

# Hossein Rabbani

Senior Member,  
IEEE

Associate Professor  
Department of Biomedical Engineering,  
Isfahan University of Medical Sciences  
&  
Medical Image & Signal Processing  
Research Centre



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## Objective and Fields of Interest

- Objective** Research in multidimensional signal processing including biosignal analysis and modeling (especially medical image/volume), sparse transforms, noise reduction and estimation problem, image/video restoration, probability models of sparse domain's coefficients.
- Fields of interest** Biomedical signal analysis and processing including multidimensional data, time-frequency analysis tools including x-lets, denoising, statistical signal processing, applied mathematics (currently I am focusing on Statistical & Mathematical Modeling of Medical Signals and Systems).

## Academic Qualifications

- 2013 –2014** Postdoctoral Research Fellow, Duke Eye Center, Durham, United States.
- Research topic: **“Automatic Analysis of Various Types of Leakages in Fluorescein Angiograms and Optical Coherence Tomography (OCT)”**
  - Supervisor: Prof. Sina Farsiu
- 2011** Postdoctoral Research Scholar, The University of Iowa, Iowa, United States.
- Research topic: **“Optical Coherence Tomography (OCT) Image Analysis”**
  - Supervisors: Prof. Milan Sonka & Prof. Michael Abramoff
- 2007** Visiting Research Scholar, Electrical & Computer Engineering Department, Queen’s University, Kingston, Ontario, Canada.
- Research topic: **“Statistical modeling of sparse domain’s coefficients and its application to medical image/volume denoising”**
  - Supervisor: Prof. Saeed Gazor.

2002 – 2008

**Doctoral Researches, Bioelectronics** (1<sup>st</sup> rank in entrance exam)

**Department of Biomedical Engineering** (The Center of Excellence on Biomedical Engineering in Iran), **Amirkabir University of Technology** (Tehran Polytechnic), **Tehran, Iran.**

- Dissertation research topic: **“Medical Image/Volume Noise Reduction in Multidimensional Complex Wavelet Transform Domain Using Bivariate Mixture Models”**
- Supervisor: Prof. Mansur Vafadust
- Passed Ph.D. courses: advanced digital signal processing, biomedical signal processing, advanced biomedical signal processing, advanced digital image processing, advanced digital communication, spread spectrum, system identification, advanced neural network.
- Passed the qualifying examination in Sept. 2004.

2000 – 2002

**Master of Science, Bioelectronics** (3<sup>rd</sup> rank)

**Department of Biomedical Engineering** (The Center of Excellence on Biomedical Engineering in Iran), **Amirkabir University of Technology** (Tehran Polytechnic), **Tehran, Iran.**

- Dissertation research topic: **“Video Restoration based on Motion Estimation in Complex Wavelet Domain”**
- Supervisor: Prof. Mansur Vafadust
- Advisor: Prof. Shohreh Kasaei
- Passed M.Sc. courses: digital signal processing, biomedical signal processing, digital image processing, medical imaging systems, stochastic processes, statistical pattern recognition, digital control systems, bioinstrument, and neural network.

1997 – 2000

**Bachelor of Science, Communication** (1<sup>st</sup> rank)

**Department of Electrical and Computer Engineering, Isfahan University of Technology, Isfahan, Iran.**

- Dissertation research topic: **“Designing and Constructing of Laser Communication between Two Computers”**

## Work Experience

2003-2016

**Teaching**

- **Undergraduate level courses**  
(B.Sc. students, Amirkabir University of Technology):

- Statistics and probability
  - Analog and digital communication systems
- **Graduate level courses**  
(M.Sc. & Ph.D. students, Isfahan University of Medical Sciences):
- Advanced Biomedical Signal Processing
  - Biological Signal & System Modeling
  - Biomedical Signal Processing
  - Digital Image Processing
  - Digital Signal Processing
  - Information Technology in Biomedicine
  - Medical Image Processing & Analysis
  - Neural Networks
  - Pattern Recognition
  - Stochastic Processes
  - Sparse Transforms and Their Applications in Signal Processing
  - System Identification
  - Advanced Biological Signal & System Modeling

### **Supervising and Advising**

- **Supervisor:**

PhD dissertation researches entitled:

- Combination of graph based algorithms and time-frequency methods for processing of OCT's
- Seeking an appropriate feature extraction method for breast cancer recurrence prediction based on microarray gene expression data
- A new model based on multivariable Gaussianization of OCT data
- Automatic analysis of features of AMD in OCT images using 3D curvelet transform
- Automatic detection of acute myeloid leukemia in microscopic images using dictionary learning
- Automatic diagnosis of Mild Cognitive Impairment (MCI) by dictionary learning -based analysis of EEG signals

PhD dissertation researches entitled (in progress):

- 3D Sparse Reconstruction of Cone-beam CT
- 3D OCT Classification by Deep Learning

M.Sc. dissertation researches entitled:

- Image restoration using Gaussian mixture models with neighborhood nonlocal clustering

