CURRICULUM VITAE

Radu Mutihac,
University of Bucharest, ROMANIA

Last name: MUTIHAC

First name: RADU

Place of birth: Bucharest, Romania

Nationality and citizenship: Romanian.

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Studies:

1. Faculty of Physics, University of Bucharest, 1971-1974; BS in **Physics**;
2. Faculty of Physics, University of Bucharest, 1974-1976, MS in **Electronic Physics**;
3. Faculty of Physics, University of Bucharest, 1994, PhD in **Physics**: "Mathematical Modeling and Computer Simulation of Neural Networks";
4. Faculty of Mathematics, University of Bucharest, 1977-1980, BS in **Informatics**.

Scientific training and research:

1. National Institutes of Health, National Institute of Deafness and Other Communication Disorders, Department of Intramural Research, Bethesda, MD 20892, USA, 2011-2013;
2. Walter Reed Army Institute of Research, Division of Psychiatry and Neuroscience, Department of Behavioral Biology, Silver Spring, MD 20910, USA, 2011-2013;
3. University of New Mexico, School of Medicine, Department of Neurology, Albuquerque, NM 87131, USA, 2010-2011;
4. Johns Hopkins University, MR Research Division, Department of Radiology, School of Medicine, Baltimore, MD, USA, 2003 – 2005;
5. Katholieke Universiteit Leuven, School of Medicine, Labo voor Neuro- en Psychofysiologie, Leuven, Belgium, 2001-2002;
6. Yale University, School of Medicine, Section of Neurobiology, New Haven, CT, USA, 2000-2001;
7. Institut Henri Poincaré, Centre Emile Borel, Paris, France, 1998;
8. Université René Descartes, URA CNRS 1448, Paris, France, 1998;
9. Ettore Majorana International Centre for Scientific Culture, Erice, Sicily, Italy, 1995, 1997;
10. Telecom-Bretagne, Brest-Iroise, France, 1993;
11. École Polytechnique, Centre de Physique Théorique, Palaiseau, France, 1993;
12. International Centre for Theoretical Physics, Trieste, Italy, 1992-2004;

Selected national and international research projects and grants:

1. *Time correlation of EPI versus real-time fMRI time series.* Zavoisky Award, International Society for Magnetic Resonance in Medicine (ISMRM), Berkeley, CA, USA, April, 2013.
2. *Optimizing correction of geometric distortion in MR images*, Zavoisky Award, International Society for Magnetic Resonance in Medicine (ISMRM), Berkeley, CA, USA, May, 2012.
3. *Exploratory analysis of functional MR neuroimaging sleep data*. The National Research Council (NRC) of the National Academy of Sciences (NAS) Research Associateship Award # W81XWH-07-2-0001-0114 at the U.S. Army Medical Research and Materiel Command, Walter Reed Army Institute of Research (WRAIR) in Silver Spring, MD 20910, USA and National Institutes of Health (NIH), Bethesda, MD 20892, USA, February 2011 – March 2013.
4. *Model-based and data-driven analysis of whole brain EVI demonstrates increased statistical power compared to EPI at 3 T*. Zavoisky Award, International Society for Magnetic Resonance in Medicine (ISMRM), Berkeley, CA, USA, May, 2011.
5. *Statistical assessment of exploratory analysis in functional MR neuroimaging*, Senior Fulbright Grant #495, University of New Mexico, School of Medicine, Department of Neurology, Albuquerque, NM 87131 USA, August 2010 – February 2011.
6. *Spatiotemporal exploratory analysis of fMRI data*, Zavoisky Award, International Society for Magnetic Resonance in Medicine (ISMRM), Berkeley, CA, USA, May, 2010.
7. *Fractal wavelet analysis of the human cerebral cortex*, European Society for Magnetic Resonance in Medicine and Biology (ESMRMB), East-Meets-West Grant, Vienna, Austria, Oct. 2009.
8. *Wavelet shrinkage versus Gaussian spatial filtering of functional MRI data*, Zavoisky Award, International Society for Magnetic Resonance in Medicine (ISMRM), Berkeley, CA, USA, April, 2009.
9. *Statistical assessment of ICA of neuroimaging data by resampling and hierarchical clustering,* European Society for Magnetic Resonance in Medicine and Biology (ESMRMB), East-Meets-West Grant, Vienna, Austria, Oct. 2008.
10. *Complex platform for medical imaging – Data acquisition, processing, management, and dissemination*, PCA-MED, 198/2006, CEEX Module 1, VIASAN, Sept. 1, 2006 - Dec. 10, 2008.
11. *Independent component analysis of fMRI data – Algorithms, model selection, and performance*, European Society for Magnetic Resonance in Medicine and Biology (ESMRMB), East-Meets-West Grant, Warsaw, POLAND, Sept. 2006.
12. *Wavelet-based statistical analysis of fMRI activation images*, Zavoisky Award, International Society for Magnetic Resonance in Medicine (ISMRM), Berkeley, CA, USA, May, 2006.
13. *Exploratory analysis of fMRI data*, NIH Grant P41 RR15241, F.M. Kirby Research Center for Functional Brain Imaging, Kennedy Krieger Institute, and MR Research Division, Department of Radiology, School of Medicine, Johns Hopkins University, 707 N. Broadway, Baltimore, MD 21205, USA, May 2003 - March 2005.
14. *Independent component analysis of functional neuroimaging data,* MAPAWAMO European Project, FP5 Programme, QLG3-CT-2000-30161, Katholieke Universiteit Leuven, School of Medicine, Labo voor Neuro- en Psychofysiologie, Campus Gasthuisberg, Herestraat 49, B-3000, Leuven, BELGIUM; October 2001- September 2002.
15. *Modeling and simulation of a mitral cell of the olfactory bulb*, Research in Neurophysics Fulbright Grant #6, 2000, Yale University, School of Medicine, Section of Neurobiology, New Haven, Connecticut, USA, October 2000 - March 2001.
16. *Questions Mathématiques en Traitement du Signal et de l'Image*, Trimestre de Mathématiques, Institut Henri Poincaré, Centre Emile Borel, Paris, FRANCE, 14 septembre – 18 décembre, 1998.
17. *Interactions between Unprotonated Amines and Polyethers, Crown Ethers, and Cryptands,* NATO Collaborative Research Grant *SRG 941403*, 1995 - 1997.
18. *Implementation of a Design Center of Artificial Intelligence Programs with Applications in Higher Education*, Project 4009/1995, item B 36, funded by the Ministry of Education and C.N.S.C.U. (National Council of University Scientific Research), 1996.

