**Curriculum Vitae**

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Warsaw, Poland

Languages: Azerbaijani, Turkish, English, Persian, Polish

**Mehdi Borjkhani**

Researcher, International Center for Translational Eye Research (ICTER), Institute of Physical Chemistry, Polish Academy of Sciences (PAN), Warsaw, Poland, 2021-Now

**Education & Work Experience**

**Polish Academy of Sciences (Poland),** Specialist 2021-now

**Nanyang Technological University (Singapore)**, Research Associate 2019-2020

**University of Tehran (Iran)**, Research Assistant 2012-2018

**Urmia University of Technology (Iran),** Lecturer2010-2011

**Tehran Polytechnic (Iran)**, M.S.C Biomedical Engineering 2009

**Urmia University (Iran)**, B.S.C Electronic and Electrical Engineering 2005

**Publications**

***Journal Articles***

[1] Investigating the role of inhibitory interneurons in shaping orientation selectivity in the primary visual cortex using a biophysical computational model of a cortical column. **M. Borjkhani**, B. Bałamut, A. Posłuszny, A.T. Foik. Submitted, PLoS One), IF=3.

[2] Amplified hybrid surface plasmon polaritons in partially reduced graphene oxide supported on gold. S. Mohajer, M.A. Sharif, A. H. Aghdam, **M. Borjkhani**, M.H.N. Assadi. Applied Surface Science (2023), IF=6.7.

[3] Alterations in the intrinsic discharge activity of CA1 pyramidal neurons associated with possible changes in the NADPH diaphorase activity in a rat model of autism induced by prenatal exposure to valproic acid. M. Rahdar, R. Hajisoltani, Sh. Davoudi, S. A. Karimi, **M. Borjkhani**, V. A. Khatibi, N. Hosseinmardi, G. Behzadi, M. Janahmadi, Brain Research (2022), IF=2.9.

[4] Kisspeptin-13 prevented the electrophysiological alterations induced by amyloid-beta pathology in rat: Possible involvement of stromal interaction molecules and pCREB. Sh. E. Khonacha, S. H. Mirbehbahani, M. Rahdar, Sh. Davoudi, **M. Borjkhani**, F. Khodagholi, F. Motamedi, M. Janahmadi. Brain Research Bulletin (2022), IF=3.8.

[5] Propagation length enhancement of surface plasmon polaritons in ultrafine Au nanodisk array, the role of kinky breather and periodic lump, M. A. Sharif, K. Hadi, **M. Borjkhani**, Physica B: Condensed Matter (2022), IF=2.8.

[6] Investigating the Cocaine-induced Reduction of Potassium Current on the Generation of Action Potentials Using a Computational Model. H. Borjkhani, **M. Borjkhani**, M.A. Sharif. Basic and Clinical Neuroscience (2020), IF=0.7.

[7] Ca2+ Channels Involvement in Low-Frequency Stimulation-Mediated Suppression of Intrinsic Excitability of Hippocampal CA1 Pyramidal Cells in a Rat Amygdala Kindling Model. Z. Ghotbeddin, S. Heysieattalab, **M. Borjkhani**, J.M. Zadeh, S. Semnanian, N.H. Mardi, M. Janahmadi, Neuroscience (2019), IF=3.

[8] Hyperexcitability of hippocampal CA1 pyramidal neurons in male offspring of a rat model of autism spectrum disorder (ASD) induced by prenatal exposure to valproic acid: A possible involvement of Ih channel current. R. Hajisoltani, S.A. Karimi, M. Rahdar, S. Davoudi, **M. Borjkhani**, N.H. Mardi, G. Behzadi, M. Janahmadi, Brain Research (2019), IF=2.7.

[9] Computational modeling of opioid-induced synaptic plasticity in hippocampus. **M. Borjkhani**, F. Bahrami, M. Janahmadi, PloS One (2018), IF=3.

[10] Formation of opioid-induced memory and its prevention: a computational study. **M. Borjkhani**, F. Bahrami, M. Janahmadi. Frontiers in Computational Neuroscience (2018), IF=2.65.

