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Mahdi Tavakoli, PhD, PEng

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Education

Thesis

Research Experience

- Jul 2017 – Jul 2017* **Professor**
University of Alberta, Department of Electrical and Computer Engineering
Edmonton, Canada
- Sep 2008 – present* **Associate Professor**
University of Alberta, Department of Electrical and Computer Engineering
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Statistics

RG Score 35.33
Publications 191
Reads 13,827
Citations 1882

Awards & Grants

Skills & Activities

Skills Robotics, Medical Robotics, Control Theory, Advanced Control Theory, Robot Control, Human-Robot Interaction, Sliding Mode Control, Haptics, Mobile Robotics, Mechatronics, Kalman Filtering, Control and Instrumentation, HRI, System Identification, System Modeling, Systems Dynamics, Biorobotics, System Integration, Biomedical Devices, Medical Image Analysis, Brachytherapy, Minimally Invasive Surgery, Robotic Surgery, Medical Device Design, Control System Design, Teleoperation, Control Systems Engineering, Biomedical Engineering, Electrical Engineering, Controller Design, Controls, Actuators, Adaptive Control, Estimation, Virtual Environments, Automation & Robotics,

Automation, Force Control, MATLAB Simulation, Control Systems

Languages

Scientific Memberships

Interests

Publication Highlights

[authors]: [title]. [details]

Books

Mahdi Tavakoli: *Haptics for Teleoperated Surgical Robotic Systems*. 01/2008; , DOI:10.1142/6816

Book Chapters

Carlos Rossa, Mcniel Keri, Mahdi Tavakoli: *Brachytherapy Needle Steering Guidance Using Image Overlay*. Handbook of Research on Biomimetics and Biomedical Robotics, 01/2018: chapter 8: pages 191-215; IGI Global., ISBN: 9781522529934, DOI:10.4018/978-1-5225-2993-4.ch008

Mahdi Tavakoli: *Hand Haptic Perception*. The Human Hand as an Inspiration for Robot Hand Development, 01/2014: pages 189-200; Springer International Publishing., DOI:10.1007/978-3-319-03017-3_9

M. Bowthorpe, M. Tavakoli: *Advances towards beating heart surgery*. 01/2014: pages 135-158;

Mahdi Tavakoli, Rajni V Patel: *Haptics in Telerobotic Systems for Minimally Invasive Surgery*. Telesurgery, 01/2008: pages 113-124; Springer Berlin Heidelberg., DOI:10.1007/978-3-540-72999-0_9

Journal Publications

Lingbo Cheng, Mojtaba Sharifi, Mahdi Tavakoli: *Towards robot-assisted anchor deployment in beating-heart mitral valve surgery*. International Journal of Medical Robotics and Computer Assisted Surgery 03/2018;, DOI:10.1002/rcs.1900

Jay Carriere, Mohsen Khadem, Carlos Rossa, Nawaid Usmani, Ronald Sloboda, Mahdi Tavakoli: *Event-triggered 3D Needle Control Using a Reduced-order Computationally Efficient Bicycle Model in a Constrained Optimization Framework*. 03/2018;, DOI:10.1142/S2424905X18420047

Bitah Fallahi, Ron Sloboda, Nawaid Usmani, Mahdi Tavakoli: *Model Averaging and Input Transformation for 3D Needle Steering*. 03/2018;, DOI:10.1142/S2424905X18410040

Lingbo Cheng, Mahdi Tavakoli: *Switched-Impedance Control of Surgical Robots in Teleoperated Beating-Heart Surgery*. 03/2018;, DOI:10.1142/S2424905X18410039

Seyed Farokh Atashzar, Mahya Shahbazi, Mahdi Tavakoli, Rajni V. Patel: *A Computational Model based Study of Supervised Haptics-enabled Therapist-in-the-Loop Training for Upper-Limb Post-Stroke Robotic*

Rehabilitation. IEEE/ASME Transactions on Mechatronics 02/2018;,
DOI:10.1109/TMECH.2018.2806918