19. *Modeling and Simulation of Neural Networks as Coupled Oscillators*, Project 3009/1993, item B1, funded by the Ministry of Education and C.N.S.C.U. (National Council of University Scientific Research), 1994-1995.
20. *PHARE Multi-Country Programme in Higher Education*, funded by PHARE supervised by the ETF (*European Training Foundation*), 1996.
21. *Pilot Project on Regional Co-operation in Reforming Higher Education,* jointly supported by the OECD and EC-PHARE, 1994-1995.
22. *Graduate Module in Artificial Intelligence: Mathematical Methods for Neural Networks*, COMETT-Matari *Programme*, Telecom-Bretagne, Brest-Iroise, France, July 21-25, 1993.
23. *Retraining and Updating in Biophysics*, TEMPUS *Individual Mobility Grant* IMG-92-RO-2084, École Polytechnique, Centre de Physique Théorique, Palaiseau, France, April 4 - July 5, 1993.

Governmental employment

1. Deputy General Director, Department of Higher Education, Romanian Ministry of Education, Bucharest, 1993-1994.

Scientific employment:

1. Guest Scientist on Dr. Allen Braun's protocol 92-DC-0178, National Institute on Deafness and other Communication Disorders (NIDCD), National Institutes of Health (NIH), 9000 Rockville Pike, Bldg 10 CRC, Room 5D45, MSC-1462, Bethesda, MD 20892-1462, U.S.A., May 10, 2011 - April 30, 2013.
2. Senior Research Associate, U.S. Army Medical Research and Materiel Command, Walter Reed Army Institute of Research (WRAIR), Contract #W81XWH-07-2-0001-0114, 503 Robert Grant Ave., Silver Spring, MD 20910, U.S.A., February 1, 2011- March 31, 2013.
3. Coordinator of Medical Physics, University of Bucharest, Department of Physics, 2010-on.
4. PhD Supervisor, University of Bucharest, Department of Physics, 2008-on.
5. Faculty and Research Associate, F.M. Kirby Research Center for Functional Brain Imaging, Kennedy Krieger Institute, and Department of Radiology, Johns Hopkins University, 707 N. Broadway, Baltimore, MD 21205, USA, February 1, 2002 - March 30, 2005.
6. Visiting Professor, Katholieke Universiteit Leuven, School of Medicine, Labo voor Neuro- en Psychofysiologie, Campus Gasthuisberg, Herestraat 49, B-3000, Leuven, BELGIUM; MAPAWAMO European Project, FP5 Programme, QLG3-CT-2000-30161, September 1, 2001 - September 30, 2002;
7. Professor, Department of Electricity and Biophysics, Faculty of Physics, University of Bucharest, ROMANIA, 2000-on;
8. Associate Professor, Department of Electricity and Biophysics, Faculty of Physics, University of Bucharest, ROMANIA,1997-1999;
9. Research Associate, Microprocessor Laboratory, the Abdus Salam International Centre for Theoretical Physics (ICTP), P.O. Box 586, Trieste, 34100, ITALY; *X-Ray Project 95A2MC02C* jointly funded by the Abdus Salam ICTP and the United Nations University (UNU), Strada Costiera 11, Trieste 34151, ITALY, September 1, 1995 -September 1, 1997.
10. Lecturer, Department of Electricity and Biophysics, Faculty of Physics, University of Bucharest, ROMANIA, 1991-1997;
11. Professor assistant, Department of Electricity and Biophysics, Faculty of Physics, University of Bucharest, ROMANIA, 1981-1991;
12. Physicist, Head of Photolithography Section, Department of Integrated Circuits, Enterprise of Radio Components and Semiconductors, 32 Erou Iancu Nicolae, Bucharest-Băneasa, ROMANIA, 1976-1981;

