TAREQ Y. AL-NAFFOURI

Al-Khawarizmi Applied Math. Building (Bldg. #1) | Office # 3-303 http://faculty.kfupm.edu.sa/EE/naffouri/
King Abdullah University of Science and Technology (KAUST) tareq.alnaffouri@kaust.edu.sa
Thuwal 23955-6900 +966-12-808-0298 (work)
Kingdom of Saudi Arabia +966-544-700-795 (cell)

EDUCATION

Ph.D. Electrical Engineering, *Stanford University, CA* 2005
Research area: Multiple antenna receiver design for wireless communications

M.S. Electrical Engineering, *Georgia Institute of Technology* 1998
Research area: Signal processing for communications

M.S. Electrical Engineering, *King Fahd University of Petroleum and Minerals* 1997
Research area: Signal processing and electromagnetics

B.Sc. Mathematics & Electrical Engineering, *King Fahd University of Petroleum and Minerals* 1994

EXPERIENCE

Associate Professor, *King Abdullah University of Science and Technology, Saudi Arabia* Feb. 2012-present

- Teaching Adaptive filtering, Digital Communications, Information Theory and Compressed Sensing.
- Carrying out research in adaptive and statistical signal processing, compressed sensing and its applications, wireless sensor networks, heterogeneous wireless networks, and network coding.

Director of Office of Cooperation with King Abdullah University (KAUST) Nov. 2008- Jul. 2012

- Established cooperation avenues between King Fahd University of Petroleum and Minerals (KFUPM) and King Abdullah University of Science and Technology (KAUST). Collaboration avenues include joint research projects, Faculty visits and sabbatical leaves, student exchange, joint student supervision, and shared-use of experimental and computational facilities.

Associate Professor, *King Fahd University of Petroleum and Minerals, Saudi Arabia* Oct. 2009-present
Assistant Professor, *King Fahd University of Petroleum and Minerals, Saudi Arabia* Apr. 2005-Oct. 2009

- Teaching Electric Circuit Analysis, Analog and Digital Communications, Probability and Random Variables, Communication Networks, Senior Project Design, Enhancing Study Skills, Digital Communications (graduate), Adaptive Filtering and Applications (graduate), Stochastic Processes (graduate), and Compressed Sensing (graduate).
- Carrying out research in adaptive filtering, channel estimation, iterative receiver design, multiuser communication, compressive sensing, and seismic signal processing.
- Serving on various academic committees.

Fulbright Scholar, *University of Southern California (USC),* CA, Prof. Giuseppe Caire Feb. 2008-Sep. 2008
California Institute of Technology, CA, Prof. Babak Hassibi

- Devised techniques for impulsive noise estimation and cancelation in OFDM using compressive sensing.
- Presented a unified approach for evaluating the distribution of indefinite quadratic forms in Gaussian variables.
- Devised a blind technique for data recovery in OFDM transmission.

Research Associate, *California Institute of Technology,* CA, Prof. Babak Hassibi Jan - Aug, 2005
Summer, 2006

- Characterized scaling laws for the capacity of broadcast multi-user wireless channels that employ multiple antennas with spatial correlation.
- Characterized the scaling laws of group broadcast channels in the narrow-band and wideband cases. Scaling was applied to the number of users, antennas, and channels.

Design Engineer, *Beceem Communications,* Santa Clara, CA, Dr. Erik Lindskog Summer, 2004

- Worked with a team of experts on designing, implementing, and testing the physical layer part of the WiMAX Standard IEEE 802.16e for broadband wireless metropolitan access networks. Specifically, worked on designing and evaluating space-time codes, pilot training schemes, and channel estimation algorithms.
- Successfully implemented and evaluated various space-time coding schemes using 2,3, and 4 antennas at the base station. The work resulted in 5 proposals to the IEEE 802.16e standard body (2 of which were voted into the standard).
- Designed training schemes to improve the operation of the space-time mode of the IEEE 802.16e standard. This resulted in 2 contributions to the IEEE 802.16e standard, one of which was voted in.
- Worked with a team of experts to design and implement channel estimation and tracking algorithms for the IEEE 802.16e standard. Came up with a computationally efficient method for channel estimation and tracking in the frequency domain.

Graduate Assistant, *Stanford University,* CA, Prof. Arogyaswami Paulraj & Prof. Ali Sayed 1998-2004

- Channel estimation and equalization: Developed adaptive/iterative algorithm for MIMO channel estimation and data detection. Algorithm is able to cope with rapidly time-variant frequency-selective channels by making a collective use of the structure underlying the communication problem. Algorithm minimizes training overhead and is able to perform recovery with no latency, thus minimizing storage requirements and lending itself to real-time applications. Various stages of the algorithm make use of dynamic programming and so can be efficiently implemented using dedicated hardware.
- Performance analysis of adaptive algorithms: Performed a unified analysis of a large class of adaptive algorithms. Analysis unifies and extends earlier analysis approaches; is able to predict stability and learning behavior of many adaptive algorithms very accurately. It allows the user to choose the adaptive algorithm best suited for a given application; applies regardless of type of nonlinearity employed in the algorithm and irrespective of the color or statistics of data driving the adaptive algorithm.

Design Engineer, *National Semiconductor,* Santa Clara, CA, Dr. Ahmad Bahai Summer, 2001
Winter, 2002

- Designed blind/semi-blind iterative algorithms for channel/data recovery for transmission over rapidly time-variant frequency-selective channels. Algorithm performs channel and data recovery with no latency while minimizing storage overhead. Work resulted in one patent, 2 journal articles, and 6 conference publications.

Research Scholar, *University of California at Los Angeles (UCLA)*, CA, Prof. Ali Sayed Summer, 1999

- Designed least-squares algorithm that combines, in an optimal manner, data arising from a finite collection of uncertain models. The algorithm can take into account data uncertainties with different sophistication levels. The algorithm demonstrated improved performance when it was applied to fusion of data arriving from a distributed network of sensors with varying degrees of reliability. The Algorithm was also applied to diversity combining of signals in the presence of microscopic or macroscopic fading.

- Developed adaptive algorithm with optimum error nonlinearity in the adaptation equation. Nonlinearity is a function of the pdf of the additive noise. Algorithm attains a lower steady-state error compared with adaptive algorithms employing other nonlinearities. Research resulted in 4 conference publications.

Summer Intern, *NEC Central Research Labs* Tokyo, Japan, Dr. Akihiko Sugiyama Summer, 98

- Carried out research on critically sampled filter banks. Designed and implemented a wide-band multirate acoustic echo canceller.

Graduate Assistant, *Georgia Institute of Technology,* GA, Prof. Guo Tong Zhou 1997-98

- Studied and analyzed algorithms for harmonic retrieval in the presence of additive and multiplicative noise. Algorithms use cyclostationary properties to recover harmonic frequencies and amplitudes from output data only, and are robust to the effect of noise regardless of its statistics.

