

# Abolfazl RAZI

ASSOCIATE PROFESSOR · SCHOOL OF COMPUTING, CLEMSON UNIVERSITY

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## RESEARCH AREAS

AI-enabled Networking, Unmanned Aerial Systems (UAS), Learning-Based Traffic Video Analysis, Internet of Things, Deep Learning for Biomedical Signal Processing, Nano-Scaled Optical Identifiers for Cyber Security, Digital Holography, Non-linear Optimizations, Game Theory

## EDUCATION

### University of Maine

PH.D. IN ELECTRICAL ENGINEERING

Orono, ME, USA

09/01/2009 - 05/31/2013

- Thesis: Distributed Adaptive Algorithm Design for Joint Data Compression and Coding in Dynamic Wireless Sensor Networks

### Tehran Polytechnic

M.S. ELECTRICAL ENGINEERING

Tehran, IRAN

09/23/1998 - 01/17/2001

### Sharif University of Technology

B.S. IN ELECTRICAL ENGINEERING

Tehran, IRAN

09/23/1994 - 09/01/1998

## ACADEMIC POSITIONS

### Clemson University

ASSOCIATE PROFESSOR OF COMPUTER SCIENCE

Clemson, SC, USA

Aug 2021-now

### Northern Arizona University

ASSISTANT PROFESSOR OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

Flagstaff, AZ, USA

Sep 2015 - Aug 2021

### Case Western Reserve University

POSTDOCTORAL RESEARCH ASSOCIATE, COMPREHENSIVE CANCER CENTER

Cleveland, OH, USA

Sep 2014 - Aug 2015

- Bioinformatics, Machine Learning, Genomic Data Analysis

### Duke University

POSTDOCTORAL RESEARCH ASSOCIATE, ECE DEPARTMENT

Durham, NC, USA

Sep 2013 - Sep 2014

- Machine Learning, Information Theory, Image Processing

### University of Maryland

VISITING GRADUATE STUDENT, ECE DEPARTMENT

College Park, MD, USA

July 2012 - Feb 2013

- Cognitive Radio Networks, Queuing Systems, Delay Intolerant Systems

## HONORS & AWARDS

2016 **IEEE Senior Membership,**

IEEE

2013 **Best Research Poster Award,** Grad EXPO

University of Maine

2012 **3rd Place Research Poster Award,** Grad EXPO

University of Maine

2011 **Best Paper Award,** EEE Fly By Wireless Conference (FBW 2011, Montreal, CANADA)

Montreal, Canada

2011 **Best Graduate Assistant Research Award,** School of Engineering

University of Maine

2009 **International Graduate Student Tuition Scholarship,** Graduate School

University of Maine

1994 **Elite Student Award,** Rank 204 in Countrywide University Entrance Exam

Dep. Education

## SPONSORED PROJECTS

### CNS Core: Small: PilotPC: Proactive Inverse Learning of Network Topology for Predictive Communication among Unmanned Vehicles

SOLE PI, **\$480K**

*NSF NeTS: Program*

Oct. 2020 - Sep 2023

### Secure Traceability in the Food Supply Chain Using Cell Phone Readable Dendritic Identifiers

NAU PI, **Total: \$480K, NAU:\$140K**

*USDA AFRI Program*

Jan. 2021 - Dec 2022

### Towards Predictive Communications for UAV based IoT Networks

SOLE-PI, **\$175K**

*NSF CRII: NeTS: Program*

Sep. 2018 - Aug 2020

### Design and Fabrication of Memory-based Physical Unclonable Functions for Robust Key Generation

Co-PI, **\$750K + \$53K Extension**

*NSF: PFI Program*

Sep. 2018 - Aug 2021

### Wildland Fire Observation, Management, and Evacuation using Intelligent Collaborative Flying and Ground Systems

Co-PI, **Total:\$1.2M**

*NSF: CPS Program*

May. 2021 - April 2023

### New distributed Sensing and Computing Over Sparse Environments (Discover) platform

Co-PI, **Total:\$1.36M**

*NSF: CCRI Program*

Sep. 2021 - Aug 2024

### Remote Heart Monitoring Platform for Early Prediction of Arterial Fibrillation for Under-served Populations

Co-I, **\$60K**

*NAU SHERC: Pilot Projects*

Jan 2018-Dec 2018

### Southwest Helath Equity Research Collaborative (SHERC)

KEY PERSONNEL: RESEARCH INFRASTRUCTURE CORE (RIC), **\$21M**

*NIH U54*

Sep. 2017 - Aug 2022

### Advanced Video Analytics for Metric-Based Network Safety Performance Prediction

Co-PI, **Total: \$1M, NAU: \$78**

*Arizona Commerce Authority (ACA)*

Jun. 2020 - May 2021

### Dynamic Spectrum Leasing in Heterogeneous Unmanned Aerial Vehicle Networks Prediction

Co-PI, **Total: \$129K**

*US Air Force Research Laboratory (AFRL)*

Jun. 2018 - Dec 2018

### Predictive and Adaptive Communications for Real-time Dynamic Network Management in Autonomous Unmanned Aerial Vehicle Networks

Co-PI, **Total: \$150K**

*US Air Force Research Laboratory (AFRL)*

Jan. 2020 - Dec 2020

### Predictive Network Topology Discovery for Autonomous Airborne Networks

PI, **\$16K**

*Air Force Research Laboratory (AFRL), VFRP Program*

Jun. 2017 - Aug 2017

### Predictive Communications for UAV Systems

PI, **\$11K**

*Air Force Research Laboratory (AFRL), VFRP Program*

July. 2016 - Aug 2016

### Multi-modal signal processing to identify hearth abnormalities using wireless health monitoring device

PI, **\$2K**

*Interns-to-Scholars (I2S) to Support Undergraduate Research*

Sep. 2016 - May. 2017

## Exploiting Nanomaterials for End-to-End Cybersecurity Solutions

Co-PI, PI: PROF. BERTRAND CAMBOU, **\$1M**

Arizona Board of Regents (ABOR)