Main fields of research/competence:

1. Univariate/multivariate imaging data analysis and data mining methods oriented towards large data bases, which include both confirmatory and exploratory approaches:
   - ✓ *Hypothesis-driven model-based statistical inference* analysis of functional magnetic resonance imaging (fMRI), real-time fMRI, and real-time resting-state fMRI data;
   - ✓ *Wavelet-based nonparametric regression* of functional neuroimaging data, particularly suited for underlying phenomena with irregular features such as spikes or discontinuities.

- ✓ *Data-driven model-independent component/subspace analysis* (ICA);
- ✓ *Fuzzy clustering analysis* (FCA) of biomedical time series, with applications in temporal clustering of functional neuroimaging data and validation of ICA decomposition of functional brain imaging.
- ✓ *Analysis of multimodal functional neuroimages.*
- ✓ *Analysis of multicontrast functional neuroimages*.
- ✓ *Validation of exploratory decompositions of functional neuroimaging data* by statistical resampling.
- ✓ *Improvement of digital image post-processing existing algorithms* in MATLAB.
- ✓ *Refining and developing* of novel algorithms for *noise reduction*, *movement correction*, *and unwarping* of MR images. Evaluation of variability induced by MR scanner types.

2. Natural image analysis with respect to:
   - ✓ *Feature extraction* with the purpose to develop methods for solving difficult high-level image feature extraction and analysis problems;
   - ✓ *Image denoising* by comparing filtering with a Gaussian kernel and wavelet shrinkage (several wavelet bases);
   - ✓ *Image compression* using biorthogonal spline wavelets.
3. Compartmental modeling and computer simulation of various nervous cells and simple neural networks using the NEURON simulation environment (http://www.neuron.yale.edu/):
   - ✓ Development of algorithms in C/C++ inside the NEURON environment for optimization by finding the global minimum/maximum of multidimensional functions;
   - ✓ Extending the conjugate gradient-based algorithms in multidimension to variable metric (quasi-Newton) algorithms for function minimization.
4. Digital X-ray medical image restoration and enhancement based on Bayesian statistics. Development of efficient and robust algorithms implementing Bayesian inference with entropic prior in:
   - ✓ *Digital mammography* and early breast cancer detection;
   - ✓ *X-ray radiology* and *computed tomography* (CT);
   - ✓ *X-ray and MR angiography*.
   - ✓ *Quantitative and diffusion MRI* to assess osteoporosis.
5. Exploratory analysis of multimodal functional neuroimaging data like fused EEG/fMRI:
   - ✓ EEG/fMRI;
   - ✓ PET/fMRI;
   - ✓ PRT/CT
   - ✓ Compressed sensing.
6. Sleep deprivation directions of study:
   - ✓ Sleep loss effects;
   - ✓ Driving simulation and sleep restriction;
   - ✓ Sleep dependent learning;
   - ✓ The effects of alcohol and sleep deprivation on reaction time and performance;
   - ✓ Effects of sleep deprivation and extended waking on cognitive performance;
   - ✓ Sleep restriction and recovery of alertness and consciousness;
   - ✓ Response measures to sleep restriction.

