Sina Mehdizadeh

[Meh-dee-zä-deh]
Curriculum Vitae, December 2020

Toronto Rehabilitation Institute- University
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sinamehdiz.com (

Highlights

- 2 grants, 5 fellowships, and 6 awards
- 24 journal publications, 2 book chapters
- Several teaching and mentoring experiences
- Formal education on teaching in higher education
- International collaborators
- Toronto Rehab's internal reviewer of CIHR Project Grants
- Member of the CIHR College of Reviewers
- CIHR reviewer of doctoral fellowships
- Certificate of rTMS operation
- Certificate of 2020 Neuromatch summer school on Computational Neuroscience
- Certificates of teaching in higher education

Research Interests: Neuromechanics of locomotion, computational neuroscience, gait biomechanics, dynamic stability of gait, rehabilitation, fall prevention, movement variability

Current position

Oct 2018 - **Postdoctoral Fellow-** *Toronto Rehabilitation Institute, Toronto, ON,* present Canada.

Achievements:

- 5 published papers
- 2 grants as co-investigator
- 3 fellowships
- 3 teaching certificates
- Mentoring students

Education

2014 **Ph.D., Biomedical Engineering-Biomechanics-** *Amirkabir University of Technology, Tehran, Iran*

- GPA: 4.0/4.0. Thesis: Identification of Skill Characteristics of Soccer Players in Agility Using Linear and Nonlinear Analysis of Movement Kinematic Variability
- Supervisor: Prof. Ahmed R. Arshi, Amirkabir University of Technology

Advisor: Prof. Keith Davids, Sheffield Hallam University

2009 MSc., Biomedical Engineering-Biomechanics- Amirkabir University of

Technology, Tehran, Iran

• GPA: 4.0/4.0

2007 **BSc.**, **Biomedical Engineering-Biomechanics-** *Amirkabir University of*

Technology, Tehran, Iran

- GPA: 3.0/4.0
- Ranked among top 0.5% in the entrance exam
- Amirkabir University of Technology rankings:
- Top three Universities in Iran, No. 1 in Biomedical Engineering
- 2014 Shanghai World University Rankings: 150-200
- For further details, see: https://en.wikipedia.org/wiki/Amirkabir_University_of_Technology

Employment

A. Research

Sep 2016-Sep 2018 **Senior Biomechanist-** *Biomechanics department, Podium Division, National Sports Institute, Kuala Lumpur, Malaysia.*

Roles:

- Clinical gait assessments
- Writing research proposals
- Conducting Research studies
- Publishing research outcomes

Jun 2015- Sep 2016 **Research Assistant-** Biomechanics Lab., Rehabilitation Research Center, Department of Rehabilitation Sciences, Iran University of Medical Sciences, Tehran, Iran.

Achievements:

- Mentoring Graduate students
- Member of the Clinical gait analysis team
- Writing research proposals

B. Teaching

[3 graduate and 2 undergrad courses]

Jan 2016 – Sep 2016 **Principal Lecturer (Undergrad)-** Biomedical Engineering Department, Science & Research University, Tehran, Iran.

Courses:

- Biomechanics (designed the syllabus, slides, assignments, exams, and gave the lectures)
- Rehabilitation Engineering (designed the syllabus, slides, assignments, exams, and gave the lectures)

Fall & Winter 2015

Co-principal Lecturer (Graduate)- Beheshti University, Tehran, Iran. Courses:

- Motor Control (co-designed the syllabus, slides, assignments, exams, and gave half of the lectures)
- Biomechanics (co-designed the syllabus, slides, assignments, exams, and gave half of the lectures)

