

Curriculum Vitae

Amir Tahmasbi



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Objective

US permanent resident seeking Assistant Professor positions in Biomedical Engineering or related fields.

Education

- 2011–2016: **Ph.D., Biomedical Engineering**,
Texas A&M University, College Station, TX, USA. GPA 4.0/4.0,
Dissertation: Performance limits of single-molecule fluorescence microscopy in two and three dimensions.
- 2008–2010: **M.Sc., Electrical Engineering, Magna Cum Laude**
Iran University of Science and Technology, Tehran, Iran. GPA 19.33/20,
Thesis: Employing cognitive pattern recognition techniques for breast cancer diagnosis.
- 2004–2008: **B.Sc., Electrical Engineering, Magna Cum Laude**
Shiraz University of Technology, Shiraz, Iran. GPA 18.15/20,
Project: Real time face detection and recognition using PCA and implementing using TMS320C6416.

Honors and Awards

- 2015: BME Graduate Student Travel Grant, Texas A&M University.
- 2015: Engineering Graduate Student Travel Award, Texas A&M University.
- 2015: Paper featured in IEEE Inside Signal Processing eNewsletter (January issue).
- 2011: 1st place award for excellence in research from the president of Iran University of Science and Technology.
- 2008: Provost's Excellence in Teaching Award, Shiraz University of Technology.
- 2008: 2nd place award for excellence in education from the president of Shiraz University of Technology.
- 2008: Shiraz University of Technology Student Travel Award.
- 2007: RoboCup IranOpen 2007 appreciation award.

Work and Research experiences

Research Assistant, Ward Ober Lab – College Station, TX

September 2011 – present

Statistical Signal Processing and Estimation

- Implemented unsupervised machine learning methods, e.g. the maximum-likelihood estimator, the Bayes' estimator, and the expectation-maximization (EM) algorithm, and tracking methods, e.g. HMM, in MATLAB
- Developed fundamental statistical signal processing algorithms for single molecule microscopy
- Examined different classifiers and unsupervised clustering algorithms, e.g. k-nearest neighbors, Gaussian mixture models, support vector machine (SVM) and k-means, for spatiotemporal point pattern analysis
- Led a team for implementing non-linear optimization algorithms for medical imaging systems, microscopy, PET
- Innovated a new probability density function, the truncated Airy profile, based on the theory of Bessel functions
- Derived expressions for the Cramér-Rao and Barankin-type bounds and implemented them in MATLAB
- Coded a semi-supervised machine learning technique, the B-spline signal processing and smoothing for single molecule microscopy in MATLAB and Java

Adaptive Optics

- Designed and developed an adaptive optical system for single molecule microscopy
- Used and interfaced deformable mirrors, Shack-Hartmann wavefront sensors, EMCCD and CMOS cameras
- Gained hands on experience with alignments of digital micro-mirror devices (DMD), lasers and optical elements

Software Development

- Developed an object-oriented software framework, the [FandPLimitTool](#), for assessing the performance of microscopes, which provides a user interface (UI), a console window, and automatic bug reporting
- Designed and executed test procedures, for software packages such as the FandPLimitTool and [MUMDesignTool](#)
- Constructed a user-friendly software (written in C/C++, relies on OpenCV) with UI for controlling adaptive optics which is capable of communicating with wavefront sensors, deformable mirrors and cameras.
- Implemented supervised learning methods, such as the artificial neural networks (ANN) in C++ with a friendly UI for prediction of chemical agent fate

Web and Database Development

- Led a team for designing a website/conference management system for the [Quantitative BioImaging Conference](#)
- Used PHP, libraries such as swiftmailer, databases (e.g. MySQL), and Bootstrap CSS
- Designed an article submission/management system for the [QBI eNewsletter](#)

Signal Processing Engineer, Satellite Research Center of IUST – Tehran, Iran July 2009 – July 2011

- Prototyped UHF and VHF transceivers on embedded systems, in particular, on ADuC, ARM, PIC, and AVR
- Implemented an S-Band software-defined radio (SDR) using TMS320F2812 for satellite communications
- Developed radio frequency (RF) circuits for transceivers and designed PCBs using Altium Designer
- Designed and implemented digital FIR, IIR and adaptive filters and low-pass differentiators on TMS320C6416
- Created end-user software with a UI for telemetry/telecommand using C and C++ for the Navid satellite

Teacher Assistant, Iran University of Science and Technology - Tehran, Iran September 2010 – December 2010

- Instructed the “Digital Signal Processing (DSP)” course.

