

NIDHAL CARLA BOUAYNAYA

Department of Electrical and Computer Engineering
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RESEARCH INTERESTS

Signal processing; Computer vision; Big data analytics; Machine learning; Optimization; Bioinformatics.

EDUCATION

University of Illinois at Chicago, Chicago, IL
PhD, Electrical & Computer Engineering, 2007

University of Illinois at Chicago, Chicago, IL
M.S., Pure Mathematics, 2007

Illinois Institute of Technology, Chicago, IL
M.S., Electrical & Computer Engineering, 2002.

National School of Electrical Engineering, Computer Science and Telecommunications (ENSEA), France
B.S., 2002.

PROFESSIONAL EXPERIENCE

Sep. 2013 - present

Associate (with Tenure) Professor

Department of Electrical and Computer Engineering, Rowan University

2007 - 2013

Associate (with Tenure) Professor (Jul. 2013 – Aug. 2013)

Assistant Professor (Aug. 2007 – Jun. 2013)

Systems Engineering Department, University of Arkansas at Little Rock

Aug. 2003- Aug. 2007

Research Assistant, Multimedia Communications Lab,

Department of Electrical and Computer Engineering, University of Illinois at Chicago

Advisor: Dan Schonfeld

AWARDS AND HONORS (certificates available upon request)

- 2016: **Top Algorithm** at the Multimodal Brain Tumor Image Segmentation (BRATS) challenge: <http://braintumorsegmentation.org/>
- 2015: **Runner-up Best Paper Award** at the 2015 IEEE International Conference on Bioinformatics and Biomedicine (BIBM 2015, acceptance rate: ~20%).
- 2013: **Best Paper Award** at the IEEE International Workshop on Genomic Signal Processing and Statistics.
- 2013: University of Arkansas at Little Rock Faculty Excellence Award in Research.

- 2006: **Best Student Paper Award** at SPIE Conference on Visual Communications and Image Processing.
- 2006 - 2007: University of Illinois Fellowship.
- 2006: University of Illinois Provost Award for Research.
- 2005: **Runner-up Best Student Paper Award** at SPIE Conference on Image and Video Communications and Processing.

SPONSORED RESEARCH (listed by chronological order starting from most recent award).

Project Title	Funding Agency	Role	Project Dates	Total Funded Amount
MRIMATH: Radiomics for Brain Tumors	National Science Foundation (NSF) (I-Corps 1811323)	PI	Jan. 2018 – Dec. 2018	\$50,000
Engaging In Stem Education With Big Data Analytics and Technologies: A Rowan-Cove Initiative	National Science Foundation (NSF) (DUE 1610911)	PI	Oct. 2016 – Sep. 2019	\$299,930
Theoretical And Algorithmic Foundations of Constrained Particle Filtering	National Science Foundation (NSF) (CCF 1527822)	PI	Sep. 2015 – Aug. 2018	\$349,901
Acquisition of a High Performance Computer to Integrate Data Intensive Research and Education: Bringing HPC to South Jersey	National Science Foundation (NSF) (ACI-1429467)	PI	Sep. 2014 – Aug. 2017	\$397,024
Video Data Mining and Pattern Recognition for Helicopter Safety	Federal Aviation Association (FAA)	PI	Jan. 2018 – Feb. 2019	\$35,000
EnAcT: Encounters from Actual Trajectories	Federal Aviation Association (FAA)	PI	Jun. 2016 – Sept. 2016	\$19,504
Proactive Waste Management Through Infrared	United States Department of	Co-PI	Oct. 2016 – Oct. 2017	\$300,000

Thermography for Landfill Monitoring and Fire Warning	Agriculture (USDA)			
Framework For Utilization Of Mobile Data Collection	New Jersey Department of Transportation (NJ DoT) (subaward of New Jersey Institute of Technology)	Co-PI	Jun. 2015 – Dec. 2016	\$740,387
Minimal-Perturbation Dynamic Control of the Melanoma Gene Regulatory Network	National Institutes of Health (NIH)-NIGMS (R01 GM096191-03)	Site PI	Aug. 2010-Aug. 2015	\$1,200,000
Improving Patient Simulators – A Rowan Collaboration	Robert Wood Johnson Foundation	PI	Jul. 2014 - Jun. 2015	\$70,475
Dynamical Properties of Molecular Networks	Rowan University Seed Funding	PI	Jul. 2014 – Jun. 2015	\$9,600
A Scalable Encrypted Human Body Area Network System	Kathleen Thomsen Hall Charitable Trust Grant	PI	Aug. 2011-Aug. 2013	\$7,000
GSM: An Interactive Software for Multidimensional Analysis and Visualization of Large-Scale Data	Arkansas Department of Higher Education (ADHE)	PI	Jan. 2013-Dec. 2013	\$4,000
Development of a Cellular Digital Transmission System for Smart Grid Technology	Arkansas Department of Higher Education (ADHE)	PI	Jan. 2012 – Dec. 2012	\$4,000
3D Biofilm Modeling and Analysis for Medical Purposes	Arkansas Department of Higher Education (ADHE)	PI	Jan. 2011 – Dec. 2011	\$4,000