Sep. 2016 - Aug. 2020

## Development of Internet of Things (IoT) Research Infrastructure Center

Co-PI, PI: PROF. PAUL FLIKKEMA, **\$50K**

Research Development Grant, NAU

Oct. 2015 - Oct. 2016

## Java Based Multi-IMSI Simcard Development

PI, **\$50K**

MCI Company

2008

## Value Added Service Development for GSM/GPRS System Using S@T Server

PI, **\$200K**

MCI Company

2007

## PATENTS & INVENTIONS

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7. B. Cambou, A. Razi, "Authentication of Images Extracted from Unclonable Objects", Patent Number: PCT/US2017/018192, 2017 ([link](#))
6. A. Razi, V. Varadan, N. Dimitrova, N. Banerjee, "Integrated method and system for identifying functional patient-specific somatic aberrations using multi-omics cancer profiles", Patent Number: US 2018/0247010 A1, Aug 2018 ([link](#))
5. F. Afghah, A. Razi, K. Najarian, S. Soroushmehr, "False Alarm Reduction Systems and Related methods", Patent Number: US 10650667, 2020 ([link](#))
4. F. Afghah, A. Razi, Ashwin Belle, K. Najarian, "Hierarchical Game Theoretic Based Feature Selection in Heterogeneous Big Data Sets", Invention Disclosure, NC A&T State University Reference Number: EN00840714, Duke University Reference Number: IDF 4435, Submitted 2014, Filed in 2015.
3. A. Razi, B. Cambou, "Securing Distributed Elements Connected to a Network with Addressable PUFs", Invention Disclosure, Submitted, Application Number 62480200, D2017-19.
2. F. Afghah, A. Razi, "Roulette Transform for Signal Processing", Invention Disclosure: D2018-007, 2018
1. A. Razi, "Methods for authenticating dendrites, unclonable optical tags to mitigate counterfeit and cloning attacks", Invention Disclosure, NAU Case Number: 2021-16

## BOOK CHAPTERS

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3. A. Abedi, F. Afghah, A. Razi, "Resource Management in Cyber Physical Systems", 28 pages, Book title: Cyber-Physical System Design with Sensor Networking Technologies, Editor: S. Zeadally, N. Jabeur, Publisher: IET Press, 2016, ISBN: 978-1849198240
2. A. Razi, A. Abedi, "Information-flow in hard to reach areas: Source estimation using correlated streams", Book title: Design Solutions for Wireless Sensor Networks in Extreme Environments, Publisher: Artech House, 2018, ISBN: 9781630811778
1. A. Abedi, A. Razi, "Sensor Design for Harsh Environments: Material Science Perspective", Book title: Design Solutions for Wireless Sensor Networks in Extreme Environments, Publisher: Artech House, 2018, ISBN: 9781630811778

## JOURNAL ARTICLES

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35. Alireza Shamsoshoara, Fatemeh Afghah, Abolfazl Razi, Liming Zheng, Peter Z. Fulé, and Erik Blasch. "Aerial Imagery Pile burn detection using Deep Learning: the FLAME dataset." Computer Networks, vol. 193, 2021.
34. A Rovira-Sugranes, F Afghah, J Chakareski, A Razi, "A Review of AI-enabled Routing Protocols for UAV Networks: Trends, Challenges, and Future Outlook", under minor revision, *Transactions on Network*

33. A Rovira-Sugranes, F Afghah, J Chakareski, A Razi, "Fully-echoed Q-routing with Simulated Annealing Inference for Flying Adhoc Networks." under minor revision, *IEEE Access*, 2021
32. D'Angelo, Jashoua, D'Angelo Bradfield, Griffin Walmsley, Shweta Agarwal, Franklin Garcia-Godoy, Huayu Li, Abolfazl Razi, and Christopher Mann. "Quantitative Phase-Contrast Microscopy of Oral Carcinoma and Precancerous Cells Using Lensless Digital Gabor Holography." submitted to, *Elsevier Medical Image Analysis*, 2020.
31. A. Rovira-Sugranes, F. Afghah, A. Razi, "Fully-echoed Q-routing with Simulated Annealing Inference for Flying Adhoc Networks", Submitted to *IEEE Transactions on Network Systems and Engineering*, 2020
30. Z. Chi, A. Valehi, H. Peng, M. Kozicki, A. Razi, "Consistency penalized graph matching for Image-based identification of dendritic patterns", *IEEE Access*, no. 8, 118623-118637, 2020
29. H. Li, X. Chen, H. Wu, Z. Chi, C. Mann, A. Razi, "Deep DIH: Statistically Inferred Reconstruction of Digital In-Line Holography by Deep Learning", submitted to *IEEE Access*, arXiv preprint: arXiv:2004.12231, 2020
28. J. Qu, H. Shi, N. Qiao, C. Wu, C. Su, and A. Razi. "New three-dimensional positioning algorithm through integrating TDOA and Newton's method", *EURASIP Journal on Wireless Communications and Networking*, vol. 1, pp. 1-8, 2020
27. J. Qu, C. Su, Z. Zhang, A. Razi, "Dilated Convolution and Feature Fusion SSD Network for Small Object Detection in Remote Sensing Images", *IEEE Access*, vol. 8, pp. 82832-82843, 2020
26. B. Zolfaghari, G. Srivastava, S. Roy, H. R. Nemati, F. Afghah, T. Koshiba, A. Razi, K. Bibak, P. Mitra, and B. K. Rai, "Content Delivery Networks: State of the Art, Trends, and Future Roadmap", *ACM Computing Surveys (CSUR)*, vol. 53, no. 2, pp. 1-34, 2020
25. J. Qu, N. Qiao, H. Shi, C. Su, A. Razi, "Convolutional Neural Network for Human Behavior Recognition Based on Smart Bracelet", *Journal of Intelligent & Fuzzy Systems*, vol. 38, no. 5, pp. 5615-5626, May 2020
24. A. Shamsoshoara, F. Afghah, A. Razi, S. Mousavi, J. Ashdown, and K. Turk. "An Autonomous Spectrum Management Scheme for Unmanned Aerial Vehicle Networks in Disaster Relief Operations", *IEEE Access*, vol. 8, no. 1, pp. 58064-58079, April 2020
23. A. Razi. "Optimal Measurement Policy for Linear Measurement Systems with Applications to UAV Network Topology Prediction", *IEEE Transactions on Vehicular Technology*, vol. 69, no.2, pp. 1970-1981, Feb 2020
22. A. Rovira-Sugranes, and A. Razi. "Optimizing the Age of Information for Blockchain Technology With Applications to IoT Sensors", *IEEE Communications Letters*, vol. 24, no. 1, pp. 183-187, Jan 2020
21. J. Chen, A. Valehi, A. Razi, "Smart Heart Monitoring: Early Prediction of Heart Problems Through Predictive Analysis of ECG Signals", *IEEE Access*, vol. 7, pp. 120831 - 120839, August 2019
20. A. Razi, "Bayesian Signal Recovery Under Measurement Matrix Uncertainty: Performance Analysis", *IEEE Access*, vol. 7, no. 1, pp. 102356-102365, 2019
19. J. Chakareski, S. Naqvi, N. Mastronarde, J. Xu, F. Afghah, A. Razi, "An Energy Efficient Framework for UAV-Assisted Millimeter Wave 5G Heterogeneous Cellular Networks", *IEEE Transactions on Green Communications and Networking*, vol. 3, no. 1, pp. 37-44, 2019
18. F. Afghah, A. Razi, R. Soroushmehr, H. Ghanbari, K. Najarian, "Game Theoretic Approach for Systematic Feature Selection; Application in False Alarm Detection in Intensive Care Units", *Entropy*, vol. 20, no. 30, 2018
17. H. Peng, A. Razi, F. Afghah, J. Ashdown, "A Unified Framework for Joint Mobility Prediction and Object Profiling of Drones in UAV Networks", *JCN Special Issue on Amateur Drone and UAV Communications and Networks*, vol. 20, no. 5, pp. 434-442, 2018

