

# Dr. Yahya S. Al-Harhi

Riyadh, Saudi Arabia  
Dr.Harhi@Gmail.com | www.Harhi.net  
+966 502711110

## EDUCATION

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- December 2005    **UNIVERSITY OF MINNESOTA**    Minneapolis, MN  
*Doctor of Philosophy (PhD) in Electrical Engineering*  
• Thesis Title: **On Opportunistic Scheduling and Adaptive Modulation in Wireless Communications.**
- January 2002    **GEORGE WASHINGTON UNIVERSITY**    Washington D.C.  
*Master of Science (MSc.) in Electrical Engineering*
- May 1996    **KING FAHD UNIVERSITY OF PETROLEUM & MINERALS**    Dhahran, Saudi Arabia  
*Bachelor of Science (BSc.) in Electrical Engineering*  
• Project Title: **Image Restoration Techniques.**

## ACADEMIC EXPERIENCE

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### Appointments

- 2006-2009    **KING FAHD UNIVERSITY OF PETROLEUM & MINERALS**    Dhahran, Saudi Arabia  
*Assistant Professor, Electrical Engineering Department*
- 2006-2007    *Communications Research Group Coordinator, Electrical Engineering Department*
- 2002    *Graduate Assistant Research Group Coordinator, Electrical Engineering Department*

### Visiting Appointments

- Summer 2006    **TAMPERE UNIVERSITY OF TECHNOLOGY,**    Tampere, Finland  
*Visiting Researcher, Institute of Communications Engineering,*  
• Host: Prof. Markku Renfors  
• Duration: 4 weeks  
• Objective: Research work was concentrated on developing solutions for wireless networks.
- Summer 2007    **UNIVERSITY OF MELBOURNE,**    Melbourne, Australia  
*Visiting Researcher, ARC Special Research Center for Ultra-Broadband Information Networks (CUBIN),*  
• Host: Dr. Stephen Hanly  
• Duration: 8 weeks  
• Objective: The research work was focusing on developing advanced techniques for wireless mesh networks.
- February 2008    **EINDHOVEN UNIVERSITY OF TECHNOLOGY,**    Eindhoven, Netherlands  
*Visiting Researcher, European Institute for the study of RANDOMness (EURANDOM)*  
• Host: Prof. Sem Borst  
• Duration: 2 weeks  
• Objective: The research objective was to develop practical techniques for improving distributed wireless networks.
- Summer 2008    **UNIVERSITY OF BRISTOL,**    Bristol, UK  
*Visiting Researcher, School of Mathematics*  
• Host: Dr. A. Ganesh  
• Duration: 8 weeks  
• Objective: The research focus was to study advanced mathematical techniques for wireless communications applications.

## INDUSTRIAL EXPERIENCE

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- 2010-Present     **A CERTIFIED CONSULTANT IN INFORMATION & COMMUNICATIONS TECHNOLOGIES,**     Saudi Arabia  
*Certified by Ministry of Commerce & Industry*
- 2009-Present     **ADVANCED ELECTRONICS COMPANY,**     Riyadh, Saudi Arabia  
2011-Present     *New-Businesses Development Manager, Corporate Development Unit*  
Focus on leading new business initiatives that contribute to the company's growth and help the company continue to achieve its vast potential. Current business focus is the transportation sector, railway industry.
- 2009-2011     *Business Development Manager, Telecommunication Systems Business Unit*  
My responsibilities are aimed and focused at developing and managing businesses with key clients: Etihad Etisalat (Mobily), Zain-Saudi Arabia, Etihad Atheeb Telecom (GO), and Saudi Aramco, in the Information and Communications Technologies (ICT) area.
- Mobily Account: We have been successfully granted couple of projects, where they cover a wide range of services. From non-core services, VAS and IT services, until core-services, optical transmission and networks services.
  - Zain & Atheeb Accounts: These two accounts are in their early stages. Despite that, we are approaching contract agreements in the area of optical transmission and IT.
  - Saudi Aramco Account: Our main business focus in this account is networks solutions and architecture.
- I am also given the reasonability to create an entity within our business unit to take care of all business developments in Rail business. Main Rail projects that we are working on:
- North South Project that is owned by Saudi Railway Company (SAR).
  - Haramain High-Speed Rail (HHR).
- Summer 1999     **SUMMER TRAINEE**     Boston, MA  
*Lucent Technologies*
- I worked with the customer technical support team, where we addressed the technical concerns of customers. My part was designing diagrams for the manual of the GS400 a network device.