Shahbazi Mahya, Seyed Farokh Atashzar, Mahdi Tavakoli, Rajni V. Patel: *Position-Force Domain Passivity of the Human Arm in Telerobotic Systems*. IEEE/ASME Transactions on Mechatronics 01/2018; PP(99),
DOI:10.1109/TMECH.2018.2793877

Thomas Lehmann, Carlos Rossa, Nawaid Usmani, Ron S. Sloboda, Mahdi Tavakoli: *Intraoperative Tissue Young's Modulus Identification During Needle Insertion Using a Laterally Actuated Needle*. IEEE Transactions on Instrumentation and Measurement 12/2017; PP(99):1-11.,
DOI:10.1109/TIM.2017.2774182

Mohsen Khadem, Carlos Rossa, Nawaid Usmani, Ron Sloboda, Mahdi Tavakoli: *Robotics-assisted Needle Steering around Anatomical Obstacles using Notched Steerable Needles*. IEEE Journal of Biomedical and Health Informatics 12/2017; PP(99):1-1., DOI:10.1109/JBHI.2017.2780192

Thomas Lehmann, Carlos Rossa, Nawaid Usmani, Ronald Sloboda, Mahdi Tavakoli: *Deflection Modeling for a Needle Actuated by Lateral Force and Axial Rotation During Insertion in Soft Phantom Tissue*. Mechatronics 12/2017; 48:43-52., DOI:10.1016/j.mechatronics.2017.10.008

Thomas Lehmann, Ronald Sloboda, Nawaid Usmani, Mahdi Tavakoli: *Human-Machine Collaboration Modalities for Semi-Automated Needle Insertion Into Soft Tissue*. 11/2017; PP(99):1-1.,
DOI:10.1109/LRA.2017.2768123

Jay Carriere, Mohsen Khadem, Carlos Rossa, Nawaid Usmani, Ronald Sloboda, Mahdi Tavakoli: *Surgeon-in-the-loop 3D Needle Steering Through Ultrasound-guided Feedback Control*. 11/2017; PP(99):1-1.,
DOI:10.1109/LRA.2017.2768122

Mojtaba Sharifi, Saeed Behzadipour, Mahdi Tavakoli: *Cooperative modalities in robotic tele-rehabilitation using nonlinear bilateral impedance control*. Control Engineering Practice 10/2017; 67:52-63.,
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S. Sepehr Tabatabaei, Heidar Ali Talebi, Mahdi Tavakoli: *An adaptive order/state estimator for linear systems with non-integer time-varying order*. DOI:10.1016/j.automatica.2017.06.042

Weihua Li, Liang Ding, Haibo Gao, Mahdi Tavakoli: *Haptic Tele-Driving of Wheeled Mobile Robots Under Nonideal Wheel Rolling, Kinematic Control and Communication Time Delay*. IEEE Transactions on Systems, Man, and Cybernetics: Systems 08/2017; PP(99):1-12., DOI:10.1109/TSMC.2017.2738670

Mojtaba Sharifi, Hassan Salarieh, Saeed Behzadipour, Mahdi Tavakoli: *Tele-echography of moving organs using an Impedance-controlled telerobotic system*. DOI:10.1016/j.mechatronics.2017.05.006

Alireza Mohammadi, Horacio J. Marquez, Mahdi Tavakoli: *Nonlinear Disturbance Observers: Design and Applications to Euler-Lagrange Systems*. IEEE control systems 07/2017; 37(4):50--72.,
DOI:10.1109/MCS.2017.2696760

Mojtaba Sharifi, Hassan Salarieh, Behzadipour Saeed, Mahdi Tavakoli: *Stable Nonlinear Trilateral Impedance Control for Dual-User Haptic Teleoperation Systems with Communication Delays*. Journal of Dynamic Systems Measurement and Control 06/2017; 139(12), DOI:10.1115/1.4037125