Design and Implementation of Synthetic Genetic Networks	Arkansas Department of Higher Education (ADHE)	PI	Jan. 2011 – Dec. 2011	\$4,000
Extension of the MUSIC algorithm to AM-FM Signals	Arkansas Department of Higher Education (ADHE)	PI	Jan. 2009 – Dec. 2009	\$4,000

All grants funded by ADHE involved undergraduate students in research.

BOOK CHAPTERS

1. **Nidhal Bouaynaya**, Roman Shterenberg, Dan Schonfeld and Hassan M Fathallah-Shaykh, "Intervention and Control of Gene Regulatory Networks," *Statistical Diagnostics of Cancer: Genetics and Genomics Data*, Frank Emmert-Streib and Matthias Dehmer (Eds.), **Wiley-Blackwell**, 2013.
2. Dimah Dera, Fabio Raman, **Nidhal Bouaynaya** and Hassan M. Fathallah-Shaykh, "Interactive Semi-automated Method Using Non-negative Matrix Factorization and Level Set Segmentation for the BRATS Challenge", *Brainlesion: Glioma, Multiple Sclerosis, Stroke and Traumatic Brain Injuries*, A. Crimi, B. Menze, O. Maier, M. Reyes, and H. Handels (Eds.), **Springer International Publishing AG**, 2017.

JOURNAL PUBLICATIONS

(Authors marked with a * were M.S. students when they worked on the article).

1. Gregory Ditzler, **N. Bouaynaya** and Roman Shterenberg, "AKRON: An Algorithm for Approximating Sparse Kernel Reconstructions," **Signal Processing**, vol. 144, pp. 265-270, March 2018.
2. N. Amor, **N. Bouaynaya**, R. Shterenberg and Souad Chebbi, "On the Convergence of Constrained Particle Filters", **Signal Processing Letters**, vol. 24, no. 6, pp. 858-862, June 2017.
3. B. Bayar*, **N. Bouaynaya** and R. Shterenberg, "SMURC: High-Dimension Small-Sample Multivariate Regression with Covariance Estimation," **IEEE Journal of Biomedical and Health Informatics**, vol. 21, issue 2, pp. 573 - 581, March 2017.
4. D. Dera*, **N. Bouaynaya** and H. M. Fathallah-Shaykh, "Automated Robust Image Segmentation: Level Set Method using Non-Negative Matrix Factorization with Application to Brain MRI," **Bulletin of Mathematical Biology**, vol.78, issue 7, pp. 1450 - 1476, July 2016.
5. P. Georgieva, **N. Bouaynaya**, F. Silva, L. Mihaylova and L. Jain, "A Beamformer-Particle Filter Framework for Localization of Correlated EEG Sources," **IEEE Journal of Biomedical and Health Informatics**, vol. 20, issue 3, pp. 880 - 892, May 2016.