- Evaluation of the symmetricity of cup to disk ratio in left and right eyes of normal subjects
- Mosaicing macula OCT images and OCT optical disk
- Designing a dictionary for OCT images based on K-SVD algorithm using texture characteristics of retinal layers for image segmentation
- Automatic segmentation of corneal layer boundaries in OCT images and obtaining 3D maps of the entire thickness of cornea and inner layers
- Automatic detection of leishman bodies in bone marrow samples from patients with visceral leishmaniasis using level set method
- Evaluation of asymmetricity of right and left eyes of normal subjects using extracted features from optical coherence tomography (OCT) and color fundus images
- Automatic diagnosis of malaria based on complete circle-ellipse fitting search algorithm
- Automatic segmentation and recognition of lung nodules in thoracic CT images using active contour modeling and convex hull
- Segmentation of enhanced depth imaging optical coherence tomography (EDI-OCT) images using graph cut algorithm based on Gaussian mixture model of wavelet features
- Forming projection images from retinal layers on the 3D optical coherence tomography (OCT) data and fusion of them using curvelet transform to form an optimal projection image
- Evaluation of image pre-compensation methods for enhancing visual efficiency in the presence of higher order ocular optical aberrations
- Extraction of 15-lead ECG signal from vectorcardiogram (VCG) signal using partial linear transformation for providing information from posterior side of the heart
- Detection of foveal avascular zone (FAZ) based on curvelet transform for grading of diabetic retinopathy
- Extraction of nucleolus candidate zone in white blood cells of peripheral blood smear images using curvelet transform
- A comparison between hp version of finite element method with EIDORS for electrical impedance tomography
- A comparison between ECG and VCG signals for detection of ischemia location
- Estimation of somatosensory evoked potentials with multi-adaptive filters
- A contourlet-based watermarking method for medical images
- Automatic detection of diabetic retinopathy by extraction of retinal image features in curvelet domain
- Estimating depth of anesthesia based on wavelet transform and neuro-fuzzy systems

- Microcalcification detection in mammographic images using fractal model in wavelet domain
- Persian script character recognition using PCA
- A comparison between ECG and VCG for detection of ischemia
- Automatic detection and recognition of lung nodule in CT image based on active contour
- Complexity analysis of EEG signals for Mild Cognitive Impairment (MCI) diagnosis
- 3D segmentation of proximal enamel lesions in micro-ct images
- Automatic analysis of tracheal acoustic signals for apnea detection and introducing new clinical indices of depth of sedation
- Statistical modeling of 3D OCT data by mixture model

B.Sc. dissertation research entitled:

- Angle detection for biomaterial based on image processing

- **Advisor:** M.Sc. dissertation researches entitled:

- Transform based ellipse detection in microscopic images using elliptical basis functions
- Automatic extraction and recognition of myeloma cell in microscopic bone marrow aspiration images
- Extraction of candida fungus from pap smear images based on ridgelet transform for vulvovaginal candidiasis diagnosis
- Extraction of vessels, optic disc and fovea avascular zone from fundus fluorescein angiogram based on Hessian analysis of directional curvelet subbands
- Medical image compression with multi-wavelet
- A new adaptive technique for fast and accurate estimation of SSAEP

## Honors

- I was really interested in studying mathematics before entering university and all of my grades in this field were excellent. I participated in the entrance exam of universities.
  - My grades in this exam were:
    - ✓ Mathematics: **98/100**
    - ✓ Physics: **86.7/100**
    - ✓ Chemistry: **91.2/100**
  - I had this opportunity to choose **all of the best universities** in Iran.
- B.Sc. Degree with the honor of the **1<sup>st</sup> rank** from Isfahan University of Technology.
- M.Sc. Degree with the honor of the **3<sup>rd</sup> rank** from Amirkabir University of Technology.
- **1<sup>st</sup> rank** in the Ph.D. entrance exam of Amirkabir University of Technology in bioelectrics.

- **1<sup>st</sup> rank** in the Ph.D. entrance exam of Isfahan University of Technology in communication engineering.
- **Outstanding selected Ph.D. thesis** by Iranian Society for Biomedical Engineering.
- **The winner of national prize of “Young Assistant Professors”.**
- **IEEE, Elected Senior Member, 2013**

## Membership

- ✓ IEEE Senior Member  
Signal Processing Society, Engineering in Medicine and Biology Society, Circuits and Systems Society, Computer Society
- ✓ SPIE member

## Article Reviewer

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| ✓ IEEE Transactions on Image Processing                            | ✓ Biomedical Signal Processing & Control                 |
| ✓ IEEE Transactions on Signal Processing                           | ✓ Pattern Recognition Letters                            |
| ✓ IEEE Transactions on Medical Imaging                             | ✓ Ultrasonics  |
| ✓ IEEE Transactions on Biomedical Engineering                      | ✓ Journal of Biophotonics                                |
| ✓ IEEE Signal Processing Letters                                   | ✓ Journal of Biomedical Optics                           |
| ✓ IEEE Transactions on Geoscience & Remote Sensing                 | ✓ Measurement  |
| ✓ IEEE Transactions on Circuits & Systems for Video Technology     | ✓ Computer Methods and Programs in Biomedicine,          |
| ✓ IEEE Transactions on Multimedia                                  | ✓ Journal of Visual Image Communication & Representation |
| ✓ IEEE Trans. on Systems, Man, and Cybernetics-Part B: Cybernetics | ✓ Applied Optics   |
| ✓ IEEE Transactions on Biomedical Circuits and Systems             | ✓ Optics Letters   |
| ✓ IEEE Journal of Biomedical and Health Informatics                | ✓ Journal of the Optical Society of America A            |
| ✓ IET Image Processing Journal                                     | ✓ Biomedical Optics Express                              |
| ✓ IET Signal Processing Journal                                    | ✓ PLOS ONE   |
| ✓ IET Computer Vision  | ✓ Journal of Medical Systems                             |
| ✓ Pattern Recognition  | ✓ The Computer Journal                                   |
| ✓ Signal Processing  | ✓ Medical & Biological Engineering & Computing           |
| ✓ Computers in Biology & Medicine                                  | ✓ Neural Computing & Applications                        |
| ✓ Digital Signal Processing  | ✓ Journal of Applied Mathematics                         |
|  | ✓ EURASIP Journal on Image and Video Processing          |

