

Ibrahim Y. Abualhaol, Ph.D. Candidate

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Objective

A successful scientist with innovative wireless system designs

Professional Experience

- [1] ➤ **Research Assistant, 2005 – Present , University of Mississippi, University, MS 38677, USA**
 - Digital signal processing for MIMO/OFDM wireless communication systems
 - Efficient resource-allocation techniques for cooperative MIMO/OFDM systems
 - Performance analysis and optimization of cooperative Relay-based wireless communication systems
 - Investigating the capacity of MIMO system over Weibull and Nakagami-m fading channels
 - Performance evaluation of high speed cooperative UAV networks in terms of the achievable throughput, spectral efficiency, and reliability
 - Application and performance analysis of Alamouti scheme in cooperative relay-based wireless systems
 - Hybrid Turbo FEC/ARQ systems and distributed space-time coding for cooperative transmission

- [2] ➤ **Teacher Assistant, 2005 – Present , University of Mississippi, University, MS 38677, USA**
 - Engineering Analysis I (Engr 310) (grading assignments and help sessions)
 - Engineering Analysis II (Engr 410) (grading assignments and help sessions)
 - Digital Communications (TC 535) (help sessions)
 - Random Signals (ELE 391) (help sessions)

- [3] ➤ **Lecturer, 2004-2005, Taif Institute of Technology, Taif, Saudi Arabia**
 - Electronic Circuits I & II (junior students)
 - Circuit Analysis I & II (junior students)
 - Signals and Systems (sophomore students)

- [4] ➤ **Teacher Assistant, 2002-2004, Jordan University of Science & Technology, Irbid, Jordan**
 - Microwave Circuits & Devices Lab (senior students)
 - Digital Communications Lab (senior students)
 - Analog Communications Lab (sophomore students)
 - Electronic Circuits Lab (junior students)

- [5] ➤ **Network Engineer, 2000-2002, Institute of Science & Telecommunication, Riyadh, Saudi Arabia**
 - Local Cisco Academy instructor (training and support)
 - Cisco CCNA courses (training and support)
 - IP telephony (Training)
 - University network (planning, management, support and troubleshooting)
 - Interconnecting Cisco Network Devices (Operations & Configuration)
 - ISDN remote access link (Operations & configuration)

Research Interests

Digital Signal Processing for Communication Systems, Cooperative Networks, Diversity Techniques, Resource Allocation and Scheduling for Multi-user Mobile Wireless Networks, MIMO, OFDM, OFDMA, MC-CDMA, Channel Coding and Information Theory, Beyond 3G Systems, Practical System Architecture Design.

Projects and Technical Areas

- **UAV Communications for Disaster Surveillance:** Developing an advanced communication system for the purpose of disaster surveillance that have both error-free and minimum delay in getting information.
- **Best Hopping Sequence Selection Protocol (BHSSP):** Developing MATLAB/SIMULINK simulation of BHSSP to achieve the required transmission rate by employing the best and sufficient number of sub-channels and turn off the other sub-channels which results in extension of the UAV battery life.
- **Adaptive Power Control Protocol (APCP):** Developing MATLAB/SIMULINK/C++ simulation and hardware implementation of APCP to adapt the transmitted power of multi-carriers system such that the received SINR lies near the lower pin of the adaptive M-QAM modulation and convolutional coding interval of service.
- **Communication Loss Recovery Protocol (CLRP):** Developing MATLAB/C++ simulation to adapt the received signal power by changing the UAV mission trace to overcome the sudden interference and/or weather conditions.
- **Channel State Detection Protocol (CSDP):** In this project, a predefined trial sequence over each sub-channel in Multi-carriers system is proposed to estimate the CSI by calculating the BER and map it to the corresponding SINR.
- **Convolutional coding and Viterbi decoding:** Developing MATLAB/C simulation and FPGA implementation of convolutional encoder and Viterbi decoder.
- **Multi-User Cooperative Network:** Performance analysis of Multi-user cooperative diversity in cellular-based communication system.
- **OFDM for wireless networks:** Orthogonal Frequency Division Multiplexing using adaptive M-QAM and DPSK based communication system was simulated in MATLAB/C and studied against its tolerance to multi-path delay spread and channel SNR.
- **Crosslayer design for cooperative wireless network:** This project is focused towards providing a cross layer design with a more realistic physical layer model for cooperative networks. MIMO-OFDM capable nodes are considered in the design.
- **Email classifications:** In this project, the emails are classified into set of classes using the Bayes and the nearest neighbor (NN) classifiers. The estimation of classifier parameters was done using maximum a posterior probability (MAP) and term frequency–inverse document frequency (TFIDF) for the Bayes classifier and NN weights, respectively.
- **Image classifications:** In this project, a bag of keypoints approach motivated by analogy to learning methods using bag of words representation for text categorization is presented. The classification of twenty categories is achieved using k-means square-error partitioning method with Naive Bayes classifier. To categorize a new image, Bayes's rule was applied to take the largest posteriori score to predict the image category. Half of images set were used as training data to estimate the classifier parameters and the other half used to calculate the classifier performance in term of the number of misclassifications.
- **Electronics design:** Digital electronics, analog electronics, amplifier design, Opamp applications, DAC and ADC design.
- **Huffman source encoding:** Huffman: ANSI C implementation of canonical Huffman codes.