6. G. Rasool, K. Iqbal, **N. Bouaynaya** and G. White, "Real-time Task Discrimination for Myoelectric Control Employing Task-Specific Muscle Synergies," *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, vol. 24, issue 1, pp. 98-108, January 2016.
7. G. Rasool, **N. Bouaynaya**, K. Iqbal and G. White, "Surface Myoelectric Signal Classification Using the AR-GARCH Model", *Biomedical Signal Processing and Control*, vol. 13, pp. 327-336, September 2014.
8. J. Khan^{*}, **N. Bouaynaya** and H. Fathallah-Shaykh, "Tracking of Time-Varying Genomic Regulatory Networks with a LASSO-Kalman Smoother", *EURASIP Journal on Bioinformatics and Systems Biology*, vol. 2014, no. 3, February 2014.
9. B. Bayar^{*}, **N. Bouaynaya** and R. Shterenberg, "Probabilistic Non-negative Matrix Factorization: Theory and Application to Microarray Data Analysis", *Journal of Bioinformatics and Computational Biology*, vol. 12, no. 1, February 2014.
10. Y. Rahmatallah, **N. Bouaynaya** and S. Mohan, "Bit Error Rate Performance of Companding Transforms for OFDM", *IEEE Transactions on Vehicular Technology*, vol. 62, no. 8, pp. 4116-4120, October 2013.
11. **N. Bouaynaya**, R. Shterenberg, and D. Schonfeld, "Optimal Perturbation Control of General Topology Molecular Networks," *IEEE Transactions on Signal Processing*, vol. 61, no. 7, pp. 1733-1742, January 2013.
12. **N. Bouaynaya**, R. Shterenberg and D. Schonfeld, "Signal Processing Methods for Optimal Intervention in Gene Regulatory Networks", *IEEE Signal Processing Magazine*, vol. 29, no.1, pp. 158 - 163, January 2012.
13. **N. Bouaynaya**, M. Charif-Chefchaoui, and D. Schonfeld, "M-Idempotent and Self-Dual Morphological Filters", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 34, no. 4, pp. 805-813, April 2012.
14. T. A. Elwi, H. M. Al-Rizzo, **N. Bouaynaya**, M. M. Hammood, and Y. Al-Naiemy, "Theory of Gain Enhancement of Uc-PBG Antenna Structures Without Invoking Maxwell's Equations: An Array Signal Processing Approach," *Progress In Electromagnetics Research B*, vol. 34, 15-30, 2011.
15. **N. Bouaynaya**, R. Shterenberg, and D. Schonfeld, "Inverse Perturbation for Optimal Intervention in Gene Regulatory Networks", *Bioinformatics*, vol.27, no.1, pp. 103-110, January 2011.
16. L. Gong, **N. Bouaynaya** and D. Schonfeld, "Information-Theoretic Model of Evolution over Protein Communication Channel", *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, vol.8, no.1, pp. 143-151, 2011.
17. **N. Bouaynaya** and D. Schonfeld, "On the Optimality of Motion-Based Particle Filtering", *IEEE Transactions on Circuits and Systems for Video Technology*, vol. 19, no.7, pp. 1068 – 1077, 2009.
18. **N. Bouaynaya** and D. Schonfeld, "Non-stationary Analysis of Coding and Non-coding Regions in Nucleotide Sequences", *IEEE Journal of Selected Topics in Signal Processing*, vol. 2, no. 3, pp. 357-364, June 2008.
19. **N. Bouaynaya**, M. Charif-Chefchaoui and D. Schonfeld, "Theoretical Foundations of Spatially-Variant Mathematical Morphology Part I: Binary Images", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 30, no. 5, pp. 823 – 836, May 2008.
20. **N. Bouaynaya** and D. Schonfeld, "Theoretical Foundations of Spatially-Variant Mathematical Morphology Part II: Gray-Level Images", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 30, no. 5, pp. 837 – 850, May 2008.
21. **N. Bouaynaya** and D. Schonfeld, "Protein Communication System: Evolution and Genomic Structure", *Algorithmica*, vol. 48, no. 4, pp. 375–397, August 2007.

22. **N. Bouaynaya**, M. Charif-Chefchaoui and D. Schonfeld, “Spatially-Variant Morphological Restoration and Skeleton Representation”, *IEEE Transactions on Image Processing*, vol. 15, no. 11, pp. 3579-3591, November 2006.
23. D. Schonfeld and **N. Bouaynaya**, “A New Method for Multidimensional Optimization and Its Application in Image and Video Processing”, *IEEE Signal Processing Letters*, vol. 13, no. 8, pp. 485 – 488, August 2006.
24. **N. Bouaynaya** and D. Schonfeld, “Motion-Based Particle Filtering For Head Tracking Applications”, *Electronic Imaging Newsletter*, vol. 15, no. 2, pp. 8, June 2005 (**Invited Paper**).

CONFERENCE PUBLICATIONS

(Authors marked with a * were M.S. students when they worked on the article).

(Authors marked with a ** were undergraduate students when they worked on the article).