16. A. Valehi, A. Razi, "An Online Learning Method to Maximize Energy Efficiency of Cognitive Sensor Networks", *IEEE Communications Letters*, vol. 22, no 5, pp. 1050-1053, May 2018.
15. J. Chen, H. Peng, A. Razi, "Remote ECG Monitoring Kit to Predict Patient-Specific Heart Abnormalities", *Journal of Systemics, Cybernetics and Informatics*, vol. 15, no. 4, pp. 82-89, Nov 2017.
14. A. Valehi, A. Razi, "Maximizing Energy Efficiency of Cognitive Wireless Sensor Networks with Constrained Age of Information", *IEEE Transactions on Cognitive Communications and Networking*, vol.3, no. 4, pp. 643-654, Dec 2017.
13. M.J. Jannati, A. Razi, A. Sayadian, "Speech naturalness improvement via  $\epsilon$ -closed extended vectors sets in voice conversion systems", *Springer Multidimensional System Signal Processing*, Jan 2017, DOI 10.1007/s11045-017-0470-3.
12. A. Razi, S. Singh, F. Afghah, V. Varadan, "Network-based Enriched Gene Subnetwork Identification: A Game Theoretic Approach", *Biomedical Engineering and Computational Biology*, vol. 7, no. 2, pp.1-14, 2016, PMID: 4822726.
11. V. Varadan, N. Dimitrova, A.B. Nagaraj, A. Razi, S. Singh, S. Kamalakaran, N. Banerjee, P. Joseph, A. Mankovich, P. Mittal, and A. DiFeo, "InFlo: A Novel Systems Biology Framework Identifies cAMP-CREB1 Axis as a Key Modulator of Platinum Resistance in Ovarian Cancer", **Nature Oncogene**, vol. 36, no. 17, pp. 2472-2482, Nov 2016, PMID:27819677.
10. A. Razi, N. Banerjee, N. Dimitrova, V. Varadan, "InFlo-Mut: A Bayesian Framework to Determine the Transcriptional Effects of Cancer-Associated Genomic Aberrations", under review *Computational Biology*.
9. A. Razi, F. Afghah, A. Abedi, "Channel-Adaptive Packetization Policy for Minimal Latency and Maximal Energy Efficiency", *IEEE transactions on Wireless Communications*, vol. 15, no. 3, pp. 2407-2420, 2016.
8. F. Afghah, A. Razi, S.M.Reza Soroushmehr, S. Molaei, H. Ghanbari and K. Najarian, "A Game Theoretic Predictive Modeling Approach to Reduction of False Alarm", *Lecture Notes in Computer Science*, vol. 9545, pp. 118-130, Springer, Jan 2016.
7. F. Afghah, A. Razi, "Game Theoretic Study of Cooperative Spectrum Leasing in Cognitive Radio Networks", *International Journal of Handheld Computing Research*, vol. 5, no. 2, pp. 61-74, Jun. 2014. **(Invited Paper)**
6. A. Razi, A. Abedi, "Convergence Analysis of Iterative Decoding for Binary CEO Problem", *IEEE transactions on Wireless Communications*, vol. 13, no. 5, pp. 2944-2954, May 2014.
5. A. Razi, F. Afghah, A. Abedi, "Power Optimized DSTBC Assisted DMF Relaying in Wireless Sensor Networks with Redundant Super nodes", *IEEE transactions on Wireless Communications*, vol. 12, no. 2, pp. 636- 645, Feb. 2013.
4. K.Yasami, A.Razi, A.Abedi, "Analysis of Channel Estimation Error in Physical Layer Network Coding", *IEEE Communications Letters*, vol. 15, no. 10, pp. 1029-1031, Oct. 2011.
3. F. Afghah, A. Razi, A. Abedi, "Stochastic Game Theoretical Model for Packet Forwarding in Relay Networks", *Springer Telecommunication Systems journal, Special Issue on Mobile Computing and Networking Technologies*, vol. 52, no. 4, pp. 1877-1893, 2011.
2. A. Razi, F. Afghah, A. Abedi, " Binary Source Estimation Using a Two-tiered Wireless Sensor Networks", *IEEE Communications Letters*, vol. 15, no. 4, pp. 449-451, Apr. 2010.
1. F. Afghah, M. Ardebilipour, A. Razi, "Fast Turbo Codes Concatenated with Space-Time Block Codes", *ISI Journal of Applied Science*, vol. 8, no. 16, pp. 2863-2867, 2008.