Education

2005 – Present, University of Mississippi, University, MS 38677, USA

- Ph.D. Candidate, Electrical Engineering
- GPA 4.0/4.0
- Dissertation: “Performance Evaluation and Optimization of Cooperative Communication Systems over Fading Channels”
- Committee: Mustafa Matalgah (Associate Prof., Chair), John Daigle (Prof.), Allen Glisson (Prof.), William Staton (Prof.)

2002-2004, Jordan University of Science & Technology, Irbid, Jordan

- M. Sc., Electrical and Electronics Communications Engineering
- Graduated first on a class of 20 students
- GPA 84 %
- Thesis: “Application of Fast Frequency Hopping in Short Range Wireless Communication Network”

1995-2000, Jordan University of Science & Technology, Irbid, Jordan

- B.Sc. with Highest Honors, Electrical and Electronics Communications Engineering
- Graduated second on a class of 170 students
- GPA 84.4 %
- Project: “Performance Study of DS-CDMA in Multi-user Optical Fiber Communication Network”

Awards Received

- IEEE Globecom 2007 Student Travel Grant Award (November 2007, Washington D.C., USA)
- University of Mississippi competitive Graduate School Summer Assistantship Award (summer 2007, USA)
- University of Mississippi Graduate Assistantship, Electrical Engineering, Ph.D. program, (2002–Present, USA)
- Jordan University of Science & Technology Graduate Assistantship, Electrical Engineering, Master program (2002–2004, Irbid, Jordan)
- The Best Instructor Award based on the votes of the students at the Institute of Telecommunication and Technology (2001, Riyadh, Saudi Arabia)

Technical Skills

- Operating Systems: DOS, Windows XP, LINUX (Fedora, Ubuntu)
- High Level Languages: C, C++, MATLAB, SIMULINK
- Software: MS-OFFICE, Adobe Photoshop
- Computational Software: MATHCAD, MATHMATICA
- Web Languages: HTML, Macromedia Dreamweaver
- Basic equipments: Oscilloscopes, Voltmeters, Function Generators, Dynamic Signal Analyzers
- Microprocessor: Motorola 68000
- Data acquisition: LabView, MATLAB Real-time Workshop

Memberships

- Sigma Xi, The Scientific Research Society(April 2008 – Present)
- Honor Society of Phi Kappa Phi (August 2006 – Present)
- Institute of Electrical and Electronics Engineers (IEEE) (March 2005 – Present)
- Jordan Engineers Association (April 2000 – Present)

Professional Activities

- Graduate student representative to the Engineering Advisory Board (EAB) meeting (Fall 2007, University of Mississippi, USA).
- Reviewer for IEEE Transactions on Vehicular Technology Journal (December 2007)
- Reviewer for IEEE International Conference on Communications (ICC)(24-28 June 2007, Glasgow, Scotland)
- Reviewer for IEEE Vehicular Technology Conference (VTC)(22 -25 April 2007, Dublin, Ireland)
- Reviewer for IEEE Wireless Communication & Networking Conference (WCNC)(11-15 March 2007, Hong Kong)
- Reviewer for IEEE Wireless Communication & Networking Conference (WCNC) (31 March-3 April 2008, Las Vegas, USA)

Publications

Book Chapter

Ibrahim Abualhaol and Mustafa Matalgah, "Performance Evaluation and Optimization of MIMO-OFDM Cooperative Communication Systems over Fading Channels," *Cooperative Communications for Improved Wireless Network Transmission*, edited by Murat Uysal, IGI Global, USA, May 2008

Journals

- [1] Ibrahim Abualhaol and Mustafa Matalgah, "Gaussian-Finite-Mixture Capacity Analysis of MIMO System over Weibull Fading Channels," to be submitted to *IET Communications* (formerly, *IEE Proceedings – Communications*)
- [2] Ibrahim Y. Abualhaol and Mustafa M. Matalgah, "Throughput Optimization of Cooperative Teleoperated UGVs Network," to be submitted to *IEEE Transactions on Vehicular Technology*
- [3] Ibrahim Y. Abualhaol and Mustafa M. Matalgah, "Adaptive Subchannel-Division Protocols for Cooperative Relay-Based MIMO/OFDM Wireless Communication Systems," to be submitted to *IEEE Transaction on Wireless Communication*
- [4] Ibrahim Y. Abualhaol and Mustafa M. Matalgah, "Performance Analysis of Cooperative Relay-Based Wireless Systems over Fading Channels," submitted to the *IEEE Transactions on Vehicular Technology* (Identification Number: VT-2008-00353, April 22, 2008)
- [5] Ibrahim Y. Abualhaol and Mustafa M. Matalgah, " Performance Analysis of Cooperative Multi-Carrier Relay-Based UAV Network Over Generalized Gaussian-Finite-Mixture Fading Channels," Submitted to the *IEEE Transaction on Aerospace and Electronic Systems* (Identification Number: TAES-200700354, November 23, 2007)