## HONORS AND AWARDS

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- BSc. graduate with honors (1995 - 2000).
- MSc. scholarship award, Ministry of Higher Education, Saudi Arabia (2000 - 2002).
- PhD. scholarship award, KFUPM, Dhahran, Saudi Arabia (2002 - 2005).
- British Council scholarship (summer 2008).

## RESEARCH ACTIVITIES

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### Research Interests

My broad research interests lie in the area of wireless communications and networking. Current specific interests are:

- ***Scheduling Algorithms in Wireless Networks***: we investigate and propose different scheduling algorithms that help increase the bit-rate of wireless systems such as: WiMax, WiFi, HSDPA/HSUPA, UMTS, etc.
- ***Radio Resource Allocation in Cellular Networks***: we address the problem of resource allocation for QoS support in cellular networks. We investigate schemes that help improve the networks and provide users with high speed connections.
- ***Analysis and Modelling of Communications Networks***: in this work mathematical derivations and simulation experiments are performed to evaluate current and proposed communication networks. Analysis of stability, statistical sharing and pricing of telephone networks are investigated.

#### General Interests:

- *Random Access Protocols.*
- *Multimedia Networking.*
- *Cross Layer Design.*
- *Internet Pricing & Game Theory (Economical Issues).*

#### Research Grants

Scheme: KFUPM (University funded project)  
Title: *Opportunistic Scheduling and Adaptive Modulation in Wireless Networks.*  
Investigator(s): Dr. Yahya S. Al-Harhi  
Amount: SR 49,000 Year: 2006-2007

#### Research Collaborations

1. **Research topic:** Distributed Scheduling: A Look at Throughput and Stability in Random Access Networks  
**Collaborator:** Prof. Sem Borst, Eindhoven University of Technology, Netherlands.
2. **Research topic:** Optimal Channel Probing Strategy for Opportunistic Spectrum Access.  
**Collaborator:** Dr. Ayalvadi Ganesh, University of Bristol, UK.

#### Invited Lectures, Seminars and Tutorials

1. "*Opportunistic Scheduling in Wireless Networks*", Seminar given at The Institute of Communications Engineering, Tampere University of Technology, June 19, 2006.
2. "*Opportunistic Scheduling in Wireless Networks: An Overview of Issues and Design Considerations*", Tutorial presented at the 20th International Symposium in Signal Processing and its Applications (ISSPA 07), February 2007, Sharjah, UAE. (Y. Al-Harhi with T. Al-Naffouri and M. -S. Alouini).
3. "*Issues on Opportunistic Scheduling in Wireless Networks*", Seminar given at CUBIN, University of Melbourne, July 25, 2007.
4. "*Distributed Scheduling: A Look at Throughput and Stability in Random Access Networks*", Seminar given at EURANDOM, Eindhoven University of Technology, February 14, 2008.
5. "*Issues on Opportunistic Scheduling in Wireless Networks*", 1st KFUPM Communications and Information Technology Research Open Day (CITROD), Dhahran, Saudi Arabia, 30 March 2008.

## PUBLICATIONS

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#### Books/Book Chapters

1. Y. Al-Harhi, "*Opportunistic Scheduling in Wireless Networks: A Feedback Load Perspective*" 4G Mobile & Wireless Communications Technologies Book, River Publishers Series in Communications, August 2008.
2. Y. Al-Harhi, "*A Hybrid Feedback Mechanism to Exploit Multiuser Diversity in Wireless Networks*" Radio Communications Book, IN-TECH Publishers, May 2010.