Mehdizadeh, Sina	CV
Fall 2010	Principal Lecturer (Graduate)- Ergonomics group, University of Social Welfare & Rehabilitation Sciences, Tehran, Iran. Courses:
	 CAD/CAM (designed the syllabus, slides, assignments, exams, and gave the lectures)
Spring 2010	 Teaching Assistant (Undergrad)- Amirkabir University of Technology, Tehran, Iran. Courses: Modeling in biomedical engineering
C. Mentoring	[2 PhD students]
2015-2019	Banafshe Ghomian, PhD candidate. Department of Rehabilitation Basic Sciences, Iran University of Medical Sciences, Tehran, Iran. Thesis title: Effect of different rocker sole designs on gait dynamic stability in people with diabetes with and without neuropathy.
2015-2019	Sadegh Norouzi, PhD candidate, Department of Physical Therapy, Jondishapoor University, Ahvaz, Iran. Thesis title: Effect of knee osteoarthritis on lower extremity coordination and coordination variability in a drop jump test.
D. Industry	
2009 - 2012	Design, engineering, R&D and CE consultant- Attila Orthopaed Co. (orthopedic implants manufacturing company), Tehran, Iran.
2012 - 2013	Design, engineering, R&D and QC consultant- Pishgaman Co.

Publications

[2 co-authored book chapters, 22 journal papers (12 first-author, 4 sole author, 1 review paper), and 12 conference abstracts]

(orthopedic implants manufacturing company), Tehran, Iran.

[journals: J Biomechanics: 6, Gait & Posture: 2, Human Movement Science: 1, Sports Medicine: 2, J Gerontology Series A: 1, Clinical Biomechanics: 1, JAMDA:1]

Book chapters

- 1. **Mehdizadeh, S.**, & Moradi, V. Chapter 11: How to run a clinical gait analysis service? In: M.A. Sanjari, Gait: Measuring and Reporting. Setayesh Hasti Publishing, Tehran. 2017. (in Persian)
- 2. Navvab, F. & **Mehdizadeh**, **S.**, V. Chapter 12: How to establish and maintain a gait analysis lab. In: M.A. Sanjari, Gait: Measuring and Reporting. Setayesh Hasti Publishing, Tehran. 2017. (in Persian)

Journal papers

Published/in-press

 Mehdizadeh, S., Glazier, P. (2021). Effect of simulated sensorimotor noise on kinematic variability and stability of a biped walking model. Computer Methods in Biomechanics and Biomedical Engineering (in press). https://doi.org/10.1080/10255842.2020.1867852

2. **Mehdizadeh, S.,** Van Ooteghem, K., Gulka, H., Nabavi, H., Faeighi, M., Taati, B., Iaboni, A. (2021). A systematic review of center of pressure measures to quantify gait changes in older adults. Experimental Gerontology, 143, 111170 (in press). https://doi.org/10.1016/j.exger.2020.111170