Conferences

- [1] Ibrahim Y. Abualhaol and Mustafa. M. Matalgah, "Subchannel-Division Adaptive Resource Allocation Technique for Cooperative Relay-Based MIMO/OFDM Wireless Communication Systems," *To appear in the Proceedings of the 2008 IEEE Wireless Communications and Networking Conference (IEEE WCNC 2008)*, March 31– April 3 2008, Las Vegas, NV, USA.
- [2] Ibrahim Y. Abualhaol and Mustafa. M. Matalgah "Capacity Analysis of MIMO System Over Nakagami-m Fading Channels Using Finite Mixture with Expectation Maximization Algorithm" *To appear in the Proceedings of the 2008 IEEE International Conference on Computer Systems and Applications (AICCSA-08)*, March 31- April 4 2008, Doha, Qatar.
- [3] Ibrahim Y. Abualhaol and Mustafa M. Matalgah, "End-to-End Performance Analysis of Cooperative Relay-Based Wireless System Over Generalized Gaussian-Finite-Mixture Fading Channels," *To appear in the Proceedings of the 50th Annual IEEE Global Communications Conference (IEEE GLOBECOM 2007)*, pp. 3942–3947, 26–30 November 2007, Washington, DC, USA.
- [4] Ibrahim Y. Abualhaol and Mustafa M. Matalgah, "Capacity Analysis of MIMO System Over Identically Independent Distributed Weibull Fading Channels," *In the Proceedings of the 2007 IEEE International Conference on Communications (IEEE ICC 2007)*, pp. 5003–5008, 24–28 June 2007, Glasgow, Scotland, UK.
- [5] Ibrahim Y. Abualhaol and Mustafa M. Matalgah, "Performance Analysis of Multi-User Cooperative Diversity in Cellular-Based Communication System," *In the Proceedings of the 2007 Mid-South Area Engineering and Science Conference (MAESC 2007)*, 17–18 May, 2007, The University of Mississippi, Oxford, MS, USA.
- [6] Ibrahim Y. Abualhaol, and Mustafa M. Matalgah, "Outage Probability Analysis in a Cooperative UAVs Network Over Nakagami-m Fading Channels," *In Proceedings of the 2006 IEEE 64th Semiannual Vehicular Technology Conference (IEEE VTC 2006 Fall)*, Digital Object Identifier 10.1109/VTCF.2006.564, pp. 1–4, 25–28 September 2006, Montreal, Canada.
- [7] Ibrahim Y. Abualhaol and Mustafa M. Matalgah, "Throughput Optimization of Cooperative UAVs Using Adaptive Channel Assignment," *In Proceedings of the 2006 IEEE Wireless Communications and Networking Conference (IEEE WCNC 2006)*, vol. 4, pp. 2279 – 2284, Las Vegas, NV, 3 – 6 April 2006.

Abstracts

- [1] Ibrahim Y. Abualhaol and Mustafa M. Matalgah, "Probability of Error Based Channel State Detection Protocol for Updating Channel State Information in Wireless Communication Systems," *Abstract: Journal of the Mississippi Academy of Sciences*, vol. 52, no. 1, pp 134, January 2007; Presentation: The Seventy-first Mississippi Academy of Sciences Annual Meeting, Starkville, MS, February 21-23, 2007 (Presentation Day February 23).
- [2] Ibrahim Y. Abualhaol, Mustafa M. Matalgah, and Atef Z. Elsherbeni, "Adaptive Power Control Protocol for Multi-Carrier Wireless Communication Systems," *Abstract: Journal of the Mississippi Academy of Sciences*, vol. 52, no. 1, pp 133, January 2007; Presentation: The Seventy-first Mississippi Academy of Sciences Annual Meeting, Starkville, MS, February 21-23, 2007 (Presentation Day February 23).

Abstracts

- [3] Ibrahim Y. Abualhaol and Mustafa M. Matalgah, "Capacity Analysis Of Multi-User Cooperative Diversity In Cellular-Based Communication System," Abstract and Poster, *The University of Mississippi Chapter of Sigma XI - The Annual Sigma XI Student Research Poster Symposium and Competition*, March 26, 2007.
- [4] Ibrahim Abualhaol and Mustafa M. Matalgah, "Outage Probability Analysis in a Cooperative UAVs Network Over Rayleigh And Nakagami-M Fading Channels," *Abstract: Journal of the Mississippi Academy of Sciences*, vol. 51, no. 1, pp. 97, January 2006; Presentation: The Seventieth Mississippi Academy of Sciences Annual Meeting, Vicksburg, MS, February 22-24, 2006.

References

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