## PEER REVIEWED CONFERENCE PAPERS

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46. Xiwen Chen, Huayu Li, Abolfazl Razi, "Boosting Belief Propagation for LDPC Codes with Deep Convolutional Neural Network Predictors", accepted in *IEEE CCNC*, Las Vegas, 2021

45. Han Peng, Abolfazl Razi, "Fully Autonomous UAV-based Action Recognition System Using Aerial Imagery", accepted in *International Symposium on Visual Computing (ISVC)*, 2020
44. Haiyu Wu, Huayu Li, Alireza Shamsoshoara, Abolfazl Razi, Fatemeh Afghah, "Transfer Learning for Wild-fire Identification in UAV Imagery", *54th Annual Conference on Information Sciences and Systems (CISS)*, pp. 1-6, March 2020
43. H. Li, A. Razi, "MEDA: Multi-output Encoder-Decoder for Spatial Attention in Convolutional Neural Networks", *Asilomar Conference on Signals, Systems and Computers*, pp. 2087-2091, Pacific Grove, CA, Nov 2019
42. S. Islam, F. Afghah, A. Razi, "Fire Frontline Monitoring by Enabling UAV-Based Virtual Reality with Adaptive Imaging Rate", *Asilomar Conference on Signals, Systems and Computers*, pp. 368-372, Pacific Grove, CA, Nov 2019
41. Junsuo Qu, Ning Qiao, Abolfazl Razi, "Convolutional Neural Network for Human Behavior Recognition Based on Smart Bracelet", *Euro-China Conference on Intelligent Data Analysis and Applications (ECC)*, Arad, Romania, Oct 2019
40. A. Shamsoshoara, M. Khaledi, F. Afghah, A. Razi, J. Ashdown, K. Turck, "A Solution for Dynamic Spectrum Management in Mission-critical UAV Networks", *IEEE SECON Workshop on Networks of Autonomous Vehicles, Robots, Sensors (IAUV)*, Boston, June 2019.
39. J. Cheng, A. Valehi, F. Afghah, A. Razi, "A Deviation Analysis Framework for ECG Signals Using Controlled Spatial Transformation", *IEEE-EMBS International Conferences on Biomedical and Health Informatics*, Chicago, May 2019
38. S. Mousavi, F. Afghah, A. Razi, R. Acharya, "ECGNET: Learning Where to Attend for Detection of Atrial Fibrillation with Deep Visual Attention", *IEEE-EMBS International Conferences on Biomedical and Health Informatics*, Chicago, May 2019
37. F. Afghah, A. Razi, "Wildfire Monitoring in Remote Areas using Autonomous Unmanned Aerial Vehicles", *INFOCOM workshop on Mission-Oriented Wireless Sensor, UAV and Robot Networking workshop*, Paris, France, May 2019
36. S Islam, A Razi, "A Path Planning Algorithm for Collective Monitoring Using Autonomous Drones", *53rd Annual Conference on Information Sciences and Systems (CISS)*, pp. 1-6, Baltimore, MD, March 2019
35. A. Shamsoshoara, M. Khaledi, F. Afghah, A. Razi, J. Ashdown, "Distributed cooperative spectrum sharing in uav networks using multi-agent reinforcement learning", *IEEE Consumer Communications and Networking Conference (CCNC)*, pp. 1-6, Las Vegas, January 2019
34. A. Rovira-sugranes, A. Razi, "Optimized Compression Policy for Flying Ad hoc Networks", *IEEE Consumer Communications and Networking Conference (CCNC)*, Las Vegas, January 2019
33. M. Finely, A. Razi, "Musical Key Estimation with Unsupervised Pattern Recognition", *IEEE 9th Annual Computing and Communication Workshop and Conference (CCWC)*. Las Vegas, January 2019
32. M. Khaledi, A. Rovira-Sugranes, F. Afghah, A. Razi, "On Greedy Routing in Dynamic UAV Networks", presented in *SECON 2018*, Hong Kong, 2018
31. F. Afghah, M. Zaeri Amirani, A. Razi, J. Chakareski, and E. Bentley, "A Coalition Formation Approach to Coordinated Task Allocation in Heterogeneous UAV Networks", *IEEE American Control Conference (ACC)*, Milwaukee, USA, 2017.
30. S. Naqvi, J. Chakareski, N. Mastronarde, J. Xu, F. Afghah, A. Razi, "Energy Efficiency Analysis of UAV-Assisted mmWave HetNets", *IEEE International Communications Conference (ICC)*, Kansas City, USA, 2018.
29. A. Razi, C. Wang, F. Almaraghi, Q. Huang, Y. Zhang, H. Lu, A. Sugranes, "Predictive Routing for Wireless Networks: Robotics-Based Test and Evaluation Platform", *IEEE Computing and Communication Workshop and Conference (CCWC)*, Las Vegas NV, Jan 2018.