[11] Period doubling and route to chaos in reduced graphene oxide, an experimental evidence, M. Faraji, M. A. Sharif, **M. Borjkhani**, K. Ashabi, Journal of Molecular Liquids (2018), IF=4.5.

[12] Do Opioids Contribute to Pathological Memory Formation? Introducing a Computational Model to Meet the Question, **M. Borjkhani**, F. Bahrami, M. Janahmadi, Basic and Clinical Neuroscience (2017), IF=0.7.

[13] Chaotic fractional‐order model for muscular blood vessel and its control via fractional control scheme, M.P. Aghababa, **M. Borjkhani**, Complexity (2014), IF=3.5.

[14] Application of GA, PSO, and ACO algorithms to path planning of autonomous underwater vehicles, M.P. Aghababa, M.H. Amrollahi, **M. Borjkhani**, Journal of Marine Science and Application (2012), IF=0.43.

[15] Temporal modulation instability, transition to chaos in non-feedback biased photorefractive media, M.A. Sharif, **M. Borjkhani**, B. Ghafary, Optics Communications (2014), IF=1.48.

[16] Low power MICS band Transmitter for Bio-Medical Sensor Nodes with Driving Capability by Energy Harvesting Systems H. Borjkhani, S. Sheikhaei, **M. Borjkhani**, Iranian Journal of Biomedical Engineering (2014).

[17] Kinematical Modeling of the Writing Process using Model Predictive Control, **M. Borjkhani**, F. Towhidkhah, Iranian Journal of Biomedical Engineering (2010).

***Conference Presentations***

[1] A biophysical computational model of a cortical column in the primary visual cortex, **M. Borjkhani**, A. T. Foik, 5th Neurons in Action Conference, Warsaw, Poland, 31st May- 2nd June (2023).

[2] Investigating the role of PV-related lateral connections in shaping orientation tuning curves in the primary visual cortex using a computational modeling approach. **M. Borjkhani**, A. T. Foik, Annual IPC PAS Micro-symposium, Warsaw, Poland, 25-26 Jan (2022).

[3] Analyzing the role of inhibitory neurons in the induction of synchronized patterns in the primary visual cortex using computational modeling approach. **M. Borjkhani**, A. T. Foik, Virtual FENS Regional Meeting, 25-27 Aug (2021).

[4] Opioid Addiction Affects Neuronal Synchronization in the Hippocampus: A Computational Model. Z.T. Mansoury, F. Bahrami, M. Janahmadi, **M. Borjkhani**, Society for Mathematical Biology Annual meeting, eSMB (2020).

[5] Dimension reduction in the computational model of the CaMKII phosphorylation process, Z.T. Mansoury, F. Bahrami, M. Janahmadi, **M. Borjkhani** .8th Basic and Clinical Neuroscience Congress, Tehran, Iran, (2019)

[6] Mathematical modeling of opioid receptor function in hippocampus. **M. Borjkhani**, F. Bahrami, M. Janahmadi, 4th Basic and Clinical Neuroscience Congress, Tehran, Iran (2015).

[7] M. Bahrami, **M. Borjkhani**, G. A. Hossein-Zadeh, F. Bahrami, "Lyapunov exponent as a feature to distinguish patients with Alzheimer's disease and healthy controls using resting-state fMRI BOLD signals," 1st Iranian Conference on Human Brain Mapping, Tehran, Iran (2014).

[8] A mathematical model for neuron astrocytes interactions in hippocampus during addiction, **M. Borjkhani**, A. Mahdavi, F. Bahrami, 21st Iranian Conference on Biomedical Engineering (2014).

[9] Probabilistic study of different synchronization measures: Application to electroencephalographic signals, **M. Borjkhani**, A.H. KhazeniFard, A. Rahimpour, 3rd Basic and Clinical Neuroscience Congress (2014).

[10] Low power current starved sub-harmonic injection locked ring oscillator, H. Borjkhani, S. Sheikhaei, **M. Borjkhani**, 22nd Iranian Conference on Electrical Engineering (2014).