- ✓ Signal, Image and Video Processing (Springer)
- ✓ Multidimensional Systems and Signal Processing (Springer)
- ✓ Circuits, Systems & Signal Processing (Springer)
- ✓ Current Medical Imaging Reviews
- ✓ International Journal of Pattern Recognition and Artificial Intelligence
- ✓ Journal of Innovative Optical Health Sciences
- ✓ Measurement Science Review
- ✓ Electronics Letters
- ✓ Progress in Electromagnetic Research (PIER)
- ✓ BMC Open
- ✓ Biomedical Engineering OnLine
- ✓ International Journal of Imaging Systems and Technology
- ✓ Mathematical Problems in Engineering
- ✓ Cognitive Neurodynamics
- ✓ Optik
- ✓ Journal of Research in Medical Sciences
- ✓ Iranian Journal of Biomedical Engineering
- ✓ Iranian Journal on Electrical & Computer Engineering
- ✓ Iranian Journal of Physics Research
- ✓ Several International IEEE Conferences and National Conferences

### Editorial Board Member:

- ✓ Journal of Isfahan Medical School
- ✓ Journal of Medical Signals and Sensors (Editor-in-Chief)

### Publications

#### International Journal Papers

- ✓ A. Rashno, D. D. Koozekanani, P. M. Drayna, B. Nazari, S. Sadri, H. Rabbani, K. K. Parhi, "Fully-Automated Segmentation of Fluid/Cyst Regions in Optical Coherence Tomography Images with Diabetic Macular Edema using Neutrosophic Sets and Graph Algorithms," **IEEE Transactions on Biomedical Engineering**, accepted, 2017.
- ✓ A. Rashno, B. Nazari, D. D. Koozekanani, P.M. Drayna, S. Sadri, H. Rabbani and K.K. Parhi, "Fully-Automated 2D and 3D Segmentation of Fluid Regions in Exudative Age-Related Macular Degeneration Subjects: Kernel Graph Cut in Neutrosophic Domain," **PLOS ONE**, accepted, 2017.
- ✓ S. Momeni, O. Sarrafzadeh, H. Rabbani, "Automatic Brain Aneurysm Extraction in Angiography Videos Using Circlet Transform and a Modified Level Set Model", **Current Medical Imaging Reviews**, accepted, 2017.
- ✓ M. Momenzadeh, A. Vard, A. Talebi, A. M. Dehnavi, H. Rabbani, "Computer-Aided Diagnosis Software for Vulvovaginal Candidiasis Detection From Pap Smear Images", **Microscopy Research & Technique**, accepted, 2017.

- ✓ Z. Amini, H. Rabbani, "Optical Coherence Tomography Image Denoising Using Gaussianization Transform", **Journal of Biomedical Optics**, vol. 22, no. 8, pp. 1-12, 2017.
- ✓ M. Momenzadeh, M.R. Sehhati, A. Mehri Dehnavi, A. Talebi, H. Rabbani, "Automatic Diagnosis of Vulvovaginal Candidiasis from Pap smear Images", **Journal of Microscopy**, vol. 267, no. 3, pp. 299-308, 2017.
- ✓ L. Fang , L. Yang , Shutao Li , H. Rabbani , Zh. Liu , X. Chen , Q. Peng, "Automatic Detection and Recognition of Multiple Macular Lesions in Retinal OCT Images with Multi-instance Multi-label Learning", **Journal of Biomedical Optics**, vol. 22, no. 6, 066014, 2017.
- ✓ M.J. Allingham, D. Mukherjee, E.B. Lally, H. Rabbani, P.S. Mettu, S.W. Cousins, S. Farsiu, "A Quantitative Approach to Predict Differential Effects of Anti-VEGF Treatment on Diffuse and Focal Leakage in Patients with Diabetic Macular Edema - A Pilot Study", **Translational Vision Science & Technology**, vol. 7, no. 6, 2017.
- ✓ Z. Amini, H. Rabbani, "Letter to the Editor: Correction to “The Normal-Laplace Distribution and its Relatives” , **Communications in Statistics - Theory and Methods**,\_vol. 46, no. 4, pp. 2076-2078, 2017.
- ✓ M. Esmaili, A. Mehri-Dehnavi, and H. Rabbani, "3D Curvelet-Based Segmentation and Quantification of Drusen in Optical Coherence Tomography Images", **Journal of Electrical and Computer Engineering**, vol. 2017 (2017), Article ID 4362603, 12 pages.
- ✓ Z. Amini, H. Rabbani, "Statistical Modeling of Retinal Optical Coherence Tomography", **IEEE Transactions on Medical Imaging**, vol. 35, no. 6, pp. 1544-1554, 2016.
- ✓ O. Sarrafzadeh, H. Rabbani, A. Mehri Dehnavi, A. Talebi, "Analyzing Features by SWLDA for the Classification of HEp-2 Cell Images Using GMM", **Pattern Recognition Letters**, vol. 82, part 1, pp. 44-85, Oct. 2016.
- ✓ M. Shahmoradi, M. Lashgari, H. Rabbani, J. Qin, M. Swain, "A comparative study of new and current methods for dental micro-CT image denoising", **Dentomaxillofacial Radiology**, vol. 45, no. 3, 2016.
- ✓ Z. Amini, H. Rabbani, “Classification of Medical Image Modeling Methods: A Review”, **Current Medical Imaging Reviews**, vol. 12, no. 2, pp. 130-148, 2016.
- ✓ H. Rabbani, R. Kafieh, M. Kazemian Jahromi, et al.,\_“Obtaining Thickness Maps of Corneal Layers Using the Optimal Algorithm for Intracorneal Layer Segmentation,” **International Journal of Biomedical Imaging**, vol. 2016, Article ID 1420230, 11 pages, 2016.
- ✓ M. Niknejad, H. Rabbani, M. Babaei-Zadeh, "Image Restoration Using Gaussian Mixture Models with Spatially Constrained Patch Clustering," **IEEE Transactions on Image Processing**, vol. 24, no. 11, pp. 3624-3636, Nov. 2015.
- ✓ R. Kafieh, H. Rabbani, I. Selesnick, “Three Dimensional Data-Driven Multi Scale Atomic Representation of Optical Coherence Tomography”, **IEEE Transactions on Medical Imaging**, vol. 34, no. 5, pp. 1042-1062, 2015.
- ✓ H. Rabbani, M.J. Allingham, P.S. Mettu, S.W. Cousins, S. Farsiu, “Fully Automatic Segmentation of Fluorescein Leakage in Subjects with Diabetic Macular Edema”, **Investigative Ophthalmology and Visual Science**, vol. 56, no. 3, pp. 1482-1492, 2015.