TEACHING

Taught 6 undergraduate courses and a graduate courses

1. PYP 003: Enhancing Study Skills (Fall 2005, Fall 2006, Spring 2006)
2. EE 201: Electric Circuits (Fall 2005, Fall 2008, Fall 2009)
3. EE 315: Probability and Random Variables (Spring 2009)
4. EE 370: Communications Engineering (Fall 2005, Fall 2006, Spring 2006)
5. EE 400: Communications Networks (Fall 2007)
6. EE 411: Capstone Project Design (Fall 2005, Spring 2005)
7. EE 570: Stochastic Processes (Fall 2008)
8. EE 571: Digital Communications (Spring 2006, Fall 2007)
9. EE 662: Adaptive Filters and Applications (Spring 2006, Spring 2010, Spring 2012)
10. EE 242 (KAUST): Digital Communications and Coding (Fall 2009, Fall 2012, Fall 2013, Fall 2014)
11. EE 341 (KAUST): Information Theory (Spring 2015)
12. EE 392A (KAUST): Special Topics in Signal Processing (Compressed Sensing) (Spring 2012, Spring 2013)

GRADUATE STUDENTS & POST DOC's

M.S. Students

1. Ahmed Abdul Quadeer, KFUPM, Sep 2006 – Jun 2008
   Thesis: "(Semi) blind channel and data recovery in OFDM"
   Current Position: PhD student, HKUST, Hong Kong.
2. Muhammad Saqib Sohail, KFUPM, Sep 2006 – Jun 2008
   Thesis: "Adaptive algorithms for channel estimation: Using a priori information for optimal design"
   Current Position: PhD student, HKUST, Hong Kong.
3. Babar Khan, KFUPM, Sep 2007 – Dec 2009
   Thesis: "Application of random matrix theory in wireless communications and seismic signal processing"
   Current Position: Saudi Aramco.

4. Ebrahim Al-Safadi, KFUPM, Sep 2008 – May 2010
   Thesis: "Applications of compressive sensing for PAPR reduction in OFDM"
   Current Position: PhD student, University of Southern California, USA.

5. Alaa Dahman, KFUPM, Feb 2008 – Jun 2010
   Thesis: "Low complexity blind equalization of SISO systems with general constellations"
   Current Position: IBM Saudi Arabia.

6. Syed Faraz Ahmed, KFUPM, Sep 2008 – Feb 2011
   Thesis: "Novel compressive sensing techniques for channel estimation and deconvolution in UWB"
   Current Position: Research Institute, KFUPM.

7. Syed Rizwanullah Hussaini, KFUPM, Feb 2009 – Jun 2012
   Thesis: "(Semi) blind seismic deconvolution using orthogonal clustering"
   Current Position: Research Institute, KFUPM.

8. Damilola Sadiq Owodunni, KFUPM, Sep 2010 – Jun 2012
   Thesis: "Compressed Sensing Based Techniques for Estimation and Cancelation of Transmitters Nonlinear Distortions in OFDM Systems"
   Current Position: Saudi Telecom (STC) R&D, Riyadh, Saudi Arabia.

9. Abdullatif Al-Rabah, KAUST, May 2012 – May 2013
   Thesis: "A Bayesian approach to PAPR reduction in oversampled OFDM"
   Current Position: Saudi Telecom (STC) R&D, Riyadh, Saudi Arabia.

10. Hussain Shibli, KAUST, May 2012 – May 2013
    Thesis: "Compressed Sensing Based Approach to feedback reduction in broadcast and relay channels"
    Current Position: Researcher, King Abdullah City for Atomic and Renewable Energy, Riyadh, Saudi Arabia.

11. Khaled Al Hujaili, KFUPM, Sep 2012 – Jan 2014
    Thesis: "Majorization Properties of Adaptive Filters"
    Current Position: Lecturer, Taibah University, Al-Madinah, Saudi Arabia.

12. Majeed Khaqan, KFUPM, Feb 2013 – May 2014
    Thesis: "Localization of Indoor Wirless Signals"
    Current Position: Lab Instructor, Prince Mohammad Bin Fahd University (PMU), Al-Khobar, Saudi Arabia.

13. Anum Ali, KFUPM, Sep 2012 – Jun 2014
    Thesis: "Combating Impairments in OFDM Systems"
    Current Position: Research Engineer, KAUST, Saudi Arabia.

14. Abdallah Moubayed, KAUST, Sep 2012 May 2014
    Thesis: "Collaborative Multi-Layer Network Coding for Hybrid Cellular Cognitive Radio Networks"
    Current position: PhD student, University of Western Ontario, Canada

15. Shamail Al-Shuhail, KAUST, Feb 2013 – Jun 2015
    Thesis: "Compressed Sensing for PAPR Reduction and NBI Cancellation".

16. Taha Bouchoucha, KAUST, Sep 2013 – Sep.2015
    Thesis: "Waveform design for plannar MIMO radar"

17. Syed Awais Wahab Shah, KFUPM, Mar 2014 – Dec 2015
    Thesis: "Blind Deconvolution of MIMO Systems".

Ph.D. Students

18. Mudassir Masood, KAUST, Feb 2012 – Sep 2015
    Thesis: "Distribution Agnostic Bayesian Estimation of Sparse Signals".

19. Mohammed Eltayeb (co-advised), The University of Akron, Sep 2010 – Oct 2014
    Thesis: "Compressed Sensing for Feedback Reduction in Broadcast and Relay Networks"
    Current Position: Postdoc at UT Austin, USA.

20. Alam Zaib, KFUPM, Sep 2012 – present
    Thesis: "Channel Estimation in Massive MIMO"
    Expected: Sep 2016.

21. Furrukh Sana, KAUST, Sep 2012 – present
    Thesis: "Tracking of Sparse Signals"
    Expected: Sep 2016.

22. Laila Afify, KAUST, Sep 2012 – present
    Thesis: "Stochastic Geometry Modeling of the Uplink in Heterogeneous Networks"
    Expected: Sep 2016.

23. Hussain Ali, KFUPM, Apr 2013 – present
    Thesis: "Application of Compressed Sensing to MIMO Radar"
    Expected: Apr 2017.

24. Omer Mahmoud Elhag, KFUPM, Jan 2013 – present
    Thesis: "Synthetic Aperture Radar"
    Expected: Jan 2017.

25. Mohammad Tamim Alkhodary, KFUPM, June 2014
    Thesis: "Performance of Coded Channel Estimation for Ultra-Wideband M-ary Multiple Access Communications"
    Expected: Oct 2016.

26. Khalil Elkhalil, KAUST, Sep 2013 – present - (MS/PhD)
    Thesis: "Feedback Reduction in Relay Networks".

27. Ahmed Douik, KAUST, Sep 2013-present - (MS/PhD)
    Thesis: "Design and Optimization of (Distributed) Network Coding"

28. Oussama Dhifallah, KAUST, Aug 2014 – present - (MS/PhD)
    Thesis "Optimization of Heterogeneous Networks"

29. Mohamed Suliman, KAUST, Sep. 2014-present - (MS/PhD)
    Thesis: "UWB Multiuser Communication"

Postdoc's

30. Mohammed F. A. Ahmed, KAUST, Apr 2012 – Feb 2014
    Current Position: Postdoctoral Fellow, École de technologie supérieure (ETS) in Montreal, Canada.