Research Scientist, Optoelectronics and Machine Vision Lab – Tehran, Iran September 2008 – December 2010

- Innovated an expert system for the detection and diagnosis of breast tumors using digital mammograms (X-ray)
- Gained a good understanding of human physiology, especially, the vision system
- Implemented image processing, computer vision and machine learning technics, e.g. ANN and SVM
- Led a team for developing novel opposition-based learning rules for ANNs, e.g. for multilayer perceptron (MLP)
- Constructed new feature extraction methods based on Zernike moments for the diagnosis of breast masses
- Developed optimized low-pass differentiators for biosensor signal processing

Research Assistant, Digital Signal Processing Research Lab – Shiraz, Iran September 2007 – August 2008

- Prototyped a face recognition system based on principal component analysis (PCA) in MATLAB
- Implemented parts of the algorithm in C on embedded systems, in particular, on a TMS320C6416 DSP
- Developed computer vision algorithms for robots, e.g. line follower and deminer, for robotic competitions

Instructor, Shiraz University of Technology - Shiraz, Iran May 2008 – August 2008

- Instructed a course titled “Implementing DSP algorithms using TMS320C6416”.

Journal Publications ([Google Scholar](#))

- [1] **A. Tahmasbi**, E. S. Ward, and R. J. Ober, “Influence of optical aberrations on the Cramér-Rao lower bound,” *Opt. Express*, in preparation, 2016.
- [2] **A. Tahmasbi**, E. S. Ward, and R. J. Ober, “Optimality of Estimators in photon-limited imaging,” *IEEE Trans. Med. Imaging*, in preparation, 2016.
- [3] **A. Tahmasbi**, E. S. Ward, and R. J. Ober, “Barankin-type bounds on location estimation in single molecule microscopy,” *IEEE trans. Signal Process.*, in preparation, 2016.
- [4] **A. Tahmasbi**, E. S. Ward, and R. J. Ober, “Performance limits of photon-limited imaging systems with a bimodal Gaussian response,” *Opt. Express*, in preparation, 2016.

- [5] **A. Tahmasbi**, E. S. Ward, and R. J. Ober, "Determination of localization accuracy based on experimentally acquired image sets: applications to single molecule microscopy," *Opt. Express*, vol. 23, no. 6, pp. 7630-7652, 2015.
- [6] R. J. Ober, **A. Tahmasbi**, S. Ram, Z. Lin, and E. S. Ward, "Quantitative aspects of single molecule microscopy: information-theoretic analysis of single-molecule data," *IEEE Signal Process. Mag.*, vol. 32, no. 1, pp. 58-69, 2015.
- [7] **A. Tahmasbi**, S. Ram, J. Chao, A. V. Abraham, F. W. Tang, E. S. Ward, and R. J. Ober, "Designing the focal plane spacing for multifocal plane microscopy," *Opt. Express*, vol. 22, no. 14, pp. 16706-16721, 2014.
- [8] R. Swiercz, S. Chiguru, **A. Tahmasbi**, S. M. Ramezani, G. Hao, D. K. Challa, M. A. Lewis, P. V. Kulkarni, X. Sun, R. J. Ober, R. P. Mason, and E. S. Ward, "Use of Fc-engineered antibodies as clearing agents to increase contrast during PET," *J. Nucl. Med.*, vol. 55, no. 7, pp. 1204-1207, 2014.
- [9] F. Saki, **A. Tahmasbi**, H. Soltanian-Zadeh, and S. B. Shokouhi, "Fast opposite weight learning rules with application in breast cancer diagnosis," *Comput. Biol. Med.*, vol. 43, no. 1, pp. 32-41, 2013.
- [10] **A. Tahmasbi**, F. Saki, A. Amirkhani, S. M. Seyedzade, and S. B. Shokouhi, "Classification of Breast Masses based on Cognitive Resonance," *Int. J. Comp. Elect. Eng.*, vol. 4, no. 3, pp. 283-287, 2012.
- [11] **A. Tahmasbi**, F. Saki, and S. B. Shokouhi, "Classification of benign and malignant masses based on Zernike moments," *Comput. Biol. Med.*, vol. 41, no. 8, pp. 726-735, 2011.