Lectures given in the Department of Electricity and Biophysics:

1. Digital Processing of Biomedical Signals (MSc, in English);
2. Physical Principles of Medical Imaging (MSc, in English);
3. Foundations of Neural Networks (MSc, in English);
4. Topics in MATLAB (BSc);
5. Modeling and Simulation of Biophysical Systems and Processes (BSc);
6. Essentials of Artificial Intelligence (Doctoral School);
7. Advances in Medical Physics (Doctoral School);

8. System Theory (MSc);
9. Microelectronics (MSc);
10. Analysis and Design of Analog and Digital VLSI circuits (MSc);
11. Elements of Automatics (BSc);
12. Technologies for Integrated Silicon Electronic Devices (BSc);
13. Solid State Electronics (BSc, EN)

Member of the following organizations:

1. Romanian Society of Radiology and Medical Imaging (SRIM), Bucharest, Romania;
2. Romanian College of Medical Physicists, Iasi, Romania;
3. Romanian US Alumni Association, Bucharest, Romania;
4. Romanian–US Fulbright Alumni, Bucharest, Romania;
5. Romanian Association of Medical Physicists (ARFM);
6. IEEE Fellow of Signal Processing Society and Neural Networks Society, USA (ID #41617054);
7. Organization for Human Brain Mapping (OHBM), Minneapolis, MN 55416 USA (ID #27100);
8. International Society for Magnetic Resonance in Medicine (ISMRM), New York, USA (ID #51004)
9. European Association for International Education (EAIE);
10. International Association of Mathematical Physics (IAMP);
11. Alfred Kastler Foundation, France;
12. Associate of the Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy.

Language competencies:

1. English,
2. French,
3. Italian.

Member of the Editorial Board of the following scientific journals:

1. *Journal of the Romanian College of Medical Physicists* (http://www.medicalphysics.ro/);
2. *Epilepsy Journal* (http://www.omicsonline.org/epilepsy.php);
3. *Journal of Childhood & Developmental Disorders* (https://childhood-developmental-disorders.imedpub.com/);
4. *Journal of Neurology and Clinical Neuroscience* (https://www.pulsus.com/journal-neurology-clinical-neuroscience.html);
5. *Medical and Clinical Reviews* (http://medical-clinical-reviews.imedpub.com/);
6. *The Neurologist - Clinical and Therapeutics Journal* (https://www.omicsonline.org/neurologist-clinical-therapeutics-journal.php).

Permanent/temporary scientific referee for the scientific journals:

1. *Revue Roumaine de Chimie* (Roumanian Academy);
2. *Roumanian Journal of Physics* (Roumanian Academy);
3. *Roumanian Quarterly Chemical Reviews* (Roumanian Academy) – discontinued;
4. *Roumanian Reports in Physics* (Roumanian Academy);
5. *Journal of Inclusion Phenomena and Molecular Recognition in Chemistry* (Kluwer Academic Publisher, USA);
6. *Biotechnology Progress* (Center for Biotechnology and Bioengineering, University of Pittsburg, USA);
7. *International Journal of Chaos Theory and Applications* (University "Alexandru Ioan Cuza", Jassy, Romania, and "Advanced and Applied Intelligent Technologies Foundation", Lausanne, Switzerland);
8. *IEEE Transactions on Image Processing* (IEEE, USA);
9. *IEEE Transactions on Medical Imaging* (IEEE, USA);
10. *Journal of Neural Engineering* (Institute of Physics Publishing Ltd., London, UK, IOP ID: 113284);
11. *Physiological Measurement* (Institute of Physics Publishing Ltd., London, UK, IOP ID: 113284);
12. *Physics in Medicine and Biology* (Institute of Physics Publishing Ltd., London, UK, IOP ID: 113284);
13. *Physical Biology* (Institute of Physics Publishing Ltd., London, UK, IOP ID: 113284);

14. *International Journal of Adaptive Control and Signal Processing* (John Wiley & Sons Ltd., Chichester, New York, Weinheim, Brisbane, Singapore, and Toronto);
15. *Neural Networks*, Elsevier Editorial System (EES);
16. *Journal of Neural Engineering* (Institute of Physics Publishing Ltd., London, UK, IOP ID:113284;
17. *Artificial Intelligence in Medicine,* Elsevier Editorial System (EES).