1. Victor Carluccio*, **Nidhal Bouaynaya**, Gregory Ditzler and Hassan M. Fathallah-Shaykh, “The AKRON-Kalman Filter for Tracking Time-Varying Networks”, in *the International Conference on Biomedical and Health Informatics (BHI)*, Orlando, Florida, February 2017.
2. Nesrine Amor, **Nidhal Bouaynaya**, Petia Georgieva, Roman Shterenberg and Souad Chebbi, “A Constrained Particle Filtering for EEG Source Localization”, *IEEE Symposium Series on Computational Intelligence (IEEE SSCI 2016)*, Athens, Greece, 2016.
3. Dimah Dera, **Nidhal Bouaynaya**, Robi Polikar, and Hassan M. Fathallah-Shaykh “Non-Negative Matrix Factorization for Non-Parametric and Unsupervised Image Clustering and Segmentation”, *the International Joint Conference on Neural Networks (IJCNN 2016)*, Vancouver, Canada, July 2016.
4. Bradley Ebinger*, **Nidhal Bouaynaya**, Petia Georgieva and Lyudmila Mihaylova “EEG Dynamic Source Localization using Marginalized Particle Filtering”, *the IEEE International Conference on Bioinformatics and Biomedicine (BIBM 2015)*, Washington D.C., November 2015.
5. Dimah Dera*, **Nidhal Bouaynaya** and Hassan M Fathallah-Shaykh “Level Set Segmentation using Non-Negative Matrix Factorization of Brain MRI Images”, *the IEEE International Conference on Bioinformatics and Biomedicine (BIBM 2015)*, Washington D.C., November 2015. (**Runner-up Best Paper Award**).
6. Bradley Ebinger*, **Nidhal Bouaynaya**, Roman Shterenberg and Robi Polikar “Constrained State Estimation In Particle Filters”, *the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2015)*, Brisbane, Australia, April 2015.
7. Belhassen Bayar*, **Nidhal Bouaynaya** and Roman Shterenberg “Kernel Reconstruction: an Exact Greedy Algorithm for Compressive Sensing”, *the IEEE International Workshop on Genomic Signal Processing and Statistics (GENSIPS 2014)*, Atlanta, Georgia, December 2014.
8. Petia Georgieva, Filipe Silva, Lyudmila Mihaylova and **Nidhal Bouaynaya**, “Statistical Approach for Reconstruction of Dynamic Brain Dipoles based on EEG Data”, *the International Joint Conference on Neural Networks (IJCNN 2014)*, Beijing, China, July 2014, pp. 2592-2599.
9. Jehandad Khan*, **Nidhal Bouaynaya** and Robi Polikar, “Optimal Bayesian Classification in Nonstationary Streaming Environments”, *the International Joint Conference on Neural Networks (IJCNN 2014)*, Beijing, China, July 2014, pp. 609-616.

10. Petia Georgieva, Filipe Silva, **Nidhal Bouaynaya** and Lyudmila Mihaylova, “Bayesian Tracking and Multi-Core Beamforming for Estimation of Correlated Brain Sources”, *the Data Fusion & Target Tracking Conference*, Liverpool, UK, February 2014.
11. Belhassen Bayar^{*}, **Nidhal Bouaynaya** and Roman Shterenberg “Inference of Genetic Regulatory Networks with Unknown Covariance Structure”, *the IEEE International Workshop on Genomic Signal Processing and Statistics (GENSIPS)*, Houston, Texas, November 2013, pp. 74-77 (**Best Paper Award**).
12. Ghulam Rasool, Kamran Iqbal, **Nidhal Bouaynaya** and Gannon White “Neural Drive Estimation Using the Hypothesis of Muscle Synergies and the State-Constrained Kalman Filter”, *the International IEEE EMBS Neural Engineering Conference*, San Diego, California, November 2013, pp. 802-805.
13. Jehandad Khan^{*}, **Nidhal Bouaynaya** and Hassan Fathallah-Shaykh “Compressive Kalman Filtering for Recovering Temporally-Rewiring Genetic Networks”, *the European Signal Processing Conference (EUSIPCO)*, Marrakesh, Morocco, September 2013, pp. 1-5.
14. Mohammed Mohammed-Rasheed, **Nidhal Bouaynaya** and Hassan Fathallah-Shaykh “A Combined Constraint Approach for Inference of Sparse Large-Scale Biomolecular Networks”, *the International Conference on Control, Engineering & Information Technology*, Sousse, Tunisia, June 2013.
15. Petia Georgieva, **Nidhal Bouaynaya**, Lyudmila Mihaylova, and Filipe Silva “Bayesian Approach for Reconstruction of Moving Brain Dipoles”, *the International Conference on Image Analysis and Recognition*, Póvoa de Varzim, Portugal, June 2013.
16. Haoyu Wang, **Nidhal Bouaynaya**, Roman Shterenberg and Dan Schonfeld “Sparse Biologically-Constrained Optimal Perturbation of Gene Regulatory Networks,” *The International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Vancouver, Canada, May 2013.
17. Ghulam Rasool and **Nidhal Bouaynaya** “Inference of Time-Varying Gene Networks using Constrained and Smoothed Kalman Filtering,” *IEEE International Workshop on Genomic Signal Processing and Statistics (GENSIPS)*, Washington, DC, December 2012.
18. Ghulam Rasool, **Nidhal Bouaynaya**, Hassan Fathallah-Shaykh and Dan Schonfeld "Inference of Genetic Regulatory Networks Using Regularized Likelihood with Covariance Estimation", in *IEEE Statistical Signal Processing Workshop (SSP)*, Ann Arbor, August 2012 (**Invited Paper**).
19. Ghulam Rasool, **Nidhal Bouaynaya** and Kamran Iqbal, "Muscle Activity Detection From Myoelectric Signals Based on the AR-GARCH Model", in *IEEE Statistical Signal Processing Workshop (SSP)*, Ann Arbor, August 2012.
20. Petia Georgieva, Lyudmila Mihaylova, **Nidhal Bouaynaya** and Lakhmi Jain "Particle Filters and Beamforming for EEG Source Estimation", in *IEEE World Congress on Computational Intelligence, International Joint Conference on Neural Networks*, Australia, June 2012.
21. Jerzy S. Zielinski, Agnieszka K. Zielinska and **Nidhal Bouaynaya** "Three-dimensional Morphology Quantification of Biofilm Structures from Confocal Laser Scanning Microscopy Images", in *International Conference on Industrial and Intelligent Information*, Singapore, March 2012.
22. Aaron Koch^{*}, **Nidhal Bouaynaya**, and Roman Shterenberg, “An Encryption Algorithm based on the Prime Roots of Unity”, in *International Conference on Industrial and Intelligent Information*, Singapore, March 2012.