31. Sameh Sorour, KAUST, Sep 2012 – Aug 2013
    Current Position: Assistant Professor, KFUPM, Saudi Arabia.

32. Tarig Ahmed, KAUST, Sep 2012 – present

33. Sian Jheng, KAUST, Apr 2014 – present.

34. Hayssam Dahrouj, KAUST, Apr 2014 – present.

Visiting Students

35. Nizar Ajeeb, American University in Beirut, Lebanon
    Sep 2012 – Dec 2012.
36. Ankit Udai, Indian Institute of Technology, India
    May 2014 – Jul 2014.
37. Ahmed Douik, SupCom, Tunis, Tunisia
    Feb 2013 – Jun 2013.
38. Taha Bouchoucha, SupCom, Tunis, Tunisia
    Feb 2013 – Jun 2013.
39. Oussama Dhifallah, SupCom, Tunis, Tunisia
    Feb 2014 – Jun 2014.
40. Mohammad Tamim Alkhodary, KFUPM, KSA
    Jun 2014 – Aug 2014.
41. Syed Awais Wahab Shah, KFUPM, KSA
    Jun 2014 – Aug 2014.

SERVICE

- Executive member of IEEE Education Society, Gulf Section (2007-2012)
- IEEE KFUPM Student Branch Counselor (2007-2012)
- Associate Editor for IEEE Transactions on Signal Processing (Aug 2013 - present)
- Reviewer for
  - IEEE Transactions Signal Processing
  - IEEE Transactions on Communications
  - IEEE Transactions on Wireless Communications
  - IEEE Transactions on Selected Areas in Communications
  - IEEE Transactions on Vehicular Technology
  - IEEE Signal Processing Letters
  - IEEE Communication Letters

AWARDS

- Best paper award in SmallNets'2015 workshop organized in conjunction with *IEEE International Conference on Communications (ICC'2015)*, London, UK.
- Almarai Award for Innovative Research in Communications 2009
- IEEE Education Society Chapter Achievement Award (Presented to the Gulf Chapter Officers) 2008
- Fulbright Scholar, Electrical Engineering Department, University of Southern California (USC) 2008
- Best student paper award, IEEE-EURASIP workshop on nonlinear signal and image processing 2001
- Recipient of Saudi scholarship for graduate studies at Georgia Institute of Technology and Stanford 1997
- Graduated with highest honors in Bachelor's degrees 1994

REFERENCES

Prof. Ali H. Sayed
University of California, Los Angeles (UCLA),
Electrical Engineering Dept.,
Engineering IV,
Los Angeles, CA 90095-1594
Tel: 310-267-2142
email: sayed@ee.ucla.edu

Prof. Babak Hassibi
California Institute of Technology (CalTech),
Electrical Engineering Dept.,
1200 East California Boulevard, MS 136-93,
Pasadena, CA 91125,
Tel: 626-395-4810
email: hassibi@caltech.edu

Prof. Giuseppe Caire
University of Southern California (USC),
Department of Electrical Engineering,
EEB 528, 3740 McClintock Ave,
Los Angeles, CA 90089
Tel: 213-740-4683
email: caire@usc.edu

Prof. Arogyaswami Paulraj
Stanford University,
Electrical Engineering Dept.,
Packard 232, 350 Serra Mall,
Stanford, CA 94305
Tel: 650-723-0002
email: apaulraj@stanford.edu

Prof. Naofal Al-Dhahir,
The University of Texas at Dallas,
Electrical Engineering Department,
PO Box 830688, Mail Station EC 33,
800 W. Campbell Road,
Richardson, TX 75083-0688
Tel : 972-883-4614
email: aldhahir@utdallas.edu

Prof. Merouane Debbah
SUPELEC,
Alcatel-Lucent Chair on Flexible Radio,
3 rue Joliot-Curie,
91192 GIF SUR YVETTE CEDEX,
France
Tel: +33-169-851-447
email: merouane.debbah@supelec.fr

THESES

1. T. Y. Al-Naffouri, "Adaptive algorithms for wireless channel estimation," Department of Electrical Engineering, Stanford University, Jan. 2005.

2. T. Y. Al-Naffouri, "Adaptive filtering using the least-mean mixed-norms algorithm and its application to echo cancellation," Department of Electrical Engineering, King Fahd University, Jul. 1997.

BOOK CHAPTERS

1. T. Y. Al-Naffouri, M. S. Saqib, and A. A. Quadeer, "Iterative forward-backward Kalman filtering for data recovery in (multiuser) OFDM communications," *Applications of Kalman Filters,* Intech , May 2010.

2. A. H. Sayed, T. Y. Al-Naffouri, and Vitor H. Nascimento "Energy conservation in adaptive filtering," *Nonlinear Signal and Image processing: Theory, Methods, and Applications,* CRC Press, 2003.

3. Ahmed Douik, Hayssam Dahrouj, Oussama Dhifallah, Tareq Y. Al-Naffouri, and Mohamed-Slim Alouini, "Coordinated Scheduling in C-RANs" *in Cloud Radio Access Networks: Principles, Technologies, and Applications,* Cambridge University Press, 2017.

JOURNAL PUBLICATIONS

95. Nasir Saeed, Abdulkadir Celik, **Tareq Y. Al-Naffouri**, and Mohamed-Slim Alouini, "Energy Harvested Empowered Underwater Optical Sensor Networks Localization", *Submitted to IEEE Transactions on Wireless Communications*.

94. O. Dhif-Allah, H. Dahrouj, **T. Y. Al-Naffouri**, and M.-S. Alouini, "Robust Beamforming for Cache-Enabled Cloud Radio Access Networks", *Submitted to IEEE Access*.

93. Khalil Elkhalil, Abla Kammoun, Romain Couillet, **Tareq Y. Al-Naffouri**, and Mohamed-Slim Alouini, "A Large Dimensional Analysis of Regularized Discriminant Analysis Classifiers", *Submitted to JMLR*.

92. Khalil Elkhalil, Abla Kammoun, **Tareq Y. Al-Naffouri**, and Mohamed-Slim Alouini, "Blind Measurement Selection: A Random Matrix Theory Approach", *Submitted to IEEE Trans. on Wireless Communications*.

91. H. Ali, S. Ahmed, **T. Y. Al-Naffouri**, M. S. Sharawi,, and M.-S. Alouini, "Reduced Complexity DOA and DOD Estimation for Moving Target in Bistatic MIMO Radar", *Submitted to IEEE Transactions on Signal Processing*.

90. O. Dhif-Allah, H. Dahrouj, **T. Y. Al-Naffouri**, and M.-S. Alouini, "Distributed Robust Power Minimization for the Downlink of Multi-Cloud Radio Access Networks", *Submitted to IEEE Transactions on Green Communications and Networking*.