- ✓ MR. Sehhati, A. Mehri, H. Rabbani, M. Pourhossein, “Stable Gene Signature Selection for Prediction of Breast Cancer Recurrence Using Joint Mutual Information”, **IEEE/ACM Transactions on Computational Biology and Bioinformatics**, vol. 12, no. 6, pp. 1440-1448, 2015.
- ✓ Z. Saeedizadeh, A. Mehri, A. Talebi, H. Rabbani, O. Sarrafzadeh, A. Vard, “Automatic Recognition of Myeloma Cells in Microscopic Images using Bottleneck algorithm, Modified Watershed and SVM Classifier”, **Journal of Microscopy**, vol. 261, no. 1, pp. 46-56, 2015.
- ✓ R. Kafieh, H. Rabbani, F. Hajizadeh, M. D. Abramoff and M. Sonka, “Thickness Mapping of Eleven Retinal Layers in Normal Eyes Using Spectral Domain Optical Coherence Tomography”, **Journal of Ophthalmology**, Article ID 259123, 14 pages, 2015.
- ✓ H. Rabbani and S. Gazor, “Local Probability Distribution of Natural Signals in Sparse Domains,” **International Journal of Adaptive Control and Signal Processing**, vol. 28, no. 1, pp. 52-62, Jan. 2014.
- ✓ SH. Hajeb, H. Rabbani, MR. Akhlaghi, “A New Combined Method Based on Curvelet Transform and Morphological Operators for Automatic Detection of Foveal Avascular Zone”, **Signal, Image & Video Processing**, vol. 8, no. 2, pp. 205-222, Feb. 2014.
- ✓ H. Danesh, R. Kafieh, H. Rabbani, F. Hajizadeh, “Segmentation of Choroidal Boundary in Enhanced Depth Imaging OCTs Using a Multiresolution Texture Based Modeling in Graph Cuts”, **Computational and Mathematical Methods in Medicine**, vol. 2014, Article ID 479268, 9 pages.
- ✓ R. Kafieh, H. Rabbani, M. Sonka, M. D. Abramoff, “Intra-Retinal Layer Segmentation of 3D Optical Coherence Tomography Using Coarse Grained Diffusion Map”, **Medical Image Analysis**, vol. 17, no. 8, pp. 907-928, Dec. 2013.
- ✓ R. Kafieh, H. Rabbani, S. Kermani, "A Review of Algorithms for Segmentation of Optical Coherence Tomography from Retina", **Journal of Medical Signals and Sensors**, vol. 3, no. 1, pp. 45-60, 2013.
- ✓ R. Kafieh, H. Rabbani, F. Hajizadeh, M. Ommani, S. Kermani, “An Accurate Multimodal 3D Vessel Segmentation Method Based on Brightness Variations on OCT Layers and Curvelet Domain Fundus Image Analysis”, **IEEE Transactions on Biomedical Engineering**, vol. 60, no. 10, pp. 2815-2823, Oct. 2013.
- ✓ M. Sheikhhosseini, H. Rabbani, M. Zekri, A. Talebi, “Automatic Diagnosis of Malaria Based on Complete Circle-Ellipse Fitting Search Algorithm”, **Journal of Microscopy**, vol. 252, no. 3, pp. 189-203, Dec. 2013.
- ✓ H. Rabbani, M. Sonka, M. D. Abramoff, “Optical Coherence Tomography Noise Reduction Using Anisotropic Local Bivariate Gaussian Mixture Prior in 3-D Complex Wavelet Domain”, **International Journal of Biomedical Imaging**, vol. 2013, Article ID 417491, 23 pages.
- ✓ M. Golabakhsh, H. Rabbani, “Vessel Based Registration of Fundus and OCT Projection Images of Retina Using a Quadratic Registration Model”, **IET Image Processing**, vol. 7, no. 8, pp. 768-776, Nov. 2013.
- ✓ M. Etehadtavakol, E.Y.K. Ng, V. Chandran, H. Rabbani, “Separable and Non-separable Discrete Wavelet Transform based Texture Features and Image Classification of Breast