- 3. **Mehdizadeh, S.**, Ng, K., Sabo, A., Mansfield A., Flint A., Taati, B., Iaboni, A. Predicting short-term risk of falls in a high risk group with dementia. Journal of the American Medical Directors Association. (in press)
- Sabo, A., Mehdizadeh, S., Ng, K. Iaboni, A., Taati, B. (2020). Assessment of Parkinsonian gait in older adults with dementia via human pose tracking in video data. Journal of NeuroEngineering and Rehabiltation, 17, 97. https://doi.org/10.1186/s12984-020-00728-9
- 5. **Mehdizadeh**, **S.** (2020). Letter to the editor regarding "Accuracy of image data stream of a markerless motion capture system in determining the local dynamic stability and joint kinematics of human gait" by Chakraborty et al. Journal of Biomechanics, 105, 109811, https://doi.org/10.1016/j.jbiomech.2020.109811.
- Ng, K., Mehdizadeh, S., Iaboni, A., Mansfield, A., Flint, A., Taati, B. (2020). Human Pose Estimation to Assess Gait and Fall Risk in Older Adults with Dementia. IEEE Journal of Translational Engineering in Health & Medicine. 8, 1-9 https://doi.org/10.1109/JTEHM.2020.2998326
- 7. **Mehdizadeh, S.**, Dolatabadi, E., Ng, K., Mansfield A., Flint A., Taati, B., Iaboni, A. (2019). Vision-based assessment of gait features associated with falls in people with dementia. Journal of Gerontology: Medical Sciences. glz187. https://doi.org/10.1093/gerona/glz187
- 8. Norouzi, S., Esfandiarpour, F., **Mehdizadeh, S.**, Yousefzadeh, N., Parnianpour, P., (2019). Lower extremity kinematic analysis in male athletes with unilateral anterior cruciate reconstruction in a jump-landing task and its association with return to sport criteria. BMC Musculoskeletal Disorders. 20, 492. https://doi.org/10.1186/s12891-019-2893-5 [my role: co-advisor, wrote the Matlab code, revised the manuscript]
- 9. Ghomian, B., Naemi, R., **Mehdizadeh, S.**, et al. (2019). Gait stability of diabetic patients is altered with the rigid rocker shoes. Clinical Biomechanics, 69: 197-204. https://doi.org/10.1016/j.clinbiomech.2019.06.015 [my role: co-advisor, wrote the Matlab code, revised the manuscript]
- 10. Glazier, P., **Mehdizadeh, S.** (2019). In search of sports biomechanics' holy grail: Can athlete-specific optimum sports techniques be identified? Journal of Biomechanics, 94: 1-4. https://doi.org/10.1016/j.jbiomech.2019.07.044 [my role: co-authored]
- 11. Glazier, P., **Mehdizadeh, S.** (2019). Authors' reply to Carson and Collins' comment on: Challenging Conventional Paradigms in Applied Sports Biomechanics Research. Sports Medicine, 49(5): 831-2 https://doi.org/10.1007/s40279-019-01081-1 [my role: co-authored]
- 12. **Mehdizadeh, S.** (2019) A Robust Method to Estimate the Largest Lyapunov Exponent of Noisy Signals: A Revision to the Rosenstein's Algorithm. Journal of Biomechanics, 85(6): 84-91. https://doi.org/10.1016/j.jbiomech.2019.01.013
- 13. Glazier, P., **Mehdizadeh, S.** (2019) Challenging conventional paradigms in applied sports biomechanics research. Sports Medicine, 49(2): 171-6. https://doi.org/10.1007/s40279-018-1030-1 [my role: co-authored]
- 14. **Mehdizadeh**, **S.**, Glazier, P. (2018). Order error in the calculation of continuous relative phase. Journal of Biomechanics, 73: 243-8.

https://doi.org/10.1016/j.jbiomech.2018.03.032

15. **Mehdizadeh, S.** (2018). The largest Lyapunov exponent of gait in young and elderly individuals: A systematic review. Gait & Posture, 60, 241–50. https://doi.org/10.1016/j.gaitpost.2017.12.016

- 16. **Mehdizadeh, S.**, Sanjari, M.A. (2017). Effect of noise and filtering on largest Lyapunov exponent of time series associated with human walking. Journal of Biomechanics, 64: 236-9. http://dx.doi.org/10.1016/j.jbiomech.2017.09.009
- 17. Nematollahi, M.R. Razeghi, M., **Mehdizadeh, S.**, Tabatabaee, H., Piroozi, S., Rojhani, Z., Rafiee, A. (2016). Inter-Segmental Coordination Pattern in Patients with Anterior Cruciate Ligament Deficiency during a Single-Step Descent. Plos One, 11(2): e0149837, 2016. http://dx.doi.org/10.1371/journal.pone.0149837 [my role: Wrote the Matlab code to calculate coordination, co-authored]
- 18. **Mehdizadeh, S.**, Arshi, A.R., Davids, K. (2016). Constraints on dynamic stability during forward, backward and lateral locomotion in skilled football players. European Journal of Sport Science, 16(2): 190-8. http://dx.doi.org/10.1080/17461391.2014.995233
- 19. Arshi, A.R., **Mehdizadeh, S.**, Davids, K. (2015). Quantifying foot placement variability and dynamic stability of movement to assess control mechanisms during forward and lateral running. Journal of Biomechanics 48(15): 4020-5. http://dx.doi.org/10.1016/j.jbiomech.2015.09.046 [my role: PhD paper]
- 20. Mehdizadeh, S., Arshi, A.R., Davids, K. (2015). A minimal limit-cycle model to profile movement patterns of individuals during agility drill performance: effects of skill level. Human Movement Science 41: 207-17. http://dx.doi.org/10.1016/j.humov.2015.03.009
- 21. **Mehdizadeh, S.**, Arshi, A.R., Davids, K. (2015). Quantifying coordination patterns and coordination variability in forward and backward running: Implications for control of motion. Gait & Posture, 42(2): 172-7. http://dx.doi.org/10.1016/j.gaitpost.2015.05.006
- 22. Arshi, A.R., Nabavi, N., **Mehdizadeh, S.**, Davids, K. (2015). An alternative approach to describing agility in sports through establishment of a relationship between velocity and radius of curvature. Journal of Sports Sciences 33(13):1349-55. http://dx.doi.org/10.1080/02640414.2014.990481 [my role: PhD paper]
- 23. **Mehdizadeh, S.**, Arshi, A.R., Davids, K. (2014). Effect of speed on local dynamic stability of locomotion under different task constraints in running. European Journal of Sport Science, 14(8): 791-8. http://dx.doi.org/10.1080/17461391.2014.905986
- 24. **Mehdizadeh, S.**, Arshi, A.R., Davids, K. (2014). Quantification of stability in an agility drill using linear and nonlinear measures of variability. Acta of Bioengineering and Biomechanics, 16(3): 59-67.