[11] Chaotic behavior analysis in rest EEG signals of rats with Alzheimer’s disease, **M. Borjkhani**, T. Toufighi, F. V. Farahani, 2nd Basic and Clinical Neuroscience Congress, Tehran, Iran (2013).

[12] Chaotic beam propagation through Chalcogenide glass fibers, M.A. Sharif, **M. Borjkhani**, Proc. of 12th International Young Scientists Conference Optics and High Technology Material Science – SPO, Kyiv, Ukraine (2011).

[13] The effect of magnetic fields on reduction of pain in the human body, **M. Borjkhani**, M.A. Sharif, Proc. of Anesthesia International Congress, Ahvaz, Iran (2011).

[14] Telemedicine Applications for Healthcare, **M. Borjkhani**, N. Ezzati, National Electrical Congress, Urmia, Iran (2011).

[15] Noninvasive detection of the fetal heartbeat signal, **M. Borjkhani**, N. Ezzati, National Electrical Congress, Urmia, Iran (2011).

[16] Intelligence control of power using GA-PID controller, S. Zaferanlouei, **M. Borjkhani**, Proc. of 4th International conference of Fuzzy information and engineering, Shomal University, Amol, Iran (2010). [17] Modeling handwriting generation using Genetic Fuzzy PID controller, **M. Borjkhani**, GH. Jahedi, F. Towhidkhah, Proc. of 4th International conference of Fuzzy information and engineering, Shomal University, Amol, Iran (2010).

[18] Diagnosis of parkinson diseases based on handwriting kinematics using fuzzy classifier, **M. Borjkhani**, M. Fallahnezhad, F. Towhidkhah, M.H. Moradi, Proc. of 4th International conference of Fuzzy information and engineering, Shomal university, Amol, Iran (2010).

[19] Simulation of nerve blocking by sinus/square biphasic high-frequency electrical current and suggested combined new wave form based on Hodgkin-Huxley model, S.B. Makooyi, A. Soltanzadeh, **M. Borjkhani**, Proc. of International Conference on Broadcast Technology and Multimedia Communication, Malaysia (2010).

[20] Conjugated Version of Electromagnetic Sensor Based on Mach-Zehnder Electro-Optical Modulator, M.A. Sharif, **M. Borjkhani**, A. Soltanian, Proc. of International Conference on Broadcast Technology and Multimedia Communication, Malaysia (2010).

[21] Non-Thermal Effects of Base Transceiver Stations on Human Health, **M. Borjkhani**, M.A. Sharif, 1st Congress on Bio-electro-magnetism, Qazvin, Iran (2010).

[22] Low frequency electromagnetic fields biological effects on nervous system, **M. Borjkhani**, M.A. Sharif, 1st Congress on Bio-electro-magnetism, Qazvin, Iran (2010).

[23] Diagnosis Parkinson's Disease Using Reliable Handwriting Kinematic Features By Artificial Neural Network, **M. Borjkhani**, M. Ahmadlou, F. Towhidkhah, Proc. of International Conference on Biomedical and Interdisciplinary Research (published in Journal of Iran university of medical science), Tehran, Iran (2009).

[24] Modeling Writing Generation in Schizophrenia Patients using Model Predictive Control, **M. Borjkhani**, F. Towhidkhah, 10th International Congress on Medicine, Tehran, Iran (2009).

[25] Modeling Kinematic Features of Human Handwriting using Model Predictive Control, **M. Borjkhani**, F. Towhidkhah, Proc. of IEEE International Biomedical Engineering Conference, Cairo (2008).

[26] Extracting Reliable Handwriting Kinematic Features using Neural Network for Diagnosis Schizophrenia Disease, **M. Borjkhani**, M. Ahmadlou, F. Towhidkhah, Proc of IEEE International Biomedical Engineering Conference, Cairo (2008).

[27] Writing Disorders in Schizophrenia Patients and Diagnosis of Disease Using Support Vector Machine, **M. Borjkhani**, H. Davandeh, F. Towhidkhah, 15th Iranian Conference on Biomedical Engineering, Mashhad, Iran (2008).