Scientific evaluator/expert/referee:

1. The Romanian–US Fulbright Commission, Bucharest, Romania, 2001-on;
2. The European Commission, Brussels, Belgium;
   - FP7 ICT CALL 9 – Neuro-Bio-Inspired Systems;
   - FP7-HEALTH-2013-INNOVATION-1 – Imaging of Mental Disorders;
   - H2020-FET-OPEN-2014-RIA – Novel Ideas for Radically New Technologies;
   - H2020-ETHICS ASSESSMENT – 2015, REA, Panel 1;
   - H2020-ECSEL-2015-1-RIA-two-stage;
   - H2020 - WP2014-2015 – ICT27 Photonics KET, Bruxelles;
   - H2020-ECSEL-2015-1-RIA-two-stage;
   - H2020-FET-OPEN-REA-2015-2 Cut-Off 2015.09.29 (Vice-Chair), Bruxelles;
   - H2020-FET-OPEN-REA-2016-1 Cut-Off 2016.05.11 (Vice-Chair), Bruxelles;
   - H2020-ECSEL-2017-1-IA-two-stage
   - H2020-IC-2017-1-Photonics KET;
3. Czech-Norwegian Research Programme (CZ09), 2014;
4. OHBM (Organization for Human Brain Mapping), New York, USA, 2004-on;
5. ISMRM (International Society for Magnetic Resonance in Medicine), Berkeley, USA, 2004-on;
6. WSEAS (World Scientific and Engineering Academy and Society), 2004, 2005;
7. MEC (Ministry of Education and Research), Bucharest, Romania, 1999;
8. CNCSIS (National Council for Scientific Research in Higher Education) Bucharest, Romania;
9. ARACIS (Romanian Agency for Quality Assurance in Higher Education) Bucharest, Romania;
10. UEFISCDI (Executive Agency for Higher Education, Research, Development and Innovation Funding), Bucharest, Romania;
    - PN-II-PT-PCCA-2013;
    - PN-II-RU-TE-2014;
    - PNCDI III, National Research, Development and Innovation Plan Programmes, 2016;
    - PN-III-P3-3.1-PM-RO-MD-Bilateral Competition Romania-Moldavia, 2016;
    - EUREKA Program 3, 2016;
    - PN-II-PT-PCCA-2013, Final Evaluation, 2017;
11. INCFDM (National Institute of Research and Development for Material Physics), Commission of Ethics, Bucharest, Romania, 2017.

References from:

1. Prof. **Peter C. M. Van Zijl**, Director, F.M. Kirby Research Center for Functional Brain Imaging, Kennedy Krieger Institute and Professor, Johns Hopkins University, Department of Radiology,
   707 North Broadway, Baltimore, MD 21205, USA,
   Phone: 1-443-923-9510, Fax: 1-443-923-9505,
   E-mail: pvanzijl@mri.jhu.edu, URL: http://mri.kennedykrieger.org/sitemap/pvanzijl.html

2. Dr. **Thomas Balkin**, Head of Behavioral Department, Division of Psychiatry and Neuroscience, Walter Reed Army Institute of Research, 503 Robert Grant Ave, Silver Spring, MD 20910, USA.
   Phone: 1-301-319-9350, Mobile: 1-410-868-3708, Fax: 1-301-319-9979
   E-mail: thomas.balkin@us.army.mil

3. Prof. **Stefan Posse**, Head of MR Laboratory, 1 University of New Mexico, Department of Neurology, Health Science Center, MSC 10 5620, Albuquerque, NM 87131, USA,
   Phone: 1-505-925-6087, 1-505-272-4919, Fax: 1-505-272-6692
   E-mail: sposse@unm.edu
4. Dr. **Allen Braun**, Chief of Language Section, National Institute of Deafness and other Communication Disorders, NIH, Bldg 10, 9000 Rockville Pike, Bethesda, MD 20892, USA.
   Phone: 1-301-402-1497, Mobile: 1-301-408-8704, Fax: 1-301-480-5940
   E-mail: brauna@nidcd.nih.gov
5. Prof. **Marc M. Van Hulle**, Catholic University of Leuven, School of Medicine, Laboratory of Neuro- and Psychophysiology, Campus Gasthuisberg, Herestraat 49, B-3000 Leuven, BELGIUM,
   Tel: +(32-16)-345961, Fax: +(32-16)-345960
   E-mail: marc@neuro.kuleuven.be, URL: http://simone.neuro.kuleuven.ac.be
6. Prof. **Gordon Shepherd**, Yale University, School of Medicine, Section of Neurobiology, C303 SHM, 333 Cedar Street, PO Box 208001, New Haven, CT 06520-8001, USA,
   Tel: 1-203-785-4336 / 4334, Fax: 1-203-785-6690,
   E-mail: gordon.shepherd@yale.edu

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Signature