Under review

1. Longitudinal analysis of gait changes in older adults with dementia and their association with fall incidents. J Gerontology series A: Biomedical science

In preparation

1. A template for reporting calculation of the local divergent exponent in human gait studies

2. A review of methods of decomposing kinematic variability in gait analysis

Conference Abstracts and Papers

- Mehdizadeh, S., Ng, K., Sabo, A., Taati, B., Iaboni, A. Developing a prognostic model based on gait mechanical stability and fall history to predict short-term falls in older adults with dementia. 21st Biennial Meeting of the Canadian Society for Biomechanics, Montreal, 2020 (submitted).
- 2. **Mehdizadeh, S.,** Dolatabadi, E., Mansfield, A., Flint, A., Arora, T., Ng, K., Taati, B., Iaboni, A. Developing prognostic models for predicting short-term falls in older adults with dementia using a vision-based gait monitoring system. 10th Canadian Conference on Dementia, Quebec City, 2019.
- 3. **Mehdizadeh, S.**, Dolatabadi, E., Arora, T., Ng, K., Taati, B., Iaboni, A. Gait stability, fall history, and neuropsychiatric symptoms are associated with falls in people with dementia. XXVII ISB Conference, Calgary, 2019.
- 4. **Mehdizadeh, S.,** Dolatabadi, E., Arora, T., Ng, K., Taati, B., Iaboni, A. Using Kinect camera to quantify gait variables that can predict falls in older adults with dementia. RESNA-RehabWeek, Toronto, 2019.
- 5. **Mehdizadeh**, **S.**, Sanjari, M.A. Effect of noise on local dynamic stability measures of human movement. XXVI ISB Conference, Brisbane, 2017.
- 6. Ghomian, B., Naemi, R., **Mehdizadeh, S.**, Jafari, H., Saeedi, H. The influence of the rocker shoe design on shear impulses during walking in patients with diabetic neuropathy. XXVI ISB Conference, Brisbane, 2017.
- 7. **Mehdizadeh, S.**, Arshi, A.R., Nabavi, H., Komasi, P. Qualitative analysis of an agility drill using different state spaces: a dynamical system approach, XXIIIrd ISB Conference, Brussels, 2011.
- 8. **Mehdizadeh, S.**, Komasi, P., Shirzad, E., Nabavi, H. Measuring Local Dynamic Stability of Athlete in Agility Drill Using Lyapunov Exponent (Abstract), 16th Annual Congress of the European College of Sport (ECSS), Liverpool, 2011.
- 9. **Mehdizadeh, S.**, Arshi, A.R., Shirzad, E., Nabavi, H. Comparison of Single and Double Inverted Pendulum Models in Determining Cerebral Palsy Trunk Muscles in Sitting Position: A Subject Specific Approach, 6th International Congress on Biomechanics, 2010.
- 10. **Mehdizadeh, S.**, Najarian, S., Farmanzad, F., Khoshgoftar, M., Sedighi, A.M. Experimental Biomechanical Analysis of Brain Tissue Necking in Tension, CSME Conference, Canada, 2008.
- 11. Nabavi, H., Maghsoodipoor, M., **Mehdizadeh, S.** Biomechanical analysis of gait kinematical variables of athlete with functional ankle instability, ICBME, Tehran, 2009 (In Persian).
- 12. Karimi, M., Hooshyar Ahmadi, S.A., **Mehdizadeh, S.**, Ghomi Rostami, M. Designing and implementing of an automatic knee arthrometer, 17th Congress of the Iran Orthopedic Surgeons, Tehran, Iran, 2009 (In Persian)