#### Conferences

1. Y. Al-Harhi, A. Tewfik, and M. -S. Alouini, "*Blind Adaptive Modulation Systems for Wireless Channels with Binary Feedback*" In Proc. of IEEE Vehicular Technology Conf., Los Angeles, CA, September 26-29, 2004.
2. Y. Al-Harhi, A. Tewfik, and M. -S. Alouini, "*Infostation Information Transfer using Hybrid ARQ Technique Combined with Adaptive Modulation*" In Proc. of 4th IEEE International Symposium on Signal processing and Information Technology (ISSPIT'04), Rome, Italy, December 18-21, 2004.

3. Y. Al-Harathi, A. Tewfik, and M. -S. Alouini, "**Opportunistic Scheduling with Quantized Feedback in Wireless Networks**" In Proc. of IEEE International Conf. on Information Technology: Coding and Computing (ITCC'05), Las Vegas, NV, April 4-6, 2005.
4. Y. Al-Harathi, A. Tewfik, and M. -S. Alouini, "**Multiuser Diversity-Enhanced Equal Access with Quantized Feedback in Multicarrier OFDM Systems**" In Proc. of IEEE Vehicular Technology Conf., Dallas, TX, September 25-28, 2005.
5. Y. Al-Harathi, A. Tewfik, and M. -S. Alouini, "**Transferring Multimedia Files using Adaptive Transmission in Infostation Technology**" In Proc. of IEEE Vehicular Technology Conf., Dallas, TX, September 25-28, 2005.
6. Y. Al-Harathi, A. Tewfik, and M. -S. Alouini, "**Multiuser Diversity with Quantized Feedback**" In Proc. of IEEE Global Telecommunications Conference 2005 (GLOBECOM'05), St. Louis, MO, 28 Nov.-2 Dec., 2005.
7. Y. Al-Harathi, A. Tewfik, and M. -S. Alouini, "**Opportunistic Scheduling in Decentralized OFDM Systems**" In Proc. of IEEE Vehicular Technology Conf., Montreal, Canada, September 25-28, 2006.
8. Y. Al-Harathi "**Reduced Feedback Opportunistic Scheduling With The Aid of User Cooperation in Wireless Networks**" In Proc. of IEEE International Symposium on Personal, Indoor, and Mobile Radio Communications (PIMRC'07), Athens, Greece, September 3-7, 2007.
9. Y. Al-Harathi, "**Path Selection Diversity for Packet Delivery in Wireless Single-hop Networks**" in Proc. of 7th IEEE International Symposium on Signal Processing and Information Technology (ISSPIT'07), Cairo, Egypt, December 15-18, 2007.
10. K. N. Paracha, A. Zerguine, Y. Al-Harathi, "**Lattice-Based Soft-Constraint Satisfaction Multi-Modulus Blind Equalization Algorithm of order  $p$** " in Proc. Of 5th Intl Wireless Communications and Mobile Computing Conference (IWCMC'09), Leipzig, Germany, June 21-24, 2009.
11. Y. Al-Harathi, S. Borst "**Distributed Adaptive Algorithms for Optimal Opportunistic Medium Access**" in Proc. Of 7th Intl. Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt'09), Seoul Korea, June 23-27, 2009.