89. M. F. A. Ahmed, T M. Emara, H. El-Sawy, S. Sorour, S. Al-Ghadhban, M.S. Alouini, and **T.Y. Al-Naffouri**, "Optimal Caching in 5G Networks with Opportunistic Spectrum Access", *Submitted to IEEE Transactions on Wireless Communications*.

88. A. Douik, S. Sorour, **T. Y. Al-Naffouri**, H.C. Yang, and and M.S. Alouini, "Delay Reduction in Multi-Hop Device-to-Device Communication using Network Coding", *Submitted to IEEE Transactions on Wireless Communications*.

87. Nasir Saeed, Abdulkadir Celik, **Tareq Y. Al-Naffouri**, and Mohamed-Slim Alouini, "Energy Harvesting Hybrid Acoustic-Optical Underwater Wireless Sensor Networks Localization", *Submitted to MDPI Sensors Journal*.

86. W. Xu, H. A. J. Alshamary, **T. Y. Al-Naffouri**, and A. Zaib, "Optimal non-coherent data detection for massive SIMO wireless systems: A polynomial complexity solution", *Submitted to IEEE. Trans. Info. Theory*.

85. F. Sana, Tarig Ballal, Maha Shadaydeh, I. Hoteit, and **T. Y. Al-Naffouri**, "Fetal ECG Extraction Exploiting Joint Sparse Supports in a Dual Dictionary Framework", *Submitted to Biomedical Signal Processing and Control*.

84. M. E. Eltayeb, **T. Y. Al-Naffouri**, and R. W. Heath, "Compressive Sensing for Millimeter Wave Antenna Array Diagnosis", in *IEEE Transactions on Communications*, Jan, 2018, Vol.PP, pp.1-1, Jan. 2018.

83. T. Ballal, M. A. Suliman, and **T. Y. Al-Naffouri**, "Bounded Perturbation Regularization for Linear Least Squares Estimation", in *IEEE Access*, Jan, 2017, Vol.5, pp.27551-27562, Jan. 2017.

82. A. Douik, H. Dahrouj, **T. Y. Al-Naffouri**, and M.-S. Alouini, "Distributed Scheduling/Signal-Level Coordination in Multi-Cloud Radio-Access Networks", in *in IEEE Transactions on Communications*, Jan, 2017, Vol., pp., Jan. 2017.

81. S. A. W. Shah, K. Abed-Meraim, and **T. Y. Al-Naffouri**, "Blind Source Separation Algorithms Using Hyperbolic and Givens Rotations for High-Order QAM Constellations", in *IEEE Transactions on Signal Processing*, Jan, 2017, Vol.PP, pp.1-1, Jan. 2017.

80. Khalil Elkhalil, Abla Kammoun, **Tareq Y. Al-Naffouri**, and Mohamed-Slim Alouini, "Fluctuations of the SNR at the output of the MVDR with regularized Tyler estimators", in *Signal Processing*, Jan, 2017, Vol.135, pp.1 - 8, Jan. 2017.

79. Shnaiwer, Y, Sorour, S, Sadeghi, P, Aboutorab, N, and **Al-Naffouri, T Y**, "Network-Coded Macrocell Offloading in Femtocaching-Assisted Cellular Networks", in *IEEE Transactions on Vehicular Technology*, Jan, 2017, Vol.PP, pp.1, Jan. 2017.

78. R. Arshad, H. ElSawy, S. Sorour, **T. Y. Al-Naffouri**, and M. S. Alouini, "Velocity-Aware Handover Management in Two-Tier Cellular Networks", in *IEEE Transactions on Wireless Communications*, Jan, 2017, Vol.16, pp.1851-1867, Jan. 2017.

77. A. Douik, H. Dahrouj, **T. Y. Al-Naffouri**, and M. S. Alouini, "Low-Complexity Scheduling and Power Adaptation for Coordinated Cloud-Radio Access Networks", in *IEEE Communications Letters*, Jan, 2017, Vol.21, pp.2298-2301, Jan. 2017.

76. M. E. Eltayeb, J. Choi, **T. Y. Al-Naffouri**, and R. W. Heath, "Enhancing Secrecy With Multiantenna Transmission in Millimeter Wave Vehicular Communication Systems", in *IEEE Transactions on Vehicular Technology*, Jan, 2017, Vol.66, pp.8139-8151, Jan. 2017.

75. O. Dhifallah, H. Dahrouj, **T. Y. Al-Naffouri**, and M. S. Alouini, "Decentralized SINR Balancing in Cognitive Radio Networks", in *IEEE Transactions on Vehicular Technology*, Jan, 2017, Vol.66, pp.3491-3496, Jan. 2017.

74. A. Douik, S. Sorour, **T. Y. Al-Naffouri**, and M. S. Alouini, "Rate Aware Instantly Decodable Network Codes", in *IEEE Transactions on Wireless Communications*, Jan, 2017, Vol.16, pp.998-1011, Jan. 2017.

73. K. Elkhalil, A. Kammoun, **T. Y. Al-Naffouri**, and M. S. Alouini, "Numerically Stable Evaluation of Moments of Random Gram Matrices With Applications", in *IEEE Signal Processing Letters*, Jan, 2017, Vol.24, pp.1353-1357, Jan. 2017.

72. A. Douik, S. Sorour, H. Tembine, **T. Y. Al-Naffouri**, and M. S. Alouini, "A Game-Theoretic Framework for Network Coding Based Device-to-Device Communications", in *IEEE Transactions on Mobile Computing*, Jan, 2017, Vol.16, pp.901-917, Jan. 2017.

71. A. K. Hassan, M. Moinuddin, U. M. Al-Saggaf, and **T. Y. Al-Naffouri**, "Performance Analysis of Beamforming in MU-MIMO Systems for Rayleigh Fading Channels", in *IEEE Access*, Jan, 2017, Vol.5, pp.3709-3720, Jan. 2017.

70. M. A. Suliman, A. M. Alrashdi, T. Ballal, and **T. Y. Al-Naffouri**, "SNR Estimation in Linear Systems With Gaussian Matrices", in *IEEE Signal Processing Letters*, Jan, 2017, Vol.24, pp.1867-1871, Jan. 2017.

69. R. Arshad, H. Elsawy, S. Sorour, M. S. Alouini, and **T. Y. Al-Naffouri**, "Mobility-Aware User Association in Uplink Cellular Networks", in *IEEE Communications Letters*, Jan, 2017, Vol.21, pp.2452-2455, Jan. 2017.

68. T. Bouchoucha, S. Ahmed, **T. Al-Naffouri**, and M. S. Alouini, "DFT-Based Closed-Form Covariance Matrix and Direct Waveforms Design for MIMO Radar to Achieve Desired Beampatterns", in *IEEE Transactions on Signal Processing*, Jan, 2017, Vol.65, pp.2104-2113, Jan. 2017.

67. A. Chaaban, O. M. S. Al-Ebraheemy, **T. Y. Al-Naffouri**, and M. S. Alouini, "Capacity Bounds for the Gaussian IM-DD Optical Multiple-Access Channel", in *IEEE Transactions on Wireless Communications*, Jan, 2017, Vol.16, pp.3328-3340, Jan. 2017.

