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OBJECTIVE

To become a World authority in wireless and wireline communications

EDUCATION

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|--------------|--|------|
| Ph.D. | Electrical Engineering, <i>Stanford University, CA</i>
Research area: Multiple antenna receiver design for wireless communications | 2005 |
| M.S. | Electrical Engineering, <i>Georgia Institute of Technology</i>
Research area: Signal processing for communications | 1998 |
| M.S. | Electrical Engineering, <i>King Fahd University of Petroleum and Minerals, Saudi Arabia</i>
Research area: Signal processing and electromagnetics | 1997 |
| B.Sc. | Mathematics, <i>King Fahd University of Petroleum and Minerals, Saudi Arabia</i> | 1994 |

EXPERIENCE

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

- Teaching Electric Circuit Analysis, Analog and Digital Communications, Communication Networks, Senior Project Design, Enhancing Study Skills, Digital Communications (graduate), Adaptive Filtering and Applications (graduate), and Radnom Variables and Statistics (graduate)
- Carrying out research in adaptive filtering, channel estimation, iterative receiver design, multiuser communication, 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 blind data recovery in OFDM transmission.

Research Visitor, *California Institute of Technology, CA, Prof. Babak Hassibi* Summer, 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 used as part of receiver for wireless LAN; 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 5 undergraduate courses and 3 graduate courses

1. PYP 003: Enhancing Study Skills (Fall 2005, Fall 2006, Spring 2006)
2. EE 201: Electric Circuits (Fall 2005)
3. EE 370: Communications Engineering (Fall 2005, Fall 2006, Spring 2006)
4. EE 400: Communications Networks (Fall 2007)
5. EE 411: Capstone Project Design (Fall 2005, Spring 2005)
6. EE 570: Random Signals and Statistics (Fall 2008)
7. EE 571: Digital Communications (Spring 2006, Fall 2007)
8. EE 662: Adaptive Filters and Applications (Spring 2006)

RESEARCH INTERESTS

Multi-user Information Theory: Scaling laws of multiple antenna (group) broadcast channels for large number of users and/or antennas; techniques for enhancing the performance broadcast channels with limited feedback.

Channel Estimation and Equalization for MIMO OFDM: Modeling and estimation of MIMO time-variant channels; Adaptive/iterative algorithms for MIMO channel estimation and data detection in OFDM transmission; Parameter reduction techniques for intercarrier interference cancelation in OFDM and for channel estimation in multiple access OFDM; Using a priori information for blind channel estimation and data detection in OFDM.

Adaptive Filtering Analysis and Design: Unified mean-square analysis of adaptive filters; exact mean-square analysis of normalized least mean-squares adaptive algorithms; Adaptive Filters with optimum nonlinearities; Fast recursive least squares filters.

Applications of Compressive Sensing: Using compressive sensing for detection and cancelation of impulsive noise in OFDM; using compressive sensing for reducing feedback and improving the efficiency in multiuser systems.

Statistical Characterization of Some Random Quantities: Using the characteristic function to study the scaling behavior of i.i.d random variables; Characterizing the behavior of indefinite quadratic norms in Gaussian and isotropic variables.

RESEARCH COLLABORATORS

1. Ali H. Sayed, Professor and Department Chair, Electrical Engineering Department, *University of California at Los Angeles (UCLA)*, CA, USA
2. Arogyaswami Paulraj, Professor, Information Systems Laboratory (ISL), *Stanford University*, CA, USA
3. Thomas Kailath, Professor Emeritus, Information Systems Laboratory (ISL), *Stanford University*, CA, USA
4. Babak Hassibi, Professor, Electrical Engineering Department, *California Institute of Technology*, CA, USA
5. Giuseppe Caire, Professor, Electrical Engineering Department, *University of Southern California (USC)*, CA, USA
6. Naofal M Al-Dhahir, Professor, Electrical Engineering Department, *University of Texas at Dallas*, TX, USA
7. Masoud Sharif, Assistant Professor, Electrical and Computer Engineering Department, *Boston University*, MA, USA
8. Amir Dana, Senior Research Engineer, *Qualcomm Inc.*, San Diego, CA, USA
9. Ahmad Bahai, Fellow and Chief Technologist, *National Semiconductor*, Santa Clara, CA, USA
10. Mrouane Debbah, Professor, Electrical Engineering Department, *Ecole Suprieure d'Electricit (Suplec)*, Paris, France
11. Ricardo Merched, Assistant Professor, Electrical Engineering Department, *Federal University of Rio de Janeiro*, Brazil
12. Vitor H. Nascimento, Associate Professor, Electronic Systems Engineering Department, *University of Sao Paulo*, Brazil
13. Ghazi Al-Rawi, Electrical Engineering Department, *King Abdulaziz University*, Saudi Arabia
14. Mohammad Moinuddin, Electrical Engineering Department, *Hafr Al-Batin Community College*, Saudi Arabia
15. Azzedine Zerguine, Associate Professor, Electrical Engineering Department, *King Fahd University of Petroleum & Minerals*, Saudi Arabia