23. Hacer Varol^{*}, **Nidhal Bouaynaya**, and William O'Neill, "Breast Cancer Detection Using Communications Technology", in *International Conference on Industrial and Intelligent Information*, Singapore, March 2012.
24. **Nidhal Bouaynaya**, Mohammad Rasheed, Roman Shterenberg, and Dan Schonfeld "Intervention in General Topology Gene Regulatory Networks", in *IEEE International Workshop on Genomic Signal Processing and Statistics (GENSIPS'11)*, San Antonio, Texas, December 2011.
25. Belhassen Bayar^{**}, **Nidhal Bouaynaya** and Roman Shterenberg "Clustering Gene Expression Data using Probabilistic Non-negative Matrix Factorization", in *IEEE International Workshop on Genomic Signal Processing and Statistics (GENSIPS'11)*, San Antonio, Texas, December 2011.
26. Yasir Rahmatallah, **Nidhal Bouaynaya** and Seshadri Mohan "Bit Error Rate Performance of Linear Companding Transforms for PAPR Reduction in OFDM Systems", in *IEEE Global Communications Conference (GLOBECOM 2011)*, Houston, Texas, December 2011 [acceptance rate: 36%].
27. **Nidhal Bouaynaya**, Roman Shterenberg and Dan Schonfeld "Robustness of Inverse Perturbation for Discrete Event Control", in *IEEE International Conference of the Engineering in Medicine and Biology Society (EMBC'11)*, Boston, MA, August 2011.
28. Yasir Rahmatallah, **Nidhal Bouaynaya** and Seshadri Mohan "On the Performance of Linear and Nonlinear Companding Transforms in OFDM Systems", in *Wireless Telecommunications Symposium (WTS 2011)*, New York City, New York, April 2011.
29. Jerzy S. Zielinski, Agnieszka K. Zielinska, **Nidhal Bouaynaya** and Mark S. Smeltzer "Automated Biofilm Region Recognition And Morphology Quantification From Confocal Laser Scanning Microscopy Imaging", in *Biomedical Science and Engineering Conference - Image Informatics and Analytics in Biomedicine (BSEC 2011)*, Knoxville, Tennessee, March 2011.
30. **Nidhal Bouaynaya**, Roman Shterenberg and Dan Schonfeld "Optimal Perturbation Control Of Gene Regulatory Networks", in *IEEE International Workshop on Genomic Signal Processing and Statistics (GENSIPS'10)*, New York, NY, November 2010.
31. Jerzy Zielinski and **Nidhal Bouaynaya** "Statistical Sequential Analysis for Detection of Microcalcifications in Digital Mammograms", in *IEEE International Conference On Signal Processing And Communications*, Bangalore, India, July 2010.
32. Jerzy Zielinski, **Nidhal Bouaynaya** and Dan Schonfeld "Two-Dimensional ARMA Modeling for Breast Cancer Detection and Classification", in *IEEE International Conference On Signal Processing And Communications*, Bangalore, India, July 2010.
33. Ahmad AbdulSadda, **Nidhal Bouaynaya** and Kamran Iqbal, "Noninvasive Breast Tumor Localization Based on Ultrawideband Microwave Backscatter", in *IEEE International Conference On Signal Processing And Communications*, Bangalore, India, July 2010.
34. Yasir Rahmatallah, **Nidhal Bouaynaya** and Seshadri Mohan "ARMA Companding Scheme With Improved Symbol Error Rate For PAPR Reduction in OFDM Systems", in *Wireless Telecommunications Symposium*, Tampa, Florida, April 2010.
35. Yupo Chan, **Nidhal Bouaynaya**, Parimal Chowdhury, Danuta Leszczynska, Tucker A. Patterson, and Olga Ta "Predictive Models Of Cognitive Outcomes of Developmental Insults", in *BioNanoTox Conference*, Little Rock, November 2009.
36. **Nidhal Bouaynaya** and Dan Schonfeld "Adaptive Mathematical Morphology: A Unified Representation Theory", in *IEEE International Conference on Image processing (ICIP'09)*, Cairo, Egypt, November 2009, pp. 2265 – 2268 (**Invited Paper**).
37. Ahmed Abdulsadda, **Nidhal Bouaynaya**, and Kamran Iqbal, "Stability Analysis and Breast Tumor Classification from 2D ARMA Models of Ultrasound Images", in *IEEE International Conference of*