66. H. Ghazzai, T. Bouchoucha, A. Alsharoa, E. Yaacoub, M. S. Alouini, and **T. Y. Al-Naffouri**, "Transmit Power Minimization and Base Station Planning for High-Speed Trains With Multiple Moving Relays in OFDMA Systems", in *IEEE Transactions on Vehicular Technology*, Jan, 2017, Vol.66, pp.175-187, Jan. 2017.

65. A. Douik, S. Sorour, **T. Y. Al-Naffouri**, and M. S. Alouini, "Decoding-Delay-Controlled Completion Time Reduction in Instantly Decodable Network Coding", in *IEEE Transactions on Vehicular Technology*, Jan, 2017, Vol.66, pp.2756-2770, Jan. 2017.

64. A. Douik, S. Sorour, **T. Y. Al-Naffouri**, and M. S. Alouini, "Instantly Decodable Network Coding: From Centralized to Device-to-Device Communications", in *IEEE Communications Surveys Tutorials*, Jan, 2017, Vol.19, pp.1201-1224, Jan. 2017.

63. Douik, Ahmed, Sorour, Sameh, **Al-Naffouri, Tareq Y.**, and Alouini, Mohamed-Slim, "Instantly decodable network coding for real-time device-to-device communications", in *EURASIP Journal on Advances in Signal Processing*, Jan, 2016, Vol.2016, pp.1, Jan. 2016.

62. A. Zaib, M. Masood, A. Ali, W. Xu, and **T. Y. Al-Naffouri**, "Distributed Channel Estimation and Pilot Contamination Analysis for Massive MIMO-OFDM Systems", in *IEEE Transactions on Communications*, Jan, 2016, Vol.64, pp.4607-4621, Jan. 2016.

61. S. J. Lin, **T. Y. Al-Naffouri**, Y. S. Han, and W. H. Chung, "Novel Polynomial Basis With Fast Fourier Transform and Its Application to Reed-Solomon Erasure Codes", in *IEEE Transactions on Information Theory*, Jan, 2016, Vol.62, pp.6284-6299, Jan. 2016.

60. M. Suliman, T. Ballal, A. Kammoun, and **T. Y. Al-Naffouri**, "Constrained Perturbation Regularization Approach for Signal Estimation Using Random Matrix Theory", in *IEEE Signal Processing Letters*, Jan, 2016, Vol.23, pp.1727-1731, Jan. 2016.

59. R. Arshad, H. Elsawy, S. Sorour, **T. Y. Al-Naffouri**, and M. S. Alouini, "Handover Management in 5G and Beyond: A Topology Aware Skipping Approach", in *IEEE Access*, Jan, 2016, Vol.4, pp.9073-9081, Jan. 2016.

58. **T. Y. Al-Naffouri**, M. Moinuddin, N. Ajeeb, B. Hassibi, and A. L. Moustakas, "On the Distribution of Indefinite Quadratic Forms in Gaussian Random Variables", in *IEEE Transactions on Communications*, Jan, 2016, Vol.64, pp.153-165, Jan. 2016.

57. I. B. Atitallah, A. Kammoun, M. S. Alouini, and **T. Y. Al-Naffouri**, "Optimal Design of Large Dimensional Adaptive Subspace Detectors", in *IEEE Transactions on Signal Processing*, Jan, 2016, Vol.64, pp.4922-4935, Jan. 2016.

56. F. Sana, K. Katterbauer, **T. Y. Al-Naffouri**, and I. Hoteit, "Orthogonal Matching Pursuit for Enhanced Recovery of Sparse Geological Structures With the Ensemble Kalman Filter", in *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, Jan, 2016, Vol.9, pp.1710-1724, Jan. 2016.

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2. **T. Y. Al-Naffouri**, A. Zerguine, and M. Bettayeb, "Convergence analysis of the LMS algorithm with a general error nonlinearity and an IID input", in *Conference Record of Thirty-Second Asilomar Conference on Signals, Systems and Computers (Cat. No.98CH36284)*, Jan, 1998, Vol.1, pp.556-559 vol.1, Jan. 1998.

1. **T. Y. Al-Naffouri**, A. Zerguine, and M. Bettayeb, "A unifying view of error nonlinearities in LMS adaptation", in *Acoustics, Speech and Signal Processing, 1998. Proceedings of the 1998 IEEE International Conference on*, Jan, 1998, Vol.3, pp.1697-1700 vol.3, Jan. 1998.

PATENTS

1. T. Y. Al-Naffouri and A. A. Quadeer, *Structure-based Bayesian sparse reconstruction,* US patent submitted.

2. K. Majeed, S. Sorour, T. Y. Al-Naffouri, S. Valaee, *RSS-Based Indoor Localization with No Deployment nor Update Efforts,* US patent submitted.

3. Muzammil Behzad, Mudassir Masoud, Tarig Ballal, Maha Shadaydeh, Tareq Y. Al-Naffouri *Image Denoising via Collaborative Support-Agnostic Recovery,* U.S. Patent Application filed.

4. Furrukh Sana, Tarig Ballal, T. Y. Al-Naffouri and Ibrahim Hoteit, *System and Method for Non-invasive Extraction of Electrocardiogram Signals,* U.S. Patent Application no. 62/433,504 filed on 13 Dec. 2016.

5. Rabe Arshad, Hesham ElSawy, Sameh Sorour, Tareq Y. Al-Naffouri, and Mohamed-Slim Alouini, *Reducing Handover Signaling in Dense Cellular Networks through Base Station Skipping,* provisionally filed in US Patent office, March 2016.

6. Furrukh Sana, Tarig Ballal, T. Y. Al-Naffouri and Ibrahim Hoteit, *Apparatus and Method for Wireless Monitoring Using Ultra-Wideband Frequencies,* U.S. Patent 9,532,735 issued on Jan. 3rd 2017.

7. Ahmed Syed Faraz, and Tareq Yousuf Al-Naffouri *Low-Complexity Method for Estimating Impulse-Radio UWB Wireless Channels,* U.S Patent 9,450,786, issued September 20, 2016.

8. Anum Ali, Damilola S. Owodunni, Oualid Hammi, T. Y. Al-Naffouri, *System and Method for Joint Compensation of Power Amplifier's Distortion,* U.S Patent 9,137,082, filed February 27, 2014, and issued September 15, 2015.

9. Zahid Saleem, Samir Alghadhban, and T. Y. Al-Naffouri *Peak Detection Method Using Blind Source Separation,* U.S Patent 8,958,750, filed September 12, 2013, and issued February 17, 2015.

10. Ebrahim A-Safadi and T.Y. Al-Naffouri, *Method of Performing Peak Reduction and Clipping Mitigation,* Patent publication number US 2014/8804862, USPTO.

11. T. Y. Al-Naffouri, N. Al-Dhahir, and M. S. Sohail, *OFDM inter-carrier interference cancelation method,* Patent publication number US 2011/0206148 A1, USPTO.

