science and Technology*, Department of Electrical and Biomedical Engineering, 2011.

Mechanical engineer and designer, *Baroumand Designs*, 2011.

Inventions

Wearable automated peritoneal dialysis device (PeritoRen®), Iranian Patent, Ashtiani and his co-workers, 2011.

Design and manufacturing of a new movable fixture of flexural strength test for advanced ceramics, Iranian Patent, Masjedi and Ashtiani, 2008.

Teachings

Teaching in *Advanced Muscle Nerve Physiology*, PhD course, Faculty of Medical Sciences, Tarbiat Modares University.

Teaching in *Analysis of Sensory-Motor Systems*, PhD course, Faculty of Medical Sciences, Tarbiat Modares University.

Teaching in *Mechanical Characterization of Biomaterials*, PhD course, Faculty of Medical Sciences, Tarbiat Modares University.

Teaching in *Research Methods in Biomedical Sciences*, MSc course, Faculty of Medical Sciences, Tarbiat Modares University.

Teaching in *Spine Biomechanics*, MSc course, Faculty of Medical Sciences, Tarbiat Modares University.

Teaching in *Musculoskeletal Biomechanics*, MSc course, Faculty of Mechanical Engineering, Tarbiat Modares University.

Teaching in *Orthopedic Biomechanics*, MSc course, Faculty of Mechanical Engineering, Tarbiat Modares University.

Teaching in *Trauma Biomechanics*, MSc course, Faculty of Mechanical Engineering, Tarbiat Modares University.

Teaching in *Experimental Methods in Orthopedic Biomechanics*, MSc course, Faculty of Mechanical Engineering, Tarbiat Modares University.

Teaching in *Technical Drawing and Computer-Aided Design*, Faculty of Mechanical Engineering, Sahand University of Technology.

Students

Supervisor: Hosseini I, *An investigation of multi-joint coordination and muscle recruitment pattern with and without perturbed standing in patients with moderate knee osteoarthritis and matched healthy subjects*, MSc student, Tarbiat Modares University.

Supervisor: Dodangue A, *Effects of 10-week transverse plane physical exercises on postural stability and initiation of gait in patients with Parkinson's disease*, MSc student, Tarbiat Modares University.

Supervisor: Habibi F, *Biomechanical analysis of the head stabilization during the gait of patients with vestibular dysfunction*, MSc student, Tarbiat Modares University.

Supervisor: Kian-Ahmadi K, *Effects of tennis serve stances on performance of the aggressive baseliners: a biomechanical modeling in Opensim*, MSc student, Tarbiat Modares University.

Supervisor: Sheikholeslami P, *Analysis of the effects of local muscle fatigue on the upper body muscular synergy during the calisthenics exercises*, MSc student, Tarbiat Modares University.

Supervisor: Rezanifar Y, *A simulation of the effect of insertion torque on dental implant osseointegration using a mechanobioregulatory model*, MSc student, Tarbiat Modares University.

Co-Supervisor: Rahmati M, *The effect of dry needling on muscle activity pattern and scapulohumeral rhythm in patients with active myofascial trigger point in the upper trapezius muscle*, PhD student, Tarbiat Modares University.

Co-Supervisor: Safari M, *Calculation of muscular forces of the lower extremity and Knee joint contact forces in patients with knee osteoarthritis*, MSc student, Tarbiat Modares University.

Co-Supervisor: Samadzadeh S, *Stability analysis in human standing using Lagrangian coherent structures*, MSc student, Tarbiat Modares University.

Advisor: Eslami N, *Immediate effect of vibrating sandal in swing phase of gait on postural indices and lower limb muscles activity in patients with moderate diabetic neuropathy compared with age-matched controls*, MSc student, Tarbiat Modares University.

Advisor: Hatami M, *Comparison of electromyographic activity of ankle and thigh muscles in reaching and transporting tasks in osteoporotic and healthy menopausal women*, MSc student, Tarbiat Modares University.

Advisor: Shirali M, *Calculation of lower limb moments using closed-loop control mode for a dynamical model of human standing on an unstable platform*, MSc student, Tarbiat Modares University.

Advisor: Karimi AR, *Design and analysis of knee joint Holder aiming walking and knee joint treating*, MSc student, Tarbiat Modares University.

Advisor: Khaki S, *Effects of kinesio tape and Mulligan tape on electromyography activity and the kinematics of scapulothoracic and kinetics of glenohumeral joints in computer users affected with scapular dyskinesis*, MSc student, Tarbiat Modares University.

Awards

Member of the *National Elites Foundation*, from Nov 2015.

Honorably Admission in MSc by *Exceptional Talent Committee*, Amirkabir University of Technology, Tehran, Iran.

Member and Head Designer, Executive Committee of the 1st *Khwarizmi International Awards (KIA)* in Surgeon Robots, Feb 2011, Tehran, Iran.

Best submitted invention in Iran's New Towns Innovations Festival, *Ministry of Road and Urban Development*, for Wearable automated peritoneal dialysis device, Dec 2012, Tehran, Iran.

LANGUAGE PROFICIENCY

Farsi (Native)
English (Fluent)
Italian (Moderate)

TECHNICAL SKILLS

Numerical Solvers
matlab, AnyBody, SPSS, ABAQUS, ADINA and Fluent

Mechanical Designs
CATIA and Gambit