Aug 2019	XXVII ISB Congress- Calgary, Canada. Gait stability, fall history, and neuropsychiatric symptoms are associated with falls in people with dementia.
Jul 2017	XXVI ISB Congress- Brisbane, Australia. Effect of noise on local dynamic stability measures of human movement.
Feb 2015	8th Intl. Congress on Physical Education and Sport Science-Tehran, Iran. Lecture: on the use of movement variability in the analysis of human movements, in the workshop: Defeat of engineering approaches in sport.
Nov 2013	Congress on Sport Sciences: Needs of Future Generation- Tehran, Iran. Workshop title: Escaping from Dynamics
Jul 2011	XXIII ISB Conference- Brussels, Belgium. Qualitative analysis of an agility drill using different state spaces: a dynamical system approach.
Jul 2010	6th International Congress on Biomechanics- Singapore. Comparison of Single and Double Inverted Pendulum Models in Determining Cerebral Palsy Trunk Muscles in Sitting

Grants, Awards, and Fellowships

competitive)

2019

Grants, Awards, and Fenowships		
Research Funds		
Nov 2019	Grant No.: SPARK-4-00286 (PI: laboni A., CO-PI: Sina	
	Mehdizadeh)- Funded	
	Funding Organization: Centre for Aging + Brain Health Innovation	
	(CABHI)	
	Amount: 50,000 CAD	
	Period of Grant Award: 11, 2019 - 11, 2020	
	Title: Video-Based gait assessment to monitor changes in health	
	status and reduce hospital visits in older adults with dementia	
	My Role on Project: Co-PI, wrote the initial draft, revised with the PI	
	and submitted the proposal.	
Feb 2020	Grant No.: RN398696–426380 (PI: laboni A., CO-investigator:	
	Sina Mehdizadeh, et al.)- Funded	
	Funding Organization: CIHR	
	Amount: 344,250 CAD	
	Period of Grant Award: 2019-2024	
	Title: Computer vision for daily monitoring of gait instability to detect	
	an increased risk of falling	
	My Role on Project: Co-Investigator, wrote the section on gait	
Aanda	stability	
Awards		
2020	Focus on Accessibility Awards- 2000 CAD- funded by the	
	Government of Ontario, Ministry of Seniors and Accessibility	
2019	CIHR Travel Award (No. RN398696-426380)- 1000 CAD	

AGE-WELL ACCESS award-2500 CAD (No.: AWAC-Oct19-010,

Mehdizadeh, Sina	CV
2019	UHN Office of Research Trainees Travel Award- 500 CAD (competitive, awarded three times per year)
2018	AGE-WELL Travel award (competitive, covered travel and accommodation)
2015	Travel award to attend 2nd International Berlin Autumn School on Movement Science, Berlin, Germany (competitive, covered registration, travel and accommodation)
Fellowships	
Sep 2020- Aug 2022	CANSSI Ontario Postdoc Fellowship top-up: Deep learning to predict optimality of future foot placements in walking of older adults- 10K CAD
Sep 2020- Aug 2021	AGE-WELL postdoc fellowship: Artificial intelligence for the real-time prediction of optimal foot placement in the gait of older adults- 20k CAD
Jan 2019- Dec 2019	Mitacs Accelerate Fellowship: A Vision-based system for intelligent monitoring of gait poses in Dementia- 45K CAD
Sep 2009- Sep 2013	PhD Graduate Fellowship (covered four years of tuition fees)
Sep 2007- Sep 2009	MSc Graduate Fellowship (covered two years of tuition fees)

Patent

Mehdizadeh, S., Hooshiar, A., Rostami, M., Karimi, M. (2009). A novel digital angular knee arthometer (IR patent No.: 60310).