12. T. Y. Al-Naffouri, E. B. Al-Safadi, and M. E. Eltayeb, *OFDM Peak-to-Average Power Ratio Reduction Method,* Patent publication number US 8483296 B2, USPTO.

13. T. Y. Al-Naffouri, N. Al-Dhahir, and M. S. Sohail, *Method for mitigating interference in OFDM communications systems,* Patent publication number US 2011/0206148 A1, USPTO.

14. G. Caire, T. Y. Al-Naffouri, and A. A. Quadeer, *Method of estimating and removing noise in OFDM systems,* Patent publication number U.S. 8213525, USPTO.

15. T. Y. Al-Naffouri and A. A. Quadeer, *Cylic prefix-based enhanced data recovery method,* Patent publication number U.S. 8194799, USPTO.

16. G. Alrawi, A. Bahai, T. Y. Al-Naffouri, and J. Cioffi, *Coded OFDM system using error control coding and cyclic prefix for channel estimation,* US Patent No. 7,633,849.

STANDARD PROPOSALS

1. Erik Lidskog et. al., "Enhancement to space-time codes for 3 transmit antennas for the OFDMA PHY," Seoul, South Korea, Aug. 2004 (*accepted and incorporated into the IEEE 802.16e Standard*)

2. Erik Lidskog et. al., "Enhancements of the 4 transmit antenna rate 1 space-time code for the OFDMA PHY," Seoul, South Korea, Aug. 2004.

3. Erik Lidskog et. al., "Enhancements to 4 transmit antenna rate 2 space-time codes for the OFDMA PHY," Seoul, South Korea, Aug. 2004.

4. Erik Lidskog et. al., "Modified pilot allocation for downlink STC PUSC," Seoul, South Korea, Aug. 2004.

5. Erik Lidskog et. al., "Fast link adaptation feedback," Seoul, Korea, Aug. 2004.

6. Erik Lidskog et. al., "Modification to open-loop MIMO precoding," Seoul, South Korea, Aug. 2004.

7. Erik Lidskog et. al., "Modified pilot allocation for AMC and optional PUSC uplink subchannels for STC mode," Portland, OR, Jul. 2004.

8. Erik Lidskog et. al., "Enhancements of space-time codes for the OFDMA PHY," Portland, OR, Jul. 2004.

9. Erik Lidskog et. al., "Space-time codes for 3 transmit antennas for the OFDMA PHY," Portland, OR, Jul. 2004 (*accepted and incorporated into the IEEE 802.16e Standard*)

PROJECTS

KFUPM Funded

1. Channel Estimation for Massive MIMO Communication Systems, *funded by DSR, King Fahd University of Petroleum & Minerals*, May 2013 May 2015. (Principal Investigator)
2. Signal Strength based Indoor Localization with No Deployment Effort, *funded by DSR, King Fahd University of Petroleum and Minerals*, Dec 2013 May 2015. (Co-Investigator)
3. Statistical Characterization of Indefinite Quadratic Forms and their Applications, *funded by Deanship of Scientific Research, King Fahd University of Petroleum & Minerals,* May 2012 – Apr. 2013. (Principal Investigator)
4. A structured Bayesian approach for block sparisty recovery, *funded by Deanship of Scientific Research, King Fahd University of Petroleum & Minerals,* Jan. 2011 – Jul. 2012. (Principal Investigator)
5. Low Complexity Blind Equalization for SISO Systems with General Constellations, *funded by Deanship of Scientific Research, King Fahd University of Petroleum & Minerals,* Dec. 2011 – Nov. 2012. (Principal Investigator)
6. PAPR Reduction of OFDM Signals by Compressed Estimation, *funded by Deanship of Scientific Research, King Fahd University of Petroleum & Minerals,* Sep. 2010 – Aug. 2011. (Principal Investigator)
7. Blind channel estimation of OFDM system by relying on the Gaussian assumption of the input, *funded by Deanship of Scientific Research, King Fahd University of Petroleum & Minerals,* Mar. 2009 – May 2010. (Principal Investigator)
8. Using the Cyclic Prefix for Blind Equalization in OFDM, *funded by Deanship of Scientific Research, King Fahd University of Petroleum & Minerals,* Sep. 2008 – Nov. 2009. (Principal Investigator)
9. Broadcasting Data to Multiple User Groups: Information Theoretic Investigation of the Wide Band Case, *funded by Deanship of Scientific Research, King Fahd University of Petroleum & Minerals,* Jun. 2007 – Feb. 2009. (Principal Investigator)
10. Free Deconvolution for Seismic Applications, *Jointly Funded Project by L'Ecole Supérieure d'électricité (Supélec), Paris, France and King Fahd University of Petroleum & Minerals,* Jun. 2008 – Dec. 2008. (Co-Investigator)
11. The Effect of Spatial Correlation on the Capacity of Multi-Input Multi-Output Broadcast Channels with Partial Side Information, *funded by Deanship of Scientific Research, King Fahd University of Petroleum & Minerals,* Mar. 2007 – Jun. 2008. (Principal Investigator)
12. Enhancing Student Participation in Extra Curricular Activities and Interaction with the Faculty, *A Project of KFUPM's Strategic Plan,* Mar. 2007 – Jun. 2008. (Co-investigator)
13. Frequency Domain Estimation of Time Variant Channels in OFDM, *Junior Faculty Project, funded by Deanship of Scientific Research, King Fahd University of Petroleum & Minerals,* Sep. 2006 – Aug. 2007. (Principal Investigator)
14. Establishing Entrepreneurial and Value-added Programs, *A Project of KFUPM's Strategic Plan,* Mar. 2006 – Jun. 2007. (Co-investigator)
15. Online Development of the Undergraduate Communication Engineering Course, *funded by Deanship of Academic Development, King Fahd University of Petroleum & Minerals,* May 2006 – Jun. 2007. (Co-investigator)

Annual King Abdul-Aziz City of Science and Technology (KACST) and National Science, Technology, and Innovation Plan (NSTIP) funded projects

1. Improving the performance of an Ultrasonic/Passive Infrared-based Urban Flood Sensor Network, *submitted to National Science, Technology, and Innovation Plan (NSTIP),* submitted (US$ 310,200) (Principal Investigator)
2. Performance of Distributed Estimation of Unknown Parameters in WSNs with Practical Wireless Channel and Observation Models, funded by King Abdul-Aziz City of Science and Technology, Sep 2014 – Sep 2016 (US$ 132,712). (Principal Investigator)
3. Compressive Sensing for Feedback Reduction in MIMO Broadcast Channels, *funded by National Science, Technology, and Innovation Plan (NSTIP),* Jun. 2010 – Jun. 2012. (Co-investigator)
4. Distributed localization of impulsive acoustical sources algorithms and prototype implementation, *funded by National Science, Technology, and Innovation Plan (NSTIP),* Jun. 2010 – Jun. 2012. (Co-investigator)
5. Narrow Band Interference Cancellation in MIMO-OFDM systems using Compressed Sensing, *funded by National Science, Technology, and Innovation Plan (NSTIP),* June 2010 – May 2012. (Co-investigator)
6. Wireless Network Optimization and Planning for WiMAX, *funded by King Abdul-Aziz City of Science and Technology,* Jun. 2009 – Jun. 2011. (Co-Investigator)
7. Estimation of Time-Variant Channels and ICI Cancellation in OFDM, *funded by King Abdul-Aziz City of Science and Technology,* Dec. 2007 – Dec. 2009. (Principal Investigator)