the Engineering in Medicine and Biology Society (EMBC'09), Minneapolis, Minnesota, September 2009.

38. **Nidhal Bouaynaya**, Dan Schonfeld and Radhakrishnan Nagarajan, "Analysis of Temporal Gene Expression profiles using Time-Dependent MUSIC Algorithm", in *IEEE International Workshop on Genomic Signal processing and Statistics (GENSIPS'09)*, Minneapolis, Minnesota, May 2009.
39. Jerzy S Zielinski, **Nidhal Bouaynaya**, Dan Schonfeld and William O'Neill, "Time-Dependent ARMA Modeling of Genomic Sequences", in *Proceedings of BMC Bioinformatics*, vol. 9, Suppl. 9, 2008.
40. **N. Bouaynaya** and D. Schonfeld, "Emergence of New Structure from Non-Stationary Analysis of Genomic Sequences", in *IEEE International Workshop on Genomic Signal Processing and Statistics (GENSIPS'08)*, Phoenix, June 2008, pp. 1-4.
41. **N. Bouaynaya** and D. Schonfeld, "Non-Stationary Analysis of Genomic Sequences", in *IEEE Statistical Signal Processing Workshop*, Madison, WI, August 2007, pp. 200-204.
42. L. Gong, **N. Bouaynaya** and D. Schonfeld, "Information-Theoretic Bounds of Evolutionary Processes Modeled as a Protein Communication System", in *IEEE Statistical Signal Processing Workshop*, Madison, WI, August 2007, pp. 1-5 (**Invited Paper**).
43. **N. Bouaynaya** and D. Schonfeld, "The Genomic Structure: Proof of the Role of Non-Coding DNA", in *IEEE International Conference of the Engineering in Medicine and Biology Society (EMBC'06)*, New York City, August 2006, pp. 4544-4547.
44. **N. Bouaynaya** and D. Schonfeld, "Biological Evolution: Distribution and Convergence Analysis of Amino Acids", in *IEEE International Conference of the Engineering in Medicine and Biology Society (EMBC'06)*, New York City, August 2006, pp. 2045 - 2048.
45. **N. Bouaynaya** and D. Schonfeld, "Analysis of Protein Evolution as a Communication System", in *IEEE International Workshop on Genomic Signal Processing and Statistics (GENSIPS'06)*, College Station, TX, May 2006, pp. 23-24.
46. **N. Bouaynaya** and D. Schonfeld, "Active Surfaces for Video Tracking and 3-D Segmentation Based on a New Method for Multidimensional Optimization", in *Visual Communications and Image Processing (VCIP'06)*, vol. 6077, San Jose, CA, January 2006.
47. **N. Bouaynaya** and D. Schonfeld, "Spatially-Variant morphological image processing: theory and applications", in *Proceedings of SPIE Visual Communications and Image Processing (VCIP'06)*, vol. 6077, San Jose, CA, January 2006 (**Best Student Paper Award**).
48. **N. Bouaynaya** and D. Schonfeld, "Complete system for head tracking using motion-based particle filter and randomly perturbed active contour", in *Proceedings of SPIE, Image and Video Communications and Processing (IVCP'05)*, vol. 5685, San Jose, CA, March 2005, pp. 864-873. (**Runner-up Best Student Paper Award**).
49. **N. Bouaynaya**, W. Qu and D. Schonfeld, "An Online Motion-Based Particle Filter for Head Tracking Applications", in *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP'05)*, vol. 2, Philadelphia, PA, March 2005, pp. 225-228.
50. W. Qu, **N. Bouaynaya** and D. Schonfeld, "Automatic Multi-Head Detection and Tracking System using A Novel Detection-Based Particle Filter and Data Fusion", in *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP'05)*, vol. 2, Philadelphia, PA, March 2005, pp. 661-664.