- Thermograms”, **Infrared Physics & Technology**, vol. 61, pp. 274-286, Nov. 2013.
- ✓ R. Kafieh, H. Rabbani, M. Sonka, M. D. Abramoff, “Curvature Correction of Retinal OCTs Using Graph-Based Geometry Detection”, **Physics in Medicine & Biology**, vol. 58, pp. 2925-2938, 2013.
  - ✓ H. Rabbani, S. Gazor, “Video Denoising in 3-D Complex Wavelet Domain Using Local Bessel K-Form Prior”, **IET Image Processing**, vol. 6, no. 9, pp. 1262-1274, Dec. 2012.
  - ✓ M. Esmaeili, H. Rabbani, A. M. Dehnavi, A. Dehghani, “Automatic Detection of Exudates and Optic Disk in Retinal Images Using Curvelet Transform”, **IET Image Processing**, vol. 6, no. 7, pp. 1005-1013, Oct. 2012.
  - ✓ SH. Hajeb, H. Rabbani, MR. Akhlaghi “Diabetic Retinopathy Grading by Digital Curvelet Transform”, **Computational and Mathematical Methods in Medicine**, vol. 2012, Article ID 761901, 11 pages, 2012.
  - ✓ SH. Hajeb, H. Rabbani, A. M. Dehnavi, MR. Akhlaghi, SH. H. Javanmard, “Analysis of Foveal Avascular Zone for Grading of Diabetic Retinopathy Severity Based on Curvelet Transform”, **Graefe's Archive for Clinical and Experimental Ophthalmology (Springer)**, vol. 250, no. 11, pp. 1607-1614, Nov. 2012.
  - ✓ R. Soltanzadeh, H. Rabbani, A. Talebi, “Extraction of Nucleolus Candidate Zone in White Blood Cells of Peripheral Blood Smear Images Using Curvelet Transform”, **Computational and Mathematical Methods in Medicine**, vol. 2012, Article ID 574184, 12 pages, 2012.
  - ✓ M. Esmaeili, H. Rabbani, A. Mehri, “Automatic Optic Disk Boundary Extraction by the Use of Curvelet Transform and Deformable Variational Level Set Model”, **Pattern Recognition**, vol. 47, no. 7, pp. 2832-2842, July 2012.
  - ✓ H. Rabbani, M. P. Mahjub, E. Farahabadi, A. Farahabadi, A. Mehri, “An Entropy-Based Method for Ischemia Diagnosis Using ECG Signal in Wavelet Domain”, **Journal of Research in Medical Sciences**, vol. 16, no. 11, pp. 1473-1482, 2011.
  - ✓ Hossein Rabbani, “Statistical modeling of low SNR magnetic resonance images in wavelet domain using Laplacian prior and two-sided Rayleigh noise for visual quality improvement”, **Measurement Science Review**, vol. 11, no. 4, pp. 125-130, 2011.
  - ✓ Farhad Rahimi and Hossein Rabbani, “A dual adaptive watermarking scheme in contourlet domain for DICOM images”, **BioMedical Engineering OnLine**, 10:53, 2011.
  - ✓ H. Rabbani H, M. P. Mahjub, E. Farahabadi, A. Farahabadi, "R Peak Detection in Electrocardiogram Signal Based on an Optimal Combination of Wavelet Transform, Hilbert Transform, and Adaptive Thresholding", **Journal of Medical Signals and Sensors**, vol. 1, no. 2, pp. 91-98, 2011.
  - ✓ A. Mehri, E. Farahabadi, H. Rabbani, A. Farahabadi, M. P. Mahjub, N. Rajabi, “Detection and Classification of Cardiac Ischemia by Using Vectorcardiogram Signal via Neural Network”, **Journal of Research in Medical Sciences**, vol. 16, no. 2, pp. 136-142, 2011.
  - ✓ H. Rabbani, S. Gazor, “Image Denoising Employing Local Mixture Models in Sparse Domains”, **IET Image Processing**, vol. 4, no. 5, pp. 413-428, Oct. 2010.
  - ✓ H. Rabbani, M. Vafadoost, S. Gazor, R. Nezafat, “Wavelet-Based 3D Medical Image Denoising Using Bivariate Laplacian Mixture Model”, **IEEE Transactions on Biomedical**

**Engineering**, vol. 56, no. 12, pp.2826-2837, Dec. 2009.

- ✓ H. Rabbani, "Image Denoising in Steerable Pyramid Domain Based on a Local Laplace Prior", **Pattern Recognition**, vol. 42, pp. 2181-2193, Sept. 2009.
- ✓ H. Rabbani, M. Vafadoost, S. Gazor, P. Abolmaesumi, "Speckle Noise Reduction of Medical Ultrasound Images in Complex Wavelet Domain Using Mixture Priors", **IEEE Transactions on Biomedical Engineering**, vol. 55, no.9, pp. 2152-2160, Sept. 2008.
- ✓ H. Rabbani, M. Vafadoost, "Image/Video Denoising Based on a Mixture of Laplace Distributions with Local Parameters in Multidimensional Complex Wavelet Domain", **Signal Processing**, vol. 88, pp. 158-173, Jan. 2008.
- ✓ H. Rabbani, M. Vafadoost, "Wavelet Based Image Denoising Based on a Mixture of Laplace Distributions", **Iranian Journal of Science & Technology**, Transaction B., Engineering, vol. 30, no. B6., pp. 711-733, 2006.

#### Book Chapters

- ✓ H. Rabbani, R. Kafieh, Z. Amini, "Optical Coherence Tomography Image Analysis", **Wiley Encyclopedia of Electrical and Electronics Engineering**, ISBN 9780471346081, Publisher: John Wiley and Sons, pp. 1–16, 2016.
- ✓ V. Lakshminarayanan, D. Thapa, K. Raahemifar and H. Rabbani, "Compressive Sensing", **The Optics Encyclopedia**, ISBN 9783527600441, Publisher: John Wiley and Sons, pp. 1–26, 2015.
- ✓ Alireza Mehri Dehnavi, Nilufar Salehpour, Hossein Rabbani, Eiman Farahabadi, Amin Farahabadi, "Automatic Analysis of Vectorcardiogram Signal for Detection of Cardiovascular Diseases", **Cardiovascular Disease**, ISBN 978-1-922227-28-7, Publisher: iConcept Press, 2013.
- ✓ Hossein Rabbani, Alireza Mehri Dehnavi and Mehrab Ghanatbari, "Estimation the Depth of Anesthesia by the Use of Artificial Neural Network", **Artificial Neural Networks - Methodological Advances and Biomedical Applications**, ISBN 978-953-307-243-2, Edited by: Kenji Suzuki, Publisher: InTech, April 2011.