Industrial Projects

1. Estimation and cancellation of impulsive noise in DSL lines, *funded by Saudi Telecom Company (STC),* Sep. 2009 May 2010. (Principal Investigator)
2. The Near-Surface Seismic Investigation Consortium, *A Consortium Funded by Saudi Aramco and Schlumberger,* Jan. 2007 - Jan. 2008. (Co-investigator)

KAUST Funded

1. Achieving Full Potentials of Massive MIMO Systems: Theories and Algorithms, March 2015-Feb. 2016, (US$ 1,079,500).
2. Advanced Public Safety Communication Infrastructure for the Middle East, Sep 2012– Sep 2014 (US$ 592,650). (Co-investigator)
3. Energy and Spectrum Efficient Passive Radar for Detection and Imaging, Jan 2014 – Jan 2017 (US$ 541,531). (Co-investigator)

TALKS

1. "Distribution Agnostic Structured Sparsity Recovery: Algorithms and Applications," *Univ. de Nice Sophia-Antipolis,* Nice, Apr. 21, 2016.
2. "Ultra-wideband Communications and Localization: Challenges and Solutions," *KAUST-NSF Conference,* KAUST, Mar. 16, 2016.
3. "Bounded Perturbation Regularization for Linear Least Squares Inverse Problems," *Earth Sciences Seminar,* KAUST, Feb. 24, 2016.

4. "Bounded perturbation regularization for linear least squares inverse problems," *Information Theory and Applications Symposium,* San Diego, Feb. 4, 2016.

5. "Distribution Agnostic Structured Sparsity Recovery: Algorithms and Applications," *Department of Computer Science Colloquiumm Western Michigan University,* Jan. 26, 2016.

6. "Distribution Agnostic Structured Sparsity Recovery: Algorithms and Applications," *Technische Universität,* Darmstadt, Germany, Oct 15, 2014.

7. "Distribution Agnostic Structured Sparsity Recovery: Algorithms and Applications," *Hungarian Academy of Sciences, Institute for Computer Science and Control,* Budapest, Hungary, July 23, 2014.

8. "Distribution Agnostic Structured Sparsity Recovery: Algorithms and Applications," *Alcatel-Lucent Bell Labs,* Paris, France, Jun 19, 2014.

9. "Distribution Agnostic Structured Sparsity Recovery: Algorithms and Applications," *Technische Universität,* München, Germany, Jun 11, 2014.

10. "An Introduction to (Bayesian) Compressed Sensing with Applications in Communication, Signal and Image Processing," *Université Paris-Est Marne-La-Vallée,* Paris, France, May 31, 2014.

11. "Bayesian Sparse Recovery: A Distribution Agnostic Approach with Applications," *VCC Summit, King Abdullah University of Science and Technology,* Thuwal, Saudi Arabia, Apr 14, 2014.

12. "An Introduction to (Bayesian) Compressed Sensing with Applications in Communication and Signal Processing," *TexasA&M University,* Qatar, Mar 31, 2014.

13. "Bayesian Sparse Recovery: A Distribution Agnostic Approach with Applications to PAPR Reduction in OFDM and Massive MIMO," *INPT,* Rabat, Morocco, Mar 20, 2014.

14. "An Introduction to (Bayesian) Compressed Sensing with Applications in Communication and Signal Processing," *SS5G 2014, SupCom,* Tunisia, Mar 17, 2014.

15. "Bayesian Sparse Recovery: Distribution Agnostic Approach with Applications to PAPR Reduction in OFDM and Massive MIMO," *King Abdullah University of Science and Technology,* Thuwal, Saudi Arabia, Feb 8, 2014.

16. "Impulse Noise Estimation and Cancellation in OFDM Systems," *ASSIA,* Santa Clara, CA, Apr. 4, 2013.

17. "Receiver-Based Bayesian PAPR Reduction in OFDM," *Qualcomm,* Santa Clara, CA, Apr. 5, 2013.

18. "Structured Sparsity: Bayesian Recovery Algorithms and Applications," *Keynote speech, WOSSPA,* Algeries, Algeria, May 2013.

19. "Distribution Agnostic Structured Sparsity Recovery Algorithms and Applications," *SupCom,* Tunisia, May 17, 2013.

20. "Structured Sparsity: Bayesian Recovery Algorithms and Applications," *University of Toronto,* June 6, 2013.

21. "Structured Sparsity: Bayesian Recovery Algorithms and Applications," *University of Ontario Institute of Technology,* June 12, 2013.

22. "Structured Sparsity: Bayesian Recovery Algorithms and Applications," *École Polytechnique de Montréal,* Montreal, June 13, 2013.

23. "Structured Sparsity: Bayesian Recovery Algorithms and Applications," *Georgia Institute of Technology,* June 17, 2013.

24. "Structured Sparsity: Bayesian Recovery Algorithms and Applications," *The University of Akron,* Akron, Ohio, June 20, 2013.

25. "Bayesian Estimaton of Sparse Signals with Applications in Signal Processing and Communications," *A tutorial at EUSIPCO,* Marrakesh, Sep. 9, 2013.

26. "A Bayesian Approach to multi-channel (Blind) Deconvolution," *KFUPM-GA Tech workshop, King Fahd University of Petroleum and Minerals (KFUPM),* Dhahran, Saudi Arabia, Dec. 17, 2012.

27. "Compressed Sensing: An overview and an application to Seismic Deconvolution," *Earth Sciences Seminar, King Abdullah University of Science and Technology (KAUST),* Thuwal, Saudi Arabia, Nov. 6, 2012.

28. "Structure Based Bayesian Sparse Reconstruction," *Electrical Engineering Department, University of Akron,* Akron, Ohio August 24, 2012.

29. "Structure Based Bayesian Sparse Reconstruction," *Electrical Engineering Department Northwestern University,* Evanston, IL, July 11, 2012.

30. "Structure Based Bayesian Sparse Reconstruction," *Electrical Engineering Department American University of Beirut,* Lebanon, May 11, 2012.

31. "Combating Impairments of OFDM Systems: A Model Reduction Approach," *Electrical Engineering Department King Abdullah University of Science and Technology (KAUST),* Thuwal, Saudi Arabia, Jan. 4, 2012.

32. "Combating Impairments of OFDM Systems Electrical Engineering Department," *Masdar Institute,* Abu Dhabi, United Arab Emirates, Oct. 13, 2011.

33. "Progress in Collaboration between KFUPM & KAUST," *KFUPM's International Advisory Board at KAUST,* Thuwal, Saudi Arabia, Jan. 12, 2010.