GRADUATE ADVISING

- Dimah Dera, M.S. 2015, "Level Set Segmentation Using Non-Negative Matrix Factorization with Application To Brain MRI."
Currently: Ph.D. student with the ECE Dept. at Rowan University (Advisor: Dr. Bouaynaya).

- Bradley Ebinger, M.S. 2015, “Particle Filtering For EEG Source Localization and Constrained State Spaces.”
Currently: Software Engineer, Google Inc., Mountain View, California.
- Jehandad Khan, M.S. 2014, “Towards a Dynamic View of Genetic Networks: A Kalman Filtering Framework for Recovering Temporally-Rewiring Stable Networks from Undersampled Data”.
Currently: Doctoral Student and Research Assistant with the ECE Dept. at Virginia Tech, Blacksburg, VA
- Belhassen Bayar, M.S. 2014, “Optimization Algorithms For Inference and Classification Of Genetic Profiles From Undersampled Measurements”
Currently: Doctoral Student and Research Assistant with the ECE Dept. at Drexel University, Philadelphia, PA
- Mohammed Rasheed, Ph.D. 2014, “Mathematical Inference and Control of Molecular Networks From Perturbation Experiments”
Currently: Assistant Professor, Department of Mathematics, University of Kirkuk, Iraq.
- Ghulam Rasool, Ph.D. 2014, “Myoelectric Prostheses: Novel Methodologies For Enhancing Usability and Control”.
Currently: Joint Post-Doctoral Fellow at Northwestern University and The Rehabilitation Institute of Chicago (RIC).
- Jerzy Zielinski, Ph.D. 2012, “Three-dimensional Digital Image Processing for Biofilm Quantification from Confocal Laser Scanning Microscopy.”
Currently: Senior Research Fellow at Children’s Hospital, Little Rock, AR.
- Yasir Taleb (Co-advised with Dr. Seshadri Mohan), Ph.D. 2011, “A Companding Scheme with Enhanced Bit Error Rate for Peak-to-Average Power Ratio Reduction in Wireless Orthogonal Frequency Division Multiplexing Systems.”
Post-doctoral researcher at the University of Arkansas for Medical Sciences (UAMS).
- Hacer Varol, M.S. 2011, “Targeting Breast Cancer Detection with Communications Technology.”
Currently: Lecturer at Sam Houston State University, TX.

TEACHING

Developed and taught a variety of ECE courses (with and without labs) at the undergraduate and graduate levels spanning freshmen to graduate.

Courses developed at Rowan University

ECE 09402/09502: Estimation and Detection Theory
ECE 09351/09361 Stochastic Processes

Core courses taught at Rowan University:

ECE 09341 Signals and Systems
ECE 09351 Digital Signal Processing
ECE 09.331 Electrical Communication Systems
ECE 09363 Probability and Statistics in Engineering
ENGR 01411 Engineering Optimization

Courses developed at UALR:

SYEN 4350/5399 Digital Signal Processing
SYEN 4399/5399 Estimation Theory
SYEN 4399/5399 Detection Theory
SYEN 7399 Statistical Signal Processing
SYEN 7399 Stochastic Processes
SYEN 7399: Statistical Signal Processing and Modelling

Core courses taught at UALR:

SYEN 1303 Introduction to Telecommunications
SYEN 2315/2115 Circuits and Systems/Lab
SYEN 3312 Optimization Methods in Systems Engineering
SYEN 3314 Probability and Random Signals
SYEN 3310/3110 Dynamic Systems: Modelling and Simulation/Lab

BROADER ENGINEERING EDUCATION & OUTREACH

- Participated in the **Perry Initiative Program**, which was held for the first time in Arkansas, at the University of Arkansas for Medical Sciences in October 2011. The Perry Initiative Program sponsors hands-on outreach programs across the country for high school women to inspire them to be leaders in the fields of Engineering, particularly Biomedical Engineering:

<http://perryinitiative.org/>

Specifically, I participated in a long-day program that included lectures and hands-on activities. I also gave an invited lecture (to the girls in the program, their parents and other participants) on emerging areas that combine engineering with biomedical sciences.