#### Selected International Conference Papers

- ✓ M. Mokhtari, H. Rabbani and A. Mehri-Dehnavi, "Alignment of optic nerve head optical coherence tomography B-scans in right and left eyes," accepted in 2017 **IEEE International Conference on Image Processing (ICIP)**, China, 2017.
- ✓ O. Sarrafzadeh, H. Rabbani and A. Mehri-Dehnavi, "Fast circlet based framework for optic disk detection" accepted in 2017 **IEEE International Conference on Image Processing (ICIP)**, China, 2017.
- ✓ Z. Ghasemi, M. Mokhtari, H. Rabbani, S. Farsiu, "Non-Rigid Registration of Fluorescein Angiography and Optical Coherence Tomography B-Scans via Scanning Laser Ophthalmoscope Imaging", in Proc. 39th Annual International Conference of the **IEEE Engineering in Medicine and Biology (EMBC)**, South Korea, 2017, pp. 4415-4418.
- ✓ M. Mokhtari, Z. Ghasemi, H. Rabbani, "Automatic Detection of Hyperreflective Foci in Optical Coherence Tomography B-Scans Using Morphological Component Analysis", in

- Proc. 39th Annual International Conference of the **IEEE** Engineering in Medicine and Biology (**EMBC**), South Korea, 2017, pp. 1497-1500.
- ✓ S. Jorjandi, H. Rabbani, R. Kafieh, Z. Amini, "Statistical Modeling of OCT Images by Asymmetric Normal Laplace Mixture Model", in Proc. 39th Annual International Conference of the **IEEE** Engineering in Medicine and Biology (**EMBC**), South Korea, 2017, pp. 4399-4402.
  - ✓ M. Mokhtari, H. Rabbani, A. Mehri-Dehnavi, R. Kafieh, "Exact Localization of Breakpoints of Retinal Pigment Epithelium in Optical Coherence Tomography of Optic Nerve Head", in Proc. 39th Annual International Conference of the **IEEE** Engineering in Medicine and Biology (**EMBC**), South Korea, 2017, pp. 1505-1508.
  - ✓ R. Rasti, H. Rabbani, A. Mehri, R. Kafieh, "Discrimination between diabetic macular edema and normal retinal OCT B-scan images based on convolutional neural networks", accepted in 2016 **IEEE** Workshop on Multimedia Signal Processing (**MMSP**), Montreal, Canada, Sept. 21-23, 2016.
  - ✓ O. Sarrafzadeh, H. Rabbani, A. Mehri, A. Talebi, "Detecting different sub-types of acute myelogenous leukemia using dictionary learning and sparse representation", in Proc. IEEE International Conference on Image Processing (**ICIP**), Quebec City, Canada, Sept. 27-30, 2015, pp. 3339-3343.
  - ✓ T. Mahmudi, R. Kafieh, H. Rabbani, A. Mehri, "Asymmetry evaluation of fundus images in right and left eyes using radon transform and fractal analysis", in Proc. IEEE International Conference on Image Processing (**ICIP**), Quebec City, Canada, Sept. 27-30, 2015, pp. 163-167.
  - ✓ M. Niknejad, H. Rabbani, M. Babaie-Zadeh, Ch. Jutten, "Image interpolation using Gaussian mixture models with spatially constrained patch clustering", in Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (**ICASSP**), Brisbane, Australia, April 19-24, 2015, pp. 1613-1617.
  - ✓ M. Niknejad, M. Sadeghi, M. Babaie-Zadeh, H. Rabbani, Ch. Jutten, "A Dictionary Learning Method for Sparse Representation Using a Homotopy Approach", Latent Variable Analysis and Signal Separation, vol. 9237 of the series Lecture Notes in Computer Science (**LVA/ICA**), 2015, pp. 271-278.
  - ✓ M. Lashgari, M. Shahmoradi, H. Rabbani, M. Swain, "A fast and accurate dental micro-CT image denoising based on total variation modeling", in Proc. **IEEE** Workshop on Signal Processing Systems, Hangzhou, China, Oct. 14-16, 2015.
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### Selected National Conference Papers

- ✓ Sh. Azimi, H. Rabbani, "A level set based method for lung segmentation in CT images," 22nd Iranian Conference on Electrical Engineering (**ICEE2014**), pp.1917-1920, 20-22 May 2014.
- ✓ O. Sarrafzadeh, A. Talebi, A. M. Dehnavi, H. Rabbani, "Automatic detection of acute myeloid leukemia from microscopic images of blood smear and bone marrow", 1st National Conference on Microscopic Studies, Histomorphometry and Stereology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran, 2014.
- ✓ M. Farahi, A. Talebi, H. Rabbani, O. Sarrafzadeh, "Automatic detection of Leishman bodies in bone marrow samples of patients with visceral leishmaniasis using active contour", 1st National Conference on Microscopic Studies, Histomorphometry and Stereology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran, 2014.
- ✓ M. R. Naemabadi, N. Amirahmadi Chomachar, M. R. Hosseini, H. Rabbani, "Online heart rate measurement using 8-bit microcontrollers in mobile monitoring", in Proc. 19<sup>th</sup> Iranian Conference of Electrical Engineering (**ICEE2011**), 17-19 May 2011, Amirkabir Univ. of Technology, Tehran, Iran.
- ✓ Sh. Gashmard, A. Mehridehnavi and H. Rabbani, "Persian script character recognition using PCA", in Proc. 17th Iranian Conference of Biomedical Engineering (**ICBME2010**), 3-4 November 2010, Isfahan, Iran.
- ✓ A. Farahabadi, E. Farahabadi, H. Rabbani, A. Mehri, M. P. Mahjoob, "Analysis of Frank VCG and Synthesized VCG for Selection of Optimal Vector Cardiogram", in Proc. 17th Iranian Conf. of Biomedical Engineering (**ICBME2010**), 3-4 November 2010, Isfahan, Iran.
- ✓ F. Rahimi, H. Rabbani, S. Kermani, "A Dual Adaptive Watermarking Scheme in Contourlet Domain for DICOM Images", in Proc. 17th Iranian Conference of Biomedical Engineering (**ICBME2010**), 3-4 November 2010, Isfahan, Iran.
- ✓ A. Shirazinowdeh, H. Rabbani, A. Mehridehnavi and H. Ahmadinoubari, "Detection of Cancerous Zones in Mammograms using Fractal Modeling and Classification by Probabilistic Neural Network", in Proc. 17th Iranian Conference of Biomedical Engineering (**ICBME2010**), 3-4 November 2010, Isfahan, Iran.