PUBLICATIONS

My publications include two theses, two book chapters, one patent, 18 submitted/accepted/published journal papers, 30 conference papers, and nine standard contributions.

PROJECTS

I have 10 funded projects. Two of these projects are funded jointly by King Fahd University of Petroleum and Minerals and two universities in Europe, one project is funded by King Abdulaziz City of Science and Technology, and one project is funded by a consortium composed of Saudi ARAMCO, Schlumberger, and SRAK. The remaining six projects are internally funded.

TALKS

I have given 28 talks in universities and companies in Saudi Arabia, Europe, and the USA.

GRADUATE STUDENTS & VISITORS

The following students and visitors are working under my supervision

1. Ahmed Abdul Quadeer, M.S. Student, Thesis Title “(Semi) blind channel and data recovery in OFDM,” June 2008.
2. Muhammad Saqib Sohail, M.S. Student, Thesis Title “Adaptive algorithms for channel estimation: Using a priori information for optimal design,” June 2008.
3. Babar Khan, M.S. Student, Thesis Title “Application of random matrix theory in wireless communications and seismic signal processing,” (expected) June 2009.
4. Ibrahim AlSafadi, M.S. Student, Thesis Title “Applications of compressive sensing to multiuser information theory and signal processing,” (expected) June 2009.
5. Alaa Dahman, M.S. Student, Thesis Title “Inter-carrier interference estimation and cancellation in OFDM,” (expected) Feb 2010.
6. Tabish Qaseem, Visitor from *Advanced Electronics Company*, Riyadh, Saudi Arabia, Research Topic “Using Compressive sensing techniques to reduce feedback in broadcast channels”
7. Mohammed Mobien, Visitor from *Helsinki University of Technology (TKK)*, Helsinki, Finland, Research Topic “Design of fast recursive least squares filters for wireless communications”.

SERVICE

1) Committees

- University Committees Research Advisory Committee (2007-2008)
- Text-Book Committee (2006-2007)
- Dhahran Techno Valley Steering Committee (2006-2007)
- E-Learning Committee (2006-2007, 2007-2008)
- Teaching Award Committee (2005-2006)
- Labs’ Development Committee (2005-2006)
- Graduate Admissions Committee (2005-2006, 2006-2007)
- Research Committee (2006-2007)
- ABET Accreditation Committee (2006-2007, 2007-2008)

2) IEEE Activities

- Executive member of IEEE Education Society, Gulf Section
- IEEE KFUPM Student Branch Counselor
- Organizer of the IEEE Ideas Challenge Contest (sponsored by Saudi ARAMCO and the IEEE Education Society)
- 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

- 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 1997
- Recipient of Monbusho scholarship for PhD studies at Tokyo Institute of Technology, Japan 1996
- Graduated with highest honors in Bachelor's degrees 1994

EXTRACURRICULAR ACTIVITIES

- Member of the Toast Masters Club, Dhahran, Saudi Arabia 2005-
- Student of improvisational theater in San Francisco and Los Angeles 2003-2006
- Member of the Stanford Debate Team 2004-2005
- Oral Communication Tutor, Center for Teaching and Learning, Stanford University 2003
- Member of the Stanford University Committee on Research 2000-2001
- Co-organizer of the First Global Entrepreneurial Challenge Stanford, 2000