Conference Proceedings and Talks

- [1] **A. Tahmasbi**, E. S. Ward, and R. J. Ober, "Efficiency of Estimators in Fluorescence Microscopy," *Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, accepted, 2016.
- [2] **A. Tahmasbi**, E. S. Ward, and R. J. Ober, "Localization accuracy in fluorescence microscopy based on experimentally acquired image sets," *BMES Annual Meeting*, Tampa Convention Center, Tampa, FL, October 7, 2015.
- [3] **A. Tahmasbi**, E. S. Ward, and R. J. Ober, "New results on the single molecule localization problem in two and three dimensions," in *Proc. SPIE, Nanoimaging and Nanospectroscopy III*, 9554: 955402, San Diego, CA, August 26, 2015.
- [4] **A. Tahmasbi**, S. Ram, J. Chao, A. V. Abraham, E. S. Ward, and R. J. Ober, "An information-theoretic approach to designing the focal plane spacing for multifocal plane microscopy," in *Proc. SPIE International Symposium on Biomedical and Optics (BiOs)*, 9330: 933011, San Francisco, CA, February 11, 2015.
- [5] **A. Tahmasbi**, S. Ram, J. Chao, A. V. Abraham, E. S. Ward, and R. J. Ober, "MUMDesignTool: A software module for designing the plane spacing for multifocal plane microscopy," *Quantitative BioImaging Conference*, Institut Pasteur, Paris, France, January 7, 2015.
- [6] R. Swiercz, S. Chiguru, **A. Tahmasbi**, S. M. Ramezani, G. Hao, D. K. Challa, M. A. Lewis, P. V. Kulkarni, X. Sun, R. J. Ober, R. P. Mason, and E. S. Ward, "Use of Fc-engineered antibodies as clearing agents to increase contrast during PET," *Immunology Symposium*, Dallas Arboretum, Dallas, TX, May 21, 2014.
- [7] **A. Tahmasbi**, F. Saki, and S. B. Shokouhi, "CWLA: A novel cognitive classifier for breast mass diagnosis," in *Proc. IEEE, 18th Iranian Conference on Biomedical Engineering*, Tehran, Iran, 2011, pp. 255-259.
- [8] **A. Tahmasbi**, F. Saki, H. Aghapanah, and S. B. Shokouhi, "A novel breast mass diagnosis system based on Zernike moments as shape and density descriptors," in *Proc. IEEE, 18th Iranian Conference on Biomedical Engineering*, Tehran, Iran, 2011, pp. 100-104.
- [9] **A. Tahmasbi**, S. Jahangirzadeh, S. M. Seyedzadeh, F. Saki, and S. B. Shokouhi, "An effective approach for data extraction from antenna polar patterns," in *Proc. IEEE, 7th Iranian Conference on Machine Vision and Image Processing*, Tehran, Iran, 2011, pp. 1-4.
- [10] **A. Tahmasbi**, F. Saki, and S. B. Shokouhi, "An effective breast mass diagnosis system using Zernike moments," in *Proc. IEEE, 17th Iranian Conference on Biomedical Engineering*, Isfahan, Iran, 2010, pp. 1-4.
- [11] **A. Tahmasbi**, F. Saki, and S. B. Shokouhi, "Mass diagnosis in mammography images using novel FTRD features," in *Proc. IEEE, 17th Iranian Conference on Biomedical Engineering*, Isfahan, Iran, 2010, pp. 1-5.
- [12] F. Saki, **A. Tahmasbi**, and S. B. Shokouhi, "A novel opposition-based classifier for mass diagnosis in mammography images," in *Proc. IEEE, 17th Iranian Conference on Biomedical Engineering*, Isfahan, Iran, 2010, pp. 1-4.
- [13] S. M. Seyedzade, S. Mirzakuchaki, and **A. Tahmasbi**, "Using symlet decomposition method, fuzzy integral and Fisherface algorithm for face recognition," in *Proc. IEEE, Int. Conference on Computer Engineering and Applications*, Bali, Indonesia, 2010, vol. 2, pp. 83-88.