- ✓ M. Esmaeili, H. Rabbani, A. Mehri, A. Dehghani, "Enhancement of Retinal Images using Curvelets", in Proc. 17th Iranian Conference on Electrical Engineering (**ICEE2009**), Iran University of Science and Technology, 12 -14 May, 2009.
- ✓ M. Ghanatbari, H. Rabbani, "Salt & Pepper Noise Reduction Based on Neural Network and Recursive Gaussian Filter", in Proc. 5th Iranian Conference on Machine Vision and Image Processing (**MVIP2008**), University of Tabriz, 4-6 November 2008.
- ✓ H. Rabbani, M. Vafadoost, " Video Denoising Based on a Gaussian Distributions with Local Variance in 3-D Complex Wavelet Domain", in Proc. of 12th International Computer Society of Iran Computer Conference (**CSICC 2007**), Tehran, 20-22 February 2007.
- ✓ H. Rabbani, M. Vafadoost, "Edge Detection with Complex Wavelet Transform", in Proc. 7th Iranian Congress of Medical Physics, Ahwaz, 13-15 February 2007.
- ✓ H. Rabbani, M. Vafadoost, S. Kasaei, "Scratch Removal with Kalman Filter in Complex Wavelet Domain", in Proc. 11th International Computer Society of Iran Computer Conference (**CSICC 2006**), Tehran, 24-26 January 2006.
- ✓ H. Rabbani, M. Vafadoost, S. Kasaei, "Scratch Removal with Kalman Filter in 3D Wavelet Domain", in Proc. 11th International Computer Society of Iran Computer Conference (**CSICC 2006**), Tehran, 24-26 January 2006.
- ✓ L. Ghaedi, A. Mehri, H. Rabbani, "A Nonlinear Adaptive Method for Removal of Power-line Noise from ECG", in Proc. 12th Iranian Conference of Biomedical Engineering (**ICBME2005**), Tabriz, 16-18 November 2005.
- ✓ M. Daliri, H. Rabbani, M. Rafinia, "Angle Detection for Biomaterial based on Image Processing Methods", in Proc. 7th Annual Research Congress of Iranian Medical Sciences Students, Tehran, 30 May-1 June 2006.

#### **National Journal Papers**

- ✓ L. Niknam, H. Rabbani, "Morphological Component Analysis for Automatic Segmentation of Six Lower Retina Layers in Optical Coherence Tomography Images", **Journal of Isfahan Medical School**, vol. 34, no. 373, 1st week, May 2016.
- ✓ Z. Saeedizadeh, A. Talebi, A. Mehri, H. Rabbani, O. Sarrafzadeh, "Extraction and Recognition of Myeloma Cell in Microscopic Bone Marrow Aspiration Images", **Journal of Isfahan Medical School**, vol. 32, no. 310, 3rd week, Jan. 2015.
- ✓ M. Momenzadeh, A. Talebi, A. Mehri, H. Rabbani, "Vulvovaginal Candidiasis Diagnosis by Automatic Extraction of Candida Fungus from Pap Smear Images", **Journal of Isfahan Medical School**, vol. 32, no. 304, first week, Dec. 2014.
- ✓ M. Naeemabadi, A. Mehri, H. Rabbani, "Statistical Analysis of Encryption Quality for Medical Images Based on Rijndael Encryption Algorithm Using Both Static and Chaotic Cipher Key", **Journal of Health and Biomedical Informatics**, vol. 1, no. 1, pp. 32-44, 2014.
- ✓ M. Farahi, H. Rabbani, A. Mehri, "Automatic Boundary Extraction of Leishman Bodies in Bone Marrow Samples from Patients with Visceral Leishmaniasis", **Journal of Isfahan Medical School**, vol. 32, no. 286, 3rd week, July 2014.
- ✓ T. Mahmudi, R. Kafieh, H. Rabbani, A. Mehri, M. R. Akhlaghi, Kh. Arbabian, M. Ahmadi, "Evaluation of Asymmetry of Retinal Nerve Fiber Layer and Total Retina in Right and

Left Eyes of Normal Subjects Using Extracted Features from Optical Coherence Tomography”, **Journal of Isfahan Medical School**, vol. 31, no. 247, first week, Oct. 2013.