28. J. Chen, A. Razi, "A Predictive Framework for ECG Signal Processing Using Controlled Nonlinear Transformation", *IEEE Conference on Biomedical and Health Informatics (BHI)*, Las Vegas, March 2018.
27. A.R. Sugranes, A. Razi, "Predictive Routing for Dynamic UAV Networks", *IEEE International Conference on Wireless for Space and Extreme Environments (WiSEE)*, Montreal CA, Oct 2017.
26. A. Razi, F. Afghah, J. Chakareski, "Optimal Measurement Policy for Predicting UAV Network Topology", *Asilomar Conference on Signals, System and Computers*, Asilomar Conference on Signals,. Systems and Computers, CA USA, Oct 2017.
25. J. Chen, "Remote ECG Monitoring Kit to Predict Patient-Specific Heart Abnormalities", Accepted in , *World Multi-Conference on Systemics, Cybernetics and Informatics (WMSCI)*, Orlando, FL, July 2017.
24. A. Valehi, A. Razi, B. Cambou, W. Yu, M. Kozicki, "A graph matching algorithm for user authentication in data networks using image-based physical unclonable functions", *Computing Conference*, London, UK, July 2017.
23. A. Razi, A. Valehi, E. Bentley, "Delay minimization by adaptive framing policy in cognitive sensor networks", (WCNC), San Fransisco, CA USA, March 2017.
22. H. Tavakkoli, A. Razi, "Optimizing Low Density Parity Check Code for two Parallel Erasure links", the *International Symposium on Information Theory and Its Applications (ISITA)*, Monterey, CA USA, Oct 2016.
21. A. Razi, F. Afghah, V. Varadan, "Identifying Gene Subnetworks Associated with Clinical Outcome in Ovarian Cancer Using Network Based Coalition Game", *IEEE Engineering in Medicine and Biology Society (EMBC)*, Milan, Italy, Aug 2015, PMID: 26737784.
20. F. Afghah, A. Razi, K. Najarian, "A Shapley Value Solution to Game Theoretic-based Feature Reduction in False Alarm Detection", *Workshop on Machine Learning in Healthcare, Neural Information Processing Systems (NIPS)* , Montreal, Canada, Dec 2015.
19. F. Afghah, A. Razi, S.M.R. Soroushmehr, S. Molaei, H. Ghanbari, and K. Najarian, "A Game Theoretic Predictive Modeling Approach to Reduction of False Alarm", *2015 International Conference for Smart Health (ICSH'15)*, Mayo Clinic, 2015.
18. A. Razi, N. Banerjee, N. Dimitrova, V.Vinay, "Non-linear Bayesian framework to determine the transcriptional effects of cancer-associated genomic aberrations", *IEEE Engineering in Medicine and Biology Society (EMBC)*, Italy, Aug 2015. PMID: 26737785.
17. L. Wang, A. Razi, M. Rodrigues, R. Calderbank, L. Carin, "Nonlinear Information-Theoretic Compressive Projection Design", *International Conference on Machine Learning (ICML)*, vol 32, China, 2014.
16. A. Razi, F. Afghah, A. Belle, K. Najarian and K. Ward, "Blood Loss Severity Prediction using Game Theoretic Based Feature", *IEEE-EMBS International Conferences on Biomedical and Health Informatics (BHI)*, pp. 776 - 780, Italy, 2014.
15. F. Afghah, A. Razi, "Cooperative Spectrum Leasing in Cognitive Radio Networks,"*National Wireless Research Collaboration Symposium (NW RCS)*, pp 106-111, Idaho Falls, USA, May 2014.
14. A. Razi, A. Abedi, A. Ephremides, "Delay minimization with channel-adaptive packetization policy for random data traffic," *48<sup>th</sup> Annual Conference on Information on Sciences and systems (CISS)*, Princeton University, pp.1-6, Mar. 2014.
13. F. Afghah, A. Razi, A. Abedi, "Power Allocation in Parallel Relay Channels using a Near-Potential Game Theoretical Approach," *48<sup>th</sup> Annual Conference on Information on Sciences and systems (CISS)*, Princeton University, pp. 1-6, Mar. 2014.
12. F. Afghah, M. Costa, A. Razi, A. Abedi, A. Ephremides, "A Reputation-based Stackelberg Game Approach for Spectrum Sharing with Cognitive Cooperation", *IEEE 52nd Annual Conference on Decision and Control (CDC)*, pp. 3287-3292, Frieenze, Italy, 2013.
11. A. Razi, A. Abedi, "Adaptive bi-modal decoder for binary source estimation with two observers", the *46th Annual Conference Information Sciences and Systems (CISS)*, Princeton University, pp. 1- 5, Mar. 2012.

10. A. Abedi, A. Razi, F. Afghah, "Smart Battery-Free Wireless Sensor Networks for Structural Health Monitoring", the 8th International Workshop on Structural Health Monitoring, Stanford University, USA, Sep. 2011.
9. A. Razi, A. Abedi, "Interference Reduction in Wireless Passive Sensor Networks Using Directional Antennas", **Best Paper Award**, IEEE Fly by Wireless Workshop, pp. 1-4, Montreal, CANADA, Jun. 2011.
8. A. Razi, A. Abedi, "Study and Implementation of Distributed PCCC Coding Scheme for Binary Source Estimation Using Multiple Observations", Poster presentation in the School of information theory, Austin, USA, May 2011.
7. A. Razi, K. Yasami, A. Abedi, "On Minimum Number of Wireless Sensors Required for Reliable Binary Source Estimation", IEEE Wireless Communications and Networking Conference (WCNC), pp. 1852-1857, Cancun, Mexico, Mar. 2011.
6. F. Afghah, A. Razi, A. Abedi, "Throughput Optimization in Relay Networks Using Markovian Game Theory", IEEE Wireless Communications and Networking Conference (WCNC), pp. 1080-1085, Cancun, Mexico, Mar. 2011.
5. A. Razi, F. Afghah, A. Abedi, "Hierarchical Network Development of Wireless Passive Sensors", IEEE Fly by Wireless Workshop, pp. 30-31, Aug. 2010.
4. F. Afghah, A. Razi, A. Abedi, "Wireless Cooperative Relaying Using Game Theory", CANEUS/IEEE Fly by Wireless Workshop, pp. 24-27, Orono, USA, Aug. 2010.
3. A. Razi, A. Abedi, "Distributed Coding of Sources with Unknown Correlation Parameter", World Congress in Computer Science, Computer Engineering, and Applied Computing (Worldcomp'10), pp. 566-571, Las Vegas, Apr. 2010.
2. A. Razi, M. Ardebilipour, F. Afghah, "Space-Time Block Codes Assisted by Fast Turbo Codes", the 4th International Conference on Wireless Communications, Networking and Mobile Computing (WICOM2008), pp. 1-6, Dalian, China, Oct. 2008.
1. F. Afghah, M. Ardebilipour, A. Razi, "Concatenation of Space-Time Block Codes and LDPC Codes", The 13th International Telecommunications Network Strategy and Planning Symposium (NETWORK 2008), pp. 61-66, Budapest, Hungary, Sep. 2008.