- [14] S. M. Seyedzade, S. Mirzakuchaki, and **A. Tahmasbi**, "Using subclass discriminant analysis, fuzzy integral and symlet decomposition for face recognition," in *Proc. IEEE, Int. Conference on Signal Processing Systems*, Dalian, China, 2010, vol. 1, pp. 372-377.
- [15] **A. Tahmasbi** and S. B. Shokouhi, "New approach for approximating Parks McClellan low-pass differentiators," in *Proc. IEEE, International Conference on Signal Acquisition and Processing*, Bangalore, India, 2010, pp. 188-192.
- [16] **A. Tahmasbi** and S. B. Shokouhi, "New optimized IIR low-pass differentiators," in *Proc. IEEE, International Conference on Signal Acquisition and Processing*, Bangalore, India, 2010, pp. 205-209.

Technical Reports

- [1] **A. Tahmasbi**, "FandPLimitTool and MUMDesignTool user's manual," Ward Ober Lab, University of Texas Southwestern Medical Center, Dallas, USA, 2014.
- [2] **A. Tahmasbi**, "Employing Cognitive Pattern Recognition Techniques for Breast Cancer Diagnosis on Mammography Images," Master's Thesis, Iran University of Science and Technology, Tehran, Iran, 2010.

Memberships and Collaborations

- Graduate Student member of IEEE, IEEE Signal Processing Society, IEEE Computer Society, IEEE Cloud Computing Community, IEEE Biometrics Council, and IEEE Young Professionals.
- Reviewer for various refereed journals, such as IEEE Transactions on Cybernetics, and multiple international conferences and symposiums, e.g. IEEE ISBEIA 2013 and IEEE BEIAC 2013.
- Executive collaboration with organizing committee of the [Quantitative Bioimaging Conference](#) from 2013 to 2016.

Skills

Programming:

- C++ (fluent), C (fluent), Java (good), Visual Basic (past experience), and Assembly (past experience)

Prototyping:

- MATLAB (expert), Python (NumPy, Matplotlib, SciPy, wxPython), Simulink, and Code Composer Studio

Firmware:

- Texas Instrument DSPs (TMS320C6xxx and TMS320C2xxx series), Analog Device DSPs, ARM, DSPIC, AVR, PIC, 8051, ADuCxx, Android development, and hybrid app development

Web:

- HTML (Bootstrap css), PHP (swiftmailer), Javascript, and MySQL (phpMyAdmin)

Other:

- OpenCV, CUDA, Autohotkey, Linux, LaTeX, Zemax, Photoshop, AutoCAD, Altium Designer, and HSpice

Language Skills

English (fluent), Farsi (native), Russian (low knowledge), Turkish (low knowledge)

Graduate Coursework

Digital Signal Processing (IUST),
 Intelligent System Design (IUST),
 Digital Integrated System Design (IUST),
 Theory and Technology of Semiconductor Devices (IUST),
 Machine Vision (IUST),
 Communications in Biomedical Engineering (TAMU),
 Human Physiology (TAMU).

Fault Tolerant Systems (IUST),
 Analogue Integrated System Design (IUST),
 Techniques in Cell and Molecular Biology (UTD),
 Introduction to Cellular Microscopy (UTD),
 Biomedical Optics Lab (TAMU),
 Biophotonics (TAMU),