- Participate yearly in the **Engineering Scholars Program (ESP)** for High-School Students. The objective of the two-week residential ESP program is to increase the number of students entering engineering programs in Arkansas through hands-on projects, plant trips, and interaction with industry engineers:

<http://ualr.edu/eit/additonal-info/outreach/>

- Participate yearly in the Women's Foundation of Arkansas **Girls of Promise Conference** hosted at universities around the state and designed to introduce eighth-grade girls to careers in ESTEM (economics, science, technology, engineering, and math) fields at a critical time in their development:

<http://www.womensfoundationarkansas.org/GirlsofPromise.html>

- At UALR, I was a Faculty member of the **university-wide research symposium planning committee**, which showcases the research efforts of undergraduate and graduate students across campus. Judges of the poster sessions are recruited from the University and from local industries and agencies. Awards are offered to the best three posters.
- **Invited speaker:** presented several invited multi-disciplinary talks at different institutions such as the University of Alabama at Birmingham, Hofstra University, and the University of North Florida, where the attendees were from the medical, engineering, and mathematics departments.

SERVICE

Service at Rowan University (major activities)

- Graduate Advisor and Coordinator for ECE Dept.
- Faculty search committee for ECE Dept.
- Library liaison for ECE Dept.
- Strategic Planning Leadership Team for Henry M. Rowan College of Engineering
- Graduate Programs committee for Henry M. Rowan College of Engineering (Chair)
- Faculty advisor for the Society of Women Engineers (SWE), Rowan Chapter

Service at UALR (major activities)

- Recruitment, Retention and Advising committee
- Faculty search committee
- Annual Performance Evaluation committee
- PhD program Candidacy Areas committee
- Bioinformatics Steering committee
- University Research Symposium Planning committee

Service to the Professional Community

- **Minisymposium Organizer** “Cancer Modelling: from Genes to Phenotypes” International Congress on Industrial and Applied Mathematics, 2015.
- **Lead Supplement Editor** for *BMC Genomics* supplement on GENSIPS 2013.
- **Track Chair and Special Session Organizer** of “Signal Processing in Systems Biology” at the 21st European Signal Processing Conference (EUSIPCO) 2013.
- **Publication Co-Chair** of IEEE International Workshop on Genomic Signal Processing and Statistics (GENSIPS) 2013.
- **Review Editor** of *Frontiers in Systems Biology*, 2011.
- **National Science Foundation (NSF) review Panel.**
- **Swiss National Science Foundation (SNSF)** panel review, Div. Mathematics, Physical and Engineering Sciences, 2011.
- **The Arkansas Department of Higher Education (ADHE)** Summer Undergraduate Research Fellowship (SURF) review panel.
- **Women’s Foundation of Arkansas** grant committee review panel, 2010-present.
- **Publicity Chair**, IEEE International Workshop on Genomic Signal Processing and Statistics, 2009.
- **Program Committee Member**,
 - IEEE International Workshop on Genomic Signal Processing and Statistics, 2013.
 - International Conference on Advances in Computing, Communications and Informatics (ICACCI), 2012.
 - International Conference on Security in Computer Networks and Distributed Systems (SNDS), 2012.
 - International ICST Conference on Bio-Inspired Models of Network, Information, and Computing Systems (Bionetics 2011), 2011.
 - IEEE Conference on Advanced Video and Signal based Surveillance, 2010.
 - IEEE International Workshop on Genomic Signal Processing and Statistics, 2009.
 - IEEE Journal of Selected Topics in Signal Processing-Special Issue on Genomic and Proteomic Signal Processing, 2008.
- **Vice-Chairwoman**, IEEE Signal Processing Society Chicago Chapter, 2006-2007
- **Reviewer**
 - IEEE Transactions on Signal Processing
 - IEEE Transactions on Pattern Analysis and Machine Intelligence
 - IEEE Transactions on Image Processing
 - IEEE Transactions on Circuit and Systems for Video Technology
 - IEEE Transactions on Robotics

- IEEE Transactions on Parallel and Distributed Systems;
- IEEE Communications Magazine
- IEEE Signal processing magazine
- Bioinformatics
- BMC Bioinformatics
- Frontiers in Systems Biology
- Nature Methods
- SIAM Journal on Imaging Sciences
- Journal of electronic imaging
- Pattern Recognition
- Journal of Visual Communication and Image Representation
- PLoS ONE