## POSTER PRESENTATIONS

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2. A. Razi, A. Abedi, "A bi-modal Decoder Design for Binary CEO Problem", North American School of Information Theory, Cornell University, Ithaca, NY, USA, Jun 2012.
1. A. Razi, A. Abedi, "Study and Implementation of Distributed PCCC Coding Scheme for Binary Source Estimation Using Multiple Observations", School of Information Theory, University of Texas at Austin, TX, USA, May 2011.

## INVITED TALKS

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12. "Unmanned Frontier", **Discussion Panelist**, Arizona Unmanned Summit, November 2018
11. "Predictive communications for UAV networks: the intersection of machine learning and wireless communications", **Keynote Speech**, The Fifth Euro-China Conference on Intelligent Data Analysis and Applications (ECC 2018), October 2018
10. "Computational Methods to Analyze Genomic Aberrations in Cancer Disease- a Bayesian Framework", University of Arizona Cancer Center (UACC), January 2017
9. "Predictive Communications for UAV Systems", Department of Mathematics, Northern Arizona University, October 2016



8. "Functional Mutation Assessment by a Hierarchical Deep Learning Algorithm - a Bayesian Framework", Department of Biological Science, Northern Arizona University, February 2016.
7. "Predictive Communications for UAV Systems", SICCS-INF501 Course: Invited Lecture, November 2016
6. "Distributed Task Coordination and Communication in Heterogeneous Airborne Networks", AFRL Faculty Presentation, Rome, New York, August 2016
5. "Predictive Topology Discovery and Communication Design for UAV Networks", AFRL Faculty Presentation, Rome, New York, July 2016
4. "Distributed Algorithm Design for Data Aggregation in Binary CEO Problem", Qualcomm Company, San Diego, CA, July 2014
3. "Distributed Algorithm Design to Improve Signal Processing Efficiency in Wireless Networks with Limited Resources", Virginia State University, Petersburg, VA, February 2013
2. "Distributed Adaptive Algorithm Design for Wireless Sensor Networks", University of Tennessee, Chattanooga, TN, Jun 2013
1. "Classification of Biomedical Data Using Game Theoretic Feature Selection and Information Preserving Compressive Sensing", Case Western Reserve University, Cleveland, OH, January 2014

## TRAINING WORKSHOPS

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1. "An Introduction to Python Programming for Deep Learning and Data Processing", SHERC RIC Workshop Series, online workshop for NAU faculty, April 2020

## TEACHING EXPERIENCE

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2016-20	<b>Instructor</b> , EE443/543-Pattern Recognition	North. Arizona Un.
2020-21	<b>Instructor</b> , EE442/542-Advanced Image Processing	North. Arizona Un.
2016-20	<b>Instructor</b> , EE436/536-Advanced Communications and Wireless Sensing	North. Arizona Un.
2015-20	<b>Instructor</b> , EE364-Fundamentals of Electromagnetics	North. Arizona Un.
2020-21	<b>Instructor</b> , EE430-Digital Communications	North. Arizona Un.
2020-21	<b>Instructor</b> , EE442/542-Advanced Image Processing	North. Arizona Un.
2011	<b>Teaching Assistant</b> , ECE515-Random Variables & Stochastic Processes	Un. Maine
2008	<b>Lecturer</b> , CS200-Computer Structure & C++ Programming	Payam. Noor
2006-7	<b>Training Workshop</b> , Wireless Networks, Structure & Services	Several Uni.
2004-6	<b>Training Workshop</b> , SIM CARD Structure & Capabilities	MCI Company

## MENTORSHIP and STUDENT SUPERVISION

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- **Postdoctoral Co-Mentor:** Mehrdad Khaledi (AY2018-19)
- **Postdoctoral Co-Mentor:** Mohammed Gharib (AY2020-21)
- **PhD Advisor:** Arnau Rovira-Sugranyes (AY2017-now)
- **PhD Advisor:** Han Peng (AY2017-now)
- **PhD Advisor:** Xiwen Chen (AY2019-now)
- **PhD Advisor:** Vinod Kumar-Gummadi (AY2019-now)
- **PhD Advisor:** Pengkai Fang (AY2019-now)
- **MS Advisor:** Zaoyi Chi: Graduated (AY2018-20)
- **MS Advisor:** Huayu Li: (AY2019-2021)
- **MS Advisor:** Qiyuan Chi: Graduated (AY2018-20)
- **MS Advisor:** Ali Valehi: Graduated (AY2016-18)
- **MS Advisor:** Jiaming Chen: Graduated (AY2017-19)
- **Independent Research Supervision:** Shafkat Islam (AY2018-19)