The aim of this device was to automatically measure the laxity of medial and lateral knee ligaments (MCL and LCL). While there was such a device for the knee anterior and posterior ligaments (ACL and PCL), the lack of such a device for medial and lateral ligaments were obvious as the current method of measuring MCL and LCL was manual and subjective. This device tried to automatize this process by changing the knee angular motion to linear measures of laxity. In this project, I was responsible for the mechanical design of the device and its mechanism of action.

Peer Review Experiences

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Journal of Biomechanics	Medicine & Science in Sport & Exercise
Gait & Posture	Journal of Sport Sciences
Clinical Biomechanics	International Journal of Athletic Therapy and Training
Human Movement Science	PLOS ONE
Journal of Applied Biomechanics	Scientia Iranica
The Open Biomedical Engineering	JMIR Rehabilitation and Assistive
Journal	Technologies
Adaptive Behavior	Computers in Biology and Medicine
Scientific reports	IEEE Access
Biomedical Engineering online	International Journal of Medical Informatics

Computer Skills

Programming	Biomechanics
Matlab (80% several years of experience,	Visual 3D (90%, several years of
everyday use),	experience),
Labview (30%, need-based use),	Opensim (50% need-based use),
Python (70%, everyday use)	PyDy Multibody Dynamics (50%, need-
	based use)
TensorFlow/Keras/Sci-kit Learn (50%,	
need-based use)	
CAD	Statistics
Catia/Solid Works (80%, several years of	R (70%, everyday use)
experience)	

Biomechanical Skills

Hands on experience in working with:

Motion Capture: Qualisys (QTM) EMG: Noraxon Myomuscle

Force plates: Kistler (Bioware + MARS); Tension Test machine: Zwick-Roell

Bertec instrumented treadmill dynamic testing machine

Accelerometer: Xsens, Noraxon

Myomotion

Language

English: Advanced. IELTS score: 7.5 TOEFL score: 102. GRE score: 308

Persian: mother tongue

Membership

Canadian Society of Biomechanics (CSB membership No.: 1100)

International society of motor control

International Society of Biomechanics (ISB membership No.: 4257)

American Society of Biomechanics (ASB membership No.: 4573)

AGE-WELL NCE highly qualified personnel (HQP)

Professional Development

Teaching

University of Toronto Certificate of Teaching Fundamentals Certificate (workshop series)

University of Toronto Certificate of Advanced University Teaching Preparation (workshop series + microteaching)

University of Toronto Prospective Professors in Training (PPIT)- Winter 2020 UHN Toastmaster group on public speaking

Research

2019 and 2020 University of Toronto, Faculty of Medicine workshop: Grant Writing University of Toronto, School of Graduate Studies workshop: writing CIHR grants Mitacs workshop: Practice Your Presentation Skills

University of Toronto, School of Graduate Studies workshop: Becoming a Productive Writer

UHN Libraries workshop: The Right Review for You

UHN workshop: Beyond Informed Consent UHN Libraries workshop: PubMed Basics, Tips

AGE-WELL Webinar: Introduction to Transdisciplinary Working in Aging & Technology AGE-WELL Webinar: Technologies that work with you: Leveraging human-centred

design to create zero-effort technologies

AGE-WELL Webinar Series: Involving End-Users in All Stages of Research

University of Toronto, School of Graduate Studies workshop: Making the Most of Oral Presentations

AGE-WELL Webinar: Advancing best practice in balance and mobility testing for fall risk assessment in older Canadians

Women's College Hospital workshop: Clinical trials lunch and learn- Resources to help you start your clinical research

AGE-WELL Webinar: Preventing fall-related head injuries in older adults- Using video evidence to inform practical interventions

Toronto Rehab's Workshop on Sex and Gender Considerations in Preparing Health Research Grants

Python programing workshop

Soft skills

Mitacs workshop: Essentials of Productive Teams

Mitacs workshop: Skills of Communication

SMRTS Webinar: Practical Project Management

AGE-WELL Webinar Series: Professional Development Series- You Got Hired! University of Toronto workshop: Teaching and Learning Transferable Skills: For

Yourself and Your Students

Other

Mitacs workshop: Discovering the Entrepreneur Within

AGE-WELL Cortex Design Workshop - Optimize your Ethnographic Study

References

Babak Taati, Ph.D., PEng.

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Andrea laboni, MD, DPhil, FRCPC

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