34. "A Model Reduction Approach for OFDM Channel Estimation Under High Mobility Conditions" Electrical Engineering Department, *King Fahd University of Petroleum and Minerals* Mar. 1, 2011

35. "An Overview of KFUPM" *King Abdullah University of Science & Technology* Dec. 1, 2010

36. "Combating Some Impairments of OFDM Systems: A Model Reduction Approach" *Electrical Engineering Department, Stanford University* Aug. 30, 2010

37. "The Potential of Compressive Sensing in (Seismic) Signal Processing" *Workshop on KFUPM-GA Tech Joint Research Program, King Fahd University of Petroleum and Minerals* Jun. 21, 2010 [Abstract]

38. "Indefinite quadratic forms in Gaussian random variables: Distribution, scaling, and applications," *Electrical Engineering Department, Texas A & M Qatar,* Jun. 3rd, 2009.

39. "Writing with two languages: $yMb0ls & Words" *Electrical Engineering Department, King Fahd University of Petroleum and Minerals,* Apr. 7, 2009.

40. "Indefinite quadratic forms in Gaussian random variables: Distribution, scaling, and applications," *Electrical Engineering Department, American University of Beirut,* Feb. 19, 2009.

41. "An Overview of Research Interests and Contributions," *KFUPM's International Advisory Board, SABIC Head Quarters,* Riyadh, Saudi Arabia Jan. 12, 2009.

42. "Indefinite quadratic forms in Gaussian random variables: Distribution, scaling, and application to the broadcast channel," *Electrical Engineering Department, University of Texas at Dallas,* TX, Sep. 4, 2008.

43. "Indefinite quadratic forms in Gaussian random variables: Distribution, scaling, and application to the broadcast channel," *Electrical Engineering Department, Smart Antenna Research Group, Stanford University,* CA, Aug. 22, 2008.

44. "Scaling laws of multiple antenna (group) broadcast channels," *Electrical Engineering Department, University of California at Irvine,* CA, Jun. 18, 2008.

45. "Scaling laws of multiple antenna (group) broadcast channels," *Electrical Engineering Department, University of Southern California,* CA, Feb. 20, 2008.

46. "(Semi) blind channel identification and equalization in OFDM," *Babak Hassibi's Research Group, Electrical Engineering Department, California Institute of Technology,* Pasadena, CA, Feb. 15, 2008.

47. "Scaling laws of multiple antenna group-broadcast channels," *Ecole Supérieure dÉlectricité (Supélec),* Paris, France, Jul. 6, 2007.

48. "How much does correlation affect the sum-rate of MIMO downlink channels?" *Institute Eurcom, Sophia-Antipolis,* France, Jun. 21, 2007.

49. "The potential of adaptive filtering for seismic signal processing," *Research Institute, King Fahd University of Petroleum and Minerals,* Dhahran, Saudi Arabia, May 15, 2007.

50. "Broadcasting data to multiple user groups: Information theoretic investigation of the wide band case," *Electrical Engineering Department, King Fahd University of Petroleum and Minerals,* Dhahran, Saudi Arabia, May 1st, 2007.

51. "Opportunistic scheduling in wireless networks: An overview of issues and design considerations," (jointly with Dr. Yahya Al-Harthi (KFUPM) and Dr. Mohamed-Slim Alouini (Texas A & M Qatar), Tutorial at the *International Symposium on Signal Processing and its Applications (ISSPA 2007),* Sharjah, UAE, Feb. 11, 2007.

52. "Employing undergraduates as teaching assistants at KFUPM," *Deanship of Academic Development, Center of Teaching and Learning, King Fahd University of Petroleum and Minerals,* Dhahran, Saudi Arabia, Jan. 16, 2007.

53. "The effect of spatial correlation on the capacity of MIMO broadcast channels with partial side information," *Electrical Engineering Department, King Fahd University of Petroleum and Minerals,* Dhahran, Saudi Arabia, Jan. 13, 2007.

54. "How much does correlation affect the sum-rate of MIMO downlink channels? *Electrical Engineering Department, Imperial College,* London, UK, Nov. 23, 2006.

55. "A unified approach to mean-square analysis of adaptive filters," *Electrical Engineering Department, King Fahd University of Petroleum and Minerals,* Dhahran, Saudi Arabia, Nov. 20, 2006.

56. "How much does correlation affect the sum-rate of MIMO downlink channels?" *Research Department, Intel Corporation,* Santa Clara, CA, Aug. 22, 2006.

57. "Broadcasting data to multiple user groups: An information theoretic investigation," *Babak Hassibi's Research Group, Electrical Engineering Department, California Institute of Technology,* Pasadena, CA, Jul. 29, 2006.

58. "A framework for the estimation of time-variant channels in OFDM," *Delft Technical University,* Delft, the Netherlands, Jun. 9th, 2006.

59. "A forward backward Kalman for the estimation of time-variant channels in OFDM," *Electrical Engineering Department, King Fahd University of Petroleum and Minerals,* Dhahran, Saudi Arabia, Nov. 16, 2005.

60. "A framework for the estimation of time-variant channels in OFDM," *the University of New Louvain,* Belgium, Nov. 2nd, 2005.

61. "A unified approach to mean-square analysis of adaptive filters," *the University of New Louvain,* Belgium, Nov. 2nd, 2005.

62. "A framework for the estimation of time-variant channels in OFDM," *Telecommunications Research Center,* Vienna, Austria, Oct. 28, 2005.

63. "Wireless broadband networks–WIMAX: A contrast and a complement to WiFi," (jointly with Dr. Salam Zummo) *Internet and Communications Engineering Technical Exchange Meeting (e-CETEM), Saudi Aramco,* Dhahran, Saudi Arabia, Sep. 19, 2005.

64. "A unified approach for transient analysis of adaptive filters," *Babak Hassibi's Research Group, Electrical Engineering Department, California Institute of Technology,* Pasadena, Mar. 25th, 2005.

65. "Receiver design for MIMO-OFDM transmission over time-variant frequency selective channels," Standards Group, *Qualcomm Corporation,* San Diego, Jun. 18th, 2004.

66. "Receiver design for MIMO-OFDM transmission over time-variant frequency selective channels," Communications Systems Lab., *Texas Instruments,* Dallas, TX, Feb. 23, 2004.

67. "Adaptive semi-blind receiver for MIMO-OFDM transmission," *ATHEROS Communications,* Sunnyvale, CA, Dec. 23, 2003.

68. "Receiver design for MIMO OFDM transmission over time-variant channels," *TZero Technologies Inc.,* Sunnyvale, CA, Jan. 27, 2004.

69. "An OFDM receiver for MIMO OFDM transmission over wireless channels," *Intel Corporation*, Sunnyvale, CA, Dec. 19, 2003.

70. "A semi-blind algorithm for OFDM transmission over wireless channels," *Stanford Networking Research Group,* Stanford University, Apr. 10, 2003.

71. "Adaptive algorithms for wireless channel estimation" Qualcomm Technology Ventures," *Qualcomm Corporation,* San Diego, Apr. 3, 2003.