- **Independent Research Supervision:** Harika Hari (AY2018-19)
- **Independent Research Supervision:** Yifei Zhang (AY2019-20)
- **Independent Research Supervision:** Arun Kokkappillil Vijayan (AY2018-19)
- **PhD Thesis Committee:** Ashwija Reddy Korenda (AY2019-now)
- **PhD Thesis Committee:** Mahsa Keshavarz (AY2019-now)
- **PhD Thesis Committee:** Alireza Shamsoushoara (AY2018-now)
- **PhD Thesis Committee:** Mohammad Mohammadi (AY2018-now)
- **PhD Thesis Committee:** Seyed Sajjad Mousavi (AY2017-20)
- **MS Thesis Committee:** Alexander Dahlman (AY2018-20)
- **MS Thesis Committee:** Md Ashiqua Amin (AY2018-20)
- **MS Thesis Committee:** Ashwija Reddy Korenda (AY2016-18)
- **MS Thesis Committee:** Jared Park (AY2015-17)
- **MS Thesis Committee:** Abdulla Shamsuddin (AY2015-16)
- **Capstone Project Supervisor:** Han Peng, Yulan Westerveld, Xinghao Qi, Benjamin Johnson, Ahmed Altamimi, Abdulmajeed Alhawsawi, Alyssa Thompson, Hashem Aldashti, Tyler Mulholland, Omar Marshad, Cody Warner, Sixian Zhang, Yazhou Li, Zening Wen, Huiwen Chu, Charles Chatwin, Tanner Brelje, Josh Gutman, Matthew Burns, Fahad Almaraghi, Yuting Zhang, Qiyuan Huang, Chaoju Wang, Hanxiao Lu, Christopher Thompson, Tyler Halperin, Tyler Criss, Huayu Li, Faisal Alotaibi, Tamey Alajmi, Tong Zhou, Junshi Wei, Mathew Ronald Miller, Rui Li, Alfred Gunasekara, Bo Sun, Jingwei Yang, Junlin Hai, Daniel Jacob Copley, Mohammed S. Almershed, Noah W. Levie

## PROFESSIONAL ACTIVITIES

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- **TPC Co-Chair:** IEEE International Conference on Wireless for Space and Extreme Environments WiSEE (2019)
- **NSF Review Panel:** SCH, NeTS, CRI, GRFP, CSD&E
- **Editorial Board:** Frontiers, (2020)
- **Invited Session Chair:** KES2020, (2020)
- **Invited Session Chair:** CISS2021-AI-enabled UAV Networking, (2020)
- **Guest Editor:** Special Issue on Machine Learning in Bioinformatics, Biomedical Engineering and Computational Biology Journal (2016-17)
- **Session Chair:** IEEE WiOPT Conference, Arizona State University (2016)
- **Session Chair:** Annual Conference on Information on Sciences and systems (CISS), John Hopkins University (2015)
- **Registration Chair:** IEEE WiSEE 2018
- **Poster Session Chair:** IEEE Consumer Communication and Networking Conference CCNC (2019 and 2020)
- **Technical Program Committee:** IEEE VTC (2017-20)
- **Technical Program Committee:** IEEE WiSEE (2014-21)
- **Technical Program Committee:** IEEE CCNC 2019
- **Technical Program Committee:** IEEE PiMRC (2018-21)
- **Technical Program Committee:** SwarmNet Workshop, in IEEE WoWMoM 2019-2021
- **Technical Program Committee:** iUAV workshop in SECON 2020
- **Technical Program Committee:** SAI2020

- **Technical Program Committee:** DroIT 2020
- **Technical Program Committee:** ICoIV 2020
- **Technical Program Committee:** Microsoft CMT (2019-now)
- **IEEE Maine Section PACE Chair:** Professional Activities Committees for Engineers (2009-12)
- **Program Committee and Sponsorship Chair:** CANEUS/IEEE Fly by Wireless workshop, Orono, Maine (Aug 2010)
- **Organizing Committee:** IEEE Seminar on “Communications for Smart grid” and “Interference Alignment”, University of Maine, (Sep. 2011)
- **Journal Paper Review:** IEEE Vehicular Technology Magazine, IEEE Transactions on Communications, IEEE Transactions on Wireless Communications, IEEE transactions on Aero Space and Electronic Systems, IEEE Transactions on Vehicular Technology (TVT), IEEE Communications Letters, IEEE Access, IEEE Journal of Biomedical and health informatics (JBHI), IEEE Internet of Things, IEEE Internet of Things Journal, Journal of Communications and Networks (JCN), ACM Transactions on Sensor Networks, BMC Research Notes (BMC), Journal of Sensors, Journal of Franklin, Elsevier Journal on Artificial Intelligence, Elsevier Engineering Applications of Artificial Intelligence, PLOS One, Hindawi Journal on Mobile Information Systems, IET Wireless Sensor Systems, Science China: Information Sciences, IEEE Transactions on Computational biology, IET Sensor Systems Journal
- **Conference Paper Review:** ICC, GlobeCom, VTC, WCNC, CCNC, ISWCS, QBSC, PiMRC, AICT, SECON, etc.

## INDUSTRIALWORK EXPERIENCE

### Mobile Company of Iran (MCI)

*Tehran, IRAN*

PROJECT MANAGER, R&D, TECHNICAL EXPERT (**FULL TIME**)

02/01/2001 - 05/31/2009

- Wireless System Radio Planning and Optimization
- Project Manager, “Value Added Services (VAS) Development Project
- SIM Test Procedure Development, Java SIM Programming
- Feature Test for Mobile Switching Centers (MSC)
- Member of MCI’s GPRS/MSC/VAS/SIM Research Groups

### Farda Telecommunications Company

*Tehran, IRAN*

PROJECT MANAGER (**PART TIME**)

05/01/2004 - 04/31/2009

- Solution Manager for Next Generation Networks Project (LTE, WiMAX)
- Wireless Network Planning and Optimization

### PTK Telecommunications Company

*Tehran, IRAN*

SOFTWARE ENGINEER (**PART TIME**)

09/23/1999 - 09/22/2001

- Software Development for PDX5: a Private Automatic Branch eXchange (PABX) Telephony Switch Telephony Switch (Capacity: 5K)