## Journals

1. Y. Al-Harathi, A. Tewfik, and M. -S. Alouini, "**Blind Adaptive Modulation Systems for Wireless Channels with Binary Feedback**" Wireless Communications and Mobile Computing Journal, vol. 7, no. 3, pp. 257-266, March 2007.
2. Y. Al-Harathi, A. Tewfik, and M. -S. Alouini, "**Multiuser Diversity with Quantized Feedback**" IEEE Trans. on Wireless Communications, vol. 6, no. 1, pp. 330-337, January 2007.
3. Y. Al-Harathi, "**Low Complexity Adaptive Wireless Transmission Systems**" Mediterranean Journal of Electronics and Communications, vol. 3, no. 1, pp. 148-153 January 2007.
4. Y. Al-Harathi, "**Joint Polling and Contention Based Feedback Algorithm to Exploit Multiuser Diversity**" Journal of Communications (JCM), vol. 4, no. 5, pp. 348-356, June 2009.
5. M. E. Eltayeb, Y. Al-Harathi, "**Multiuser Diversity with Binary Feedback**", Wireless Personal Communications, Published online 05 January 2010.
6. Y. Al-Harathi, S. Al-Ghathban, "**Relay Aided Opportunistic Scheduling in Wireless Networks**", IET Communications, vol. 4, no. 3, pp. 303-311, 2010.
7. Y. Al-Harathi, "**Opportunistic Multiuser Scheduling With Reduced Feedback Load**" European Transactions on Telecommunications, vol. 21, no. 4, pp. 299-311, 2010.
8. Y. Al-Harathi, S. Borst, and P. Whiting, "**Distributed Adaptive Algorithms for Optimal Opportunistic Medium Access**" MOBILE NETWORKS AND APPLICATIONS (MONET) Special Issue 2010.
9. M. E. Eltayeb, Y. Al-Harathi, "**Opportunistic Multiuser Scheduling Algorithm for Multi-carrier Wireless Data Systems**" accepted at Physical Communications 2011.

## ADVISING AND SUPERVISORSHIP

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### Master Degrees, Thesis Advisor

1. Mr. Mohamed E. El-Taib,  
Thesis Topic: *Opportunistic Scheduling with Limited Feedback in Wireless Communications Systems*.  
Date: March 2009
2. Mr. Abdullah Abubakar Mas'ud,  
Thesis Topic: *Adaptive Modulation and Multiuser Diversity for Fading Channels*.  
Date: Ongoing.

### Master Degrees, Thesis Committee Member

1. Mr. Kashif N. Paracha,  
Thesis Topic: *Stochastic Newtons-Like Multi Modulus Blind Equalization Algorithm*.  
Date: March 2008
2. Mr. Refat A. Al-Nimnim,  
Thesis Topic: *Classification and Weighting Techniques for NLOS Mitigation in TOA-Based Radiolocation*.  
Date: April 2008
3. Mr. Muhammad S. Sohail,  
Thesis Topic: *Adaptive Algorithms for Channel Estimation: Using Apriori Information for Optimal Design*.  
Date: June 2008
4. Mr. Hamood-ur-Rehman Khan,  
Thesis Topic: *DLL Code Tracking of CDMA Signals under Fading and Multiple Access Interference*.  
Date: January 2009
5. Mr. Mohammad M. Abdellatif,  
Thesis Topic: *Performance of Multi-Hop Ad-Hoc Networks in Wireless Environments*.  
Date: February 2009
6. Mr. Ahmed S. Salim,  
Thesis Topic: *Performance of Layered Steered Space-Time Codes in Wireless Systems*.  
Date: January 2010

### Capstone Projects, Project Advisor

1. Project Title: *"A Comparative Study of Scheduling Algorithms for Downlink Wireless Networks Systems"*. Co-supervising with Dr. Samir Al-Ghadhban (2006).
2. Project Title: *"DTMF Remote Controller for Smart Homes"*. Co-supervising with Dr. Samir Al-Ghadhban. (2007).
3. Project Title: *"Controlling Home Appliances Using Wireless Devices"*. Co-supervising with Dr. Tareq Al-Naffouri, and Dr. Sheikh Sharif Iqbal. (2007).
4. Project Title: *"Modulation Classification Techniques"*. Co-supervising with Dr. Mohamed Deriche. (2008)

## TEACHING ACTIVITIES

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### Undergraduate Taught Courses

#### EE 201 - Electric Circuits I

Basic laws: Ohm's, KVL, KCL. Resistive networks. Circuit analysis techniques: nodal and mesh analysis. Network theorems: Thevenin's, Norton's, source transformations, superposition, maximum power transfer. Energy storage elements. Phasor technique for steady-state sinusoidal response. Important power concepts of ac circuits. Transient analysis of first-order circuits.