- ✓ Z. Amini, H. Rabbani, "EEG- based Seizure detection by Gaussian Process model", **Journal of Isfahan Medical School**, vol. 31, no. 243, first week, Aug. 2013.
- ✓ H. Danesh, R. Kafieh, H. Rabbani, "Automated Choroidal Segmentation in Enhanced Depth Imaging Optical Coherence Tomography Images", **Journal of Isfahan Medical School**, vol. 31, no. 230, 4th week, May 2013.
- ✓ J. Jalili, H. Rabbani, A. Mehri, M. R. Akhlaghi, "Formation and Fusion of Projection Images from 11 Layers of Retina Using Statistical Indicators to Obtain an Image with Appropriate Contrast from the Retinal Depth", **Journal of Isfahan Medical School**, vol. 31, no. 255, first week, Dec. 2013.
- ✓ S. Mohammadpour, Alireza Mehri, H. Rabbani, "A Method for Pre-Compensation of Digital Images Based on Total Variation Deconvolution, and Comparing it with Wiener Deconvolution, to Enhance Visual Efficiency In The Presence Of Higher Order Ocular Optical Aberrations", **Journal of Isfahan Medical School**, vol. 31, no. 223, first week, April 2013.
- ✓ SH. Gashmard, A. Mehri, H. Rabbani, “Character Recognition in Farsi Printed Scripts Using Principal Component”, **Journal of Isfahan Medical School**, vol. 29, no. 174, special issue (biomedical engineering), 2012.
- ✓ F. Rahimi, H. Rabbani, S. Kermani, “Comparison between Medical Image Watermarking in Wavelet, Contourlet, Curvelet and Complex Wavelet Domains”, **Journal of Isfahan Medical School**, vol. 29, no. 171, 3rd week, March 2012.
- ✓ R. Soltanzadeh, H. Rabbani, A. Talebi, “Automatic Extraction of Nucleus and Cytoplasm in White Blood Cells of Peripheral Blood Smear”, **Journal of Isfahan Medical School**, vol. 29, no. 174, special issue (biomedical engineering), 2012.
- ✓ H. Rabbani, “Deblurring of medical ultrasonic images using Least Squared Method for Detection and Non-Isotropic Window-Based Denoising and Wavelet-based Denoising for Enhancement”, **Iranian Journal of Biomedical Engineering**, vol. 3, no. 1, pp. 1-14, 2010.
- ✓ H. Rabbani, M. Vafadoost, "Abdominal CT Image Enhancement in Complex Wavelet Domain Using MMSE Estimator and Laplacian Mixture Prior", **Iranian Journal of Electrical and Computer Engineering**, vol. 7, no. 2, pp. 162-169, 2010.
- ✓ H. Rabbani, M. Vafadoost, S. Kasaei, "Edge Detection Using Complex Wavelet Transform", **Esteghlal Journal of Engineering**, vol. 28, no. 1, pp. 17-35, 2009.
- ✓ H. Rabbani, M. Vafadoost, "Wavelet Based Image Denoising with Local Mixture Laplace Model", **Amirkabir Journal of Science and Technology**, vol. 66, pp. 81-88, 2007.
- ✓ A. Farahabadi, E. Farahabadi, H. Rabbani, M. Rezvani, "An Automatic Method for Measuring The Angle of Lumbar Lordosis", **Journal of Isfahan Medical School**, vol. 30, no. 200, 2nd week, pp. 1145-1152.

#### Submitted Papers (Under Review)

- ✓ "Image Analysis in In-Vivo Stem Cell Tracking", **accepted**.
- ✓ "The hp-version of Finite Element Method for Electrical Impedance Tomography with

EIDORS", **accepted**.

- ✓ "Interdisciplinary Researches in Iran", **accepted**.
- ✓ "Circular Symmetric Laplacian Mixture Model In Wavelet Diffusion for Dental Image Denoising", **accepted**.
- ✓ "Detection and Classification of Breast Cancer in Wavelet Sub-bands of Fractal Segmented Cancerous Zones", **accepted**.
- ✓ "Hybrid Method for Prediction of Metastasis in Breast Cancer Patients Using Gene Expression Signals", **accepted**.
- ✓ "Interdisciplinary Researches in Iran II", **accepted**.
- ✓ "Bio-Signal and System Modeling: From Image Processing to System Biology", **accepted**.
- ✓ "Using protein interaction database and support vector machine to improve gene signatures for prediction of breast cancer recurrence", **accepted**.
- ✓ "Designing and implementing bio-impedance spectroscopy device by measuring impedance in a mouse tissue", **accepted**.
- ✓ "Assessment of TGF- $\beta$ 3 on production of aggrecan by human articular chondrocytes in pellet culture system", **accepted**.
- ✓ "An Automatic Algorithm for Segmentation of the Boundaries of Corneal Layers in Optical Coherence Tomography Images using Gaussian Mixture Model", **accepted**.
- ✓ "Interdisciplinary Researches in Iran III :(Multi-Dimensional) Medical Signal Analysis Softwares", **accepted**.
- ✓ "Analysis of Fundus Fluorescein Angiogram Based on the Hessian Matrix of Directional Curvelet Sub-bands and Distance Regularized Level Set Evolution ", **accepted**.

#### **Under Preparation Papers**

- ✓ "Statistical Modeling of Speckle in Optical Coherence Tomography Images"
- ✓ "Automatic Symptomatic Exudate-Associated Derangement (SEAD) Detection in Optical Coherence Tomography"
- ✓ "Image Modeling Using Spherically Invariance Random Processes"
- ✓ "Gauss-Taylor Expansion: A New Model for Statistical Modeling of Images in Sparse Domains"
- ✓ "On the Local EM Algorithm"
- ✓ "A New Speckle Noise Reduction Method in a Bayesian Framework"
- ✓ "A Two-Step Video Denoising Method Based on an Accurate Estimation of Local Variance in a Bayesian Framework "

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