### Powers System Company (Tehran Niroo)

*Tehran, IRAN*

SOFTWARE ENGINEER (**PART TIME**)

11/1/1997 - 10/30/1998

- Power Station Automation Based on Power Line Carrier Project

## DEVELOPED SOFTWARE PACKAGES

17. Ali Valehi and Abolfazl Razi, “Cognitive Radio Network Queuing Simulator”, **MATLAB**, (link)
16. Ali Valehi and Abolfazl Razi, “NFSIM2”, A modified version of NFSIM package, **C++**, a molecular interaction simulator (link)
15. Ali Valehi and Abolfazl Razi, “Dendrite-generator”, **MATLAB** A simulator to generate artificial dendritic patterns (link)
14. Ali Valehi and Abolfazl Razi, “BioNetFit”, A **C++** Package for molecular interaction modeling, (link)
13. Huayu Li and Abolfazl Razi, “DIH: Learning-Based 3D Image Reconstruction for Digital Holography”, **Python**

12. Huayu Li, Xiwen Chen, and Abolfazl Razi, "Subband-Pyramid-Network", Image denoising tool, **Python**
11. Qiyuan Huang, Abolfazl Razi, "Vison-Based Semi-Empirical Fire Spread Modeling", in **MATLAB**
10. NFSIM.v2 Molecular Interaction Modeling (Modifications): **C++**, NAU
9. BioNetFit.v2 Molecular Interaction Model Tuning (Modifications): **C++/MPI**, NAU
8. PDX5 PABX SC Alarm Panel Design: **C, 8051 Assembly**, PTK Company
7. PDX5 PABX SC O&M Console Design: **VB6**, PTK Company
6. HDLC Protocol Design for PLC: **C, Motorola Assembly**, Tehran Niroo Company
5. SIM CARD Management and Test Suit: **VB6, PCSC**, MCI Company
4. Multi-IMSI Applet Design: **Java: JDK2.2.1**, MCI Company
3. Call Center Management Software **VC++**, TCI Company
2. KPI Analysis Software **VB and Access**, FARDA Company
1. Passive Sensor Interrogator **Xilinx Virtex 4 FPGA Board**, University of Maine

## HW & SW SKILLS

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<b>Concepts:</b>	Object Oriented Programming (OOP), Real-time Programming
<b>Programming:</b>	VB, C/C++, Java, Perl, Python, MATLAB, R, Mathematica
<b>DataBase:</b>	SQL Server, Microsoft Access
<b>Hardware:</b>	Intel Assembly (8086, 8051), PLC, Xilinx Virtex. 4 DSP Tools
<b>Wireless:</b>	TEMS Investigation, Mentum Planet, Nokia NED, Ericsson Alex library, Asset Enterprise
<b>Sensor Networks:</b>	Tiny OS (TelosB motes), Arduino, Rasbery Pai, Libelium WSN Kit, TI WSN Kit
<b>Smart Card Tools:</b>	Gemxplorer SIM suite, SIMSurf, SIM Tester, SIM Alliance JDK Enterprises
<b>Molecular Biology:</b>	NFSIM, BioNetGen, RuleBender, Nauty, Cytoscape, GSEA, Paradigm, InfloMut
<b>Electrical Equipment:</b>	USRP Cognitive Radio, Wireless Channel Emulator (SPIRENT SR5500 ), Spectrum Analyzer, Digital Logic Analyzer

## TRAINING COURSES & CERTIFICATES

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2012	<b>School of Information Theory,</b>	<i>University of Texas</i>
2011	<b>IEEE Membership Development,</b>	<i>IEEE Region 1, NY</i>
2003	<b>MSC/VLR Operation (LZU108405), GSM Statistics Handling (LZU1083274),</b>	<i>Ericsson Company</i>
2003	<b>AXE 10 Emergency Handling Periodic Refresh Training (LZU108094),</b>	<i>Ericsson Company</i>
2002	<b>GSM/GPRS Operation SubSystem R9.1 On Site Introduction,</b>	<i>Ericsson Company</i>
2007	<b>BSS Parameter Planning,</b>	<i>Nokia Company</i>
2007	<b>SIM, STK and OTA Basics, Value Added Services (T1001I),</b>	<i>Gemalto Co.</i>
2007	<b>Java SIM Applet Development (T1007D),</b>	<i>Gemalto Co.</i>
2006	<b>Mobile SS7 Signaling,</b>	<i>AirCom Company</i>
2004	<b>GSM SIM Card Technology,</b>	<i>ST-Incard, Italy</i>

## NAU Services

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- **Graduate Coordinator**, EE Department, AY2015-16
- **Member of PhD Admission Committee**, SICCS, AY2019-20
- **Faculty Status Committee**, SICCS, AY2017-18, AY2020-21
- **Postdoctoral Hiring Committee**, NAU, Multiple Positions, AY2017-Now
- **Faculty Search Committee**, SICCS, Multiple Committees, AY2017-2019
- **Proposal Review Committee**, Native American Cancer Prevention (NACP), AY 2016-17
- **Proposal Review**, HURA Award, April 2019
- **EE Scholarship Assignment Committee**, EE Department, AY2016-17
- **SICCS ABET Committee**, SICCS, AY2015-Now
- **EE Undergraduate Curriculum Committee**, AY2016- 2017
- **Judge**, IEEE Student Chapter Robotics Competition, Dec 2017
- **Capstone Reviewer**, Computer Science Capstone Projects, AY 2017-18
- **Graduate Recruitment Committee**, SICCS, AY 2020-21
- **Graduate Curriculum Committee**, SICCS, AY 2020-21
- **Graduate Scholarship Committee**, SICCS, AY 2020-21
- **Graduate Activities Committee**, SICCS, AY 2020-21
- **Capstone Reviewer**, Computer Science Capstone Projects, AY 2017-18