[28] Do Human Beings use Gestalts when Predicting Obstacle Movements, B. Taghizadeh, F. Towhidkhah, M.A. Pajouh, **M. Borjkhani**, 15th Iranian Conference on Biomedical Engineering, Mashhad, Iran (2008).

[29] Schizophrenia Diagnosis using a new Artificial Immune System based on writing patterns, **M. Borjkhani**, S. Jafari, F. Towhidkhah, H.R. Mohammadi, 16th Iranian Electrical Engineering Conference, Tarbiat Modarres University, Iran (2008).

**Research Interests**

Computational Neuroscience

Mathematical Modeling

Statistical and Biomedical Signal Processing

Pattern Recognition

Estimation and System Identification

fMRI Data Analysis

EEG Data Analysis

**Lab experiment**

24 channel NIRS signal acquisition using synthetic hemodynamic generator in liquid phantom (2020)

Rat and mice handling in Nanyang Technological University at Singapore (2019)

Acquisition of Handwriting and its analysis for MS patients in Imam-Reza hospital in Urmia (2018)

Acquisition and analysis of fMRI signals at Imam-khomeini hospital in Tehran (2014)

**Design and implementations**

Design and implementation of a 24 channel CW-NIRS system for investigation of light propagation through liquid phantom (human head phantom) (2020)

HRV system using Kubios software for stress assessment (2018)

Design and implementation of Robot Arm (2014)

Design and implementation of seven robots for Iranian ABU-ROBOCON contest (2004-2005)

**Graduate Courses**

Dynamical Systems in Neuroscience

Biological Systems Modeling

Electrophysiology

Discrete signal processing

Biomedical signal processing

Functional Medical Imaging Systems

Stochastic Processes

Pattern Recognition

Estimation and System Identification

Artificial Neural Networks

Fuzzy Control

Neuro-muscular systems control

**Teaching Experience**

Biomedical signal processing (graduate)

System identification (graduate)

Modeling and simulation in bio-mechatronic (graduate)

Intelligent Control systems (graduate)

Artificial Neural Networks (graduate)

Advanced engineering mathematics (undergraduate)

An introduction to biomedical engineering (undergraduate)

Physics - Electricity and Magnetism Electrical Circuits I & II (undergraduate)

Electronic I & II (undergraduate)

Linear Control Systems (undergraduate)

Process Control (undergraduate)

Electrical Circuits I & II (undergraduate)

**Programming skills**

C/C++

MATLAB and Simulink

Python

pySONATA

Brain Modeling Toolkit (BMTK)

Visual Neuronal Dynamics (VND)

Dynamical Systems and Bifurcation Analysis software (Matcont)

Dynamical systems analysis software (Xppaut)

fMRI analysis software (FSL)

EEGLAB toolbox

ICALAB toolbox

Arduino programming

Arduino live-link with MATLAB

**References**

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| **Prof. Morteza A. Sharif**  Assistant professor  Electrical Engineering Department  Urmia University of Technology  Urmia, Iran  Email: [m\_a\_sharif@hotmail.com](mailto:m_a_sharif@hotmail.com)  Phone: +989143458471 | **Prof. Mahyar Janahmadi**  Professor  Neuroscience Research Center  Faculty of Medicine  Shahid Beheshti University of Medical Sciences  Tehran, Iran  Email: mjanahmadi@yahoo.com  janahmadi@sbmu.ac.ir |
| **Prof. Fariba Bahrami**  Associate Professor  Head of Biomedical Engineering Group  Director of Human Motor Control and Computational Neuroscience Laboratory  School of Electrical and Computer Engineering  College of Engineering, University of Tehran  Tehran, Iran  Email: [fbahrami@ut.ac.ir](mailto:fbahrami@ut.ac.ir)  Phone: +98-21-6111 4924 | **Dr. Hadi Borj khani**  Research Assistant  Ph.D. in Biomedical engineering from the University of Tehran  Hochschule für Technik und Wirtschaft Berlin  Berlin, Germany  Email: [Hadi.borj@htw-berlin.de](mailto:Hadi.borj@htw-berlin.de)  Phone: +49 1523 1434208 |
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