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- Bitafallahi, Carlos Rossa, Ron S. Sloboda, Nawaid Usmani, Mahdi Tavakoli: *Sliding-based image-guided 3D needle steering in soft tissue*. Control Engineering Practice 06/2017; 63:34-43., DOI:10.1016/j.conengprac.2017.04.001
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- Seyed Farokh Atashzar, Mahya Shahbazi, Mahdi Tavakoli, Rajni V Patel: *A grasp-based passivity signature for haptics-enabled human-robot interaction: Application to design of a new safety mechanism for robotic rehabilitation*. The International Journal of Robotics Research 04/2017;, DOI:10.1177/0278364916689139
- Carlos Rossa, Mahdi Tavakoli: *Issues in Closed-Loop Needle Steering*. Control Engineering Practice 03/2017; 62:55-69., DOI:10.1016/j.conengprac.2017.03.004
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- Ala Shariati, Mahdi Tavakoli: *A Descriptor Approach to Robust Leader-Following Output Consensus of Uncertain Multi-Agent Systems with Delay*. IEEE Transactions on Automatic Control 12/2016; PP(99):1-1., DOI:10.1109/TAC.2016.2643444
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- Mohsen Khadem, Carlos Rossa, Nawaid Usmani, Ron S. Sloboda, Mahdi Tavakoli: *Semi-Automated Needle Steering in Biological Tissue Using an Ultrasound-Based Deflection Predictor*. Annals of Biomedical Engineering 09/2016; 45(4)., DOI:10.1007/s10439-016-1736-x
- Muhammad Faisal Jamaluddin, Sunita Ghosh, Michael Waine, Ronald Sloboda, Mahdi Tavakoli, John Amanie, Don Yee, Albert Murtha, Nawaid Usmani: *110: Intraoperative Factors Associated with Iodine-125 Placement Accuracy in Prostate Brachytherapy*. Radiotherapy and Oncology 09/2016; 120:S42., DOI:10.1016/S0167-8140(16)33509-5
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- Muhammad F. Jamaluddin, Sunita Ghosh, Michael Waine, Ronald S. Sloboda, Mahdi Tavakoli, John Amanie, Albert D. Murtha, Don Yee, Nawaid Usmani: *Quantifying Iodine-125 Placement Accuracy in Prostate Brachytherapy Using Post-Implant Transrectal Ultrasound Images*. Brachytherapy 05/2016; 15(1):S180., DOI:10.1016/j.brachy.2016.04.330
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- Meaghan Bowthorpe, Mahdi Tavakoli: *Ultrasound-Based Image Guidance and Motion Compensating Control for Robot-Assisted Beating-Heart Surgery*. 03/2016; 01(01):1640002., DOI:10.1142/S2424905X1640002X
- Mohsen Khadem, Carlos Rossa, Ron S. Sloboda, Nawaid Usmani, Mahdi Tavakoli: *Ultrasound-Guided Model Predictive Control of Needle Steering in Biological Tissue*. 03/2016; 01(01):1640007., DOI:10.1142/S2424905X16400079
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- Nooshin Jafari, Kim D. Adams, Mahdi Tavakoli, Sandra A. Wiebe: *Development of an Assistive Robotic System with Virtual Assistance to Enhance Play for Children with Disabilities: A Preliminary Study*. Journal of Medical and Biological Engineering 01/2016; 38(2)., DOI:10.1007/s40846-017-0305-6
- Weihua Li, Liang Ding, Zhen Liu, Weidong Wang, Haibo Gao, Mahdi Tavakoli: *Kinematic Bilateral Tele-Driving of Wheeled Mobile Robots Coupled with Slippage*. IEEE Transactions on Industrial Electronics 01/2016; 64(3):1-1., DOI:10.1109/TIE.2016.2619320

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- Ting Yang, Yili Fu, Mahdi Tavakoli: *Digital versus analog control of bilateral teleoperation systems: A task performance comparison*. Control Engineering Practice 05/2015; 38., DOI:10.1016/j.conengprac.2015.01.008
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