#### EE 204 - Fundamentals of Electrical Circuits

Basic laws: Ohm's, KVL, KCL. Resistive networks, mesh and node equations. Network theorems. Inductance and capacitance. Sinusoidal analysis and phasor methods. Power concepts of AC circuits. Polyphase circuits.

#### EE 315 - Probabilistic Methods in Electrical Engineering

Fundamentals of probability theory. Single and multiple discrete and continuous random variables. Probability density function. Gaussian and other distributions. Functions of random variables. Joint and conditional probabilities. Moments and statistical averages. Central limit theorem. Random processes. Stationarity and ergodicity. Correlation function. Power spectrum density. Gaussian and Poisson random processes. Response of linear systems to random signals.

#### EE 400 - Telecommunication Networks

Survey of design and implementation of communication networks. Transmission media. Network topologies. Routing. Switching. Network protocols and architectures. Internetworking. Network performance. Broadband access.

#### EE499-Special Topics: Wireless and Mobile Communications

Wireless Communication is the fastest growing segment of the communication industry. In the ages of the first- and second-generation mobile cellular systems, technical interest was mainly in increasing system capacity for voice services. However, these days, it has surely turned toward achieving future high-speed reliable wireless multimedia systems rather than voice systems because of the rapid growth of people's needs for multimedia communications services, including voice, data, and image. The goal of this course is to provide a fundamental understanding of the design, performance and state of the art of wireless communication systems. The course concentrates on cellular system design and planning, wireless channel modeling, mobility management, and current and future wireless communications standards.

#### Graduate courses

##### EE674-Telecommunication Networks

With the rapid growth of digital telecommunication services, proper design and operation of highly efficient communication networks is becoming more and more important. The goal of this course is to provide a comprehensive coverage of the subject matter by offering a balanced mix of descriptive material and performance analysis techniques. The descriptive aspects will cover the main concepts and structure of packet and circuit networking technologies (e.g. TCP/IP, Ethernet, ATM, Wireless LANs, 3G mobile cellular, etc.). On the other hand, the theoretical analysis will focus on the performance of networks (using Queuing Theory results).

#### COMMITTEES ACTIVITIES

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##### Committees

2008-2009	<b>KING FAHD UNIVERSITY OF PETROLEUM &amp; MINERALS</b> Member of the Committee for the University Innovation: Studying and proposing convenient University measures to invigorate the University innovation in all academic and research aspects and at all levels.	Dhahran, Saudi Arabia
2008	Member of the Housing Committee.	

#### PROFESSIONAL ASSOCIATIONS AND ACTIVITIES

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##### Membership of Scientific Societies

Member of the Institute of Electrical and Electronic Engineer (IEEE):

- IEEE Communication Society.
- IEEE Signal Processing Society.

##### Reviewer

- Journals: IEEE Transaction on Wireless Communications, IEEE/ACM Transaction on Networking, IEEE Communication Magazine, IEEE Transaction on Vehicular Technology.
- Conferences/Workshops: ITCC 2005, ISWCS 2005, ICC 2006, VTC-Fall 2006, PIMRC 2007, ICC 2008, VTC-Fall 2008.

**Technical Program Committee Membership**

- 2006:
  - Co-ordination Committee of the 18th International Conference on Microelectronics, 2006,
- 2007:
  - Technical Committee of the Technical Organizing Committee of Information & Communication Technologies IIT 2007.
- 2008:
  - Chair of the local arrangement of the 13th Saudi Technical Exchange Meeting (STEM).
  - Technical Committee of the Engineering Design and Communication Skill Program Workshop.

(Update: 2011)