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## **EDUCATION**

**Pursuing Ph.D. in Electrical Engineering** **May 2010**  
Electrical Engineering Department, University of Arkansas-Fayetteville **GPA: 4.0**  
Dissertation Title: Modeling Biopotential, Current Densities, and Biomagnetics of Multiple Breast Cancerous Cells.

**M. Sc. of Electronics and Communication Engineering (with highest honors)** **2006**  
Electronics and Communications Department, Cairo University **GPA: 4.0**  
Thesis Title: The use of Digital Signal Processing techniques for solving the inverse scattering problem

**B. Sc. of Electronics and Communication Engineering (with highest honors)** **2004**  
Electronics and Communications Department, Cairo University **GPA: 4.0**  
Ranking: 2<sup>nd</sup> out of a class of 500 students  
Graduation Project: A 2.25Kbps speech codec incorporating wavelets based techniques adapted for use over IP

## **RESEARCH EXPERIENCE**

### **1- Graduate Research Assistant, University of Arkansas, Fayetteville, AR, USA (Jan. 2007-May 2010).**

As a graduate research assistant I worked on three main research projects: (i) metamaterials, (ii) microwave measurements using ultrawideband antennas, and (iii) biopotential/biomagnetic detection of breast cancer which is the topic of my dissertation. The experimental microwave imaging was conducted in collaboration with the University of Mississippi and the biopotential/biomagnetic detection of breast cancer project was conducted in collaboration with the University of Arkansas for Medical Sciences. During my dissertation research, I worked extensively with the Star of Arkansas supercomputer at the University of Arkansas and the Ranger supercomputer at the University of Texas-Austin. In addition, I assisted my advisor in the preparation of several proposals for the DOD Concept and Synergistic programs; the NIH R21 and RC1 programs; the NSF MRI program and the Arkansas Bioscience Institute (ABI) funding program.

### **2- Graduate Research Assistant, Cairo University, Cairo, Egypt (Aug. 2004-Sept. 2006).**

I worked on solving the inverse scattering problem for a 1-dimensional *discrete, low loss, multilayer* system using digital signal processing (DSP) techniques. Three basic reconstruction algorithms were implemented and compared: (i) The FFT inversion method, (ii) The Extended Dynamic Predictive Deconvolution (DPD) method and (iii) The *Asymmetric Discrete Lattice Filter* inversion method. The performance of the three

algorithms was found to significantly improve when incorporated with a preprocessing stage comprised of a time delay estimation algorithm. The time delay estimation algorithm implemented was the Weighted Fourier transform and RELAXation (WRELAX) algorithm.

**3- Exchange Undergraduate Student, Otto-von-Guericke University, Magdeburg, Germany, (June. 2003-Aug. 2003).**

Practical training in the Microwave Department of the University under the International Association for the Exchange of Students for Technical Experience (*IAESTE*) program. The training consisted of developing circuit models for RF MEMS switches as well as designing and simulating MEMS based phase shifters.

## **TEACHING EXPERIENCE**

**1- Teaching Assistant, University of Arkansas, Fayetteville, AR, USA (Jan. 2007-May 2010)**

- Electronics I Lab (Spring 2007-Fall 2007)
- Energy Conversion Lab (Spring 2007)
- Digital Signal Processing Lab (Fall 2007-Spring 2008)
- Co-mentoring *Jessica Rutledge*, an undergraduate electric engineering student, in the summer of 2008 under the Research Experiences for Undergraduates (REU) program. The title of her project was “*Using the Selective Minimum-Norm Estimation method for Breast Cancer Tumor Location*”

Student evaluations: 4.3-5 out of 5

**2- Teaching Assistant, Cairo University, Cairo, Egypt (Aug. 2004-Sept. 2006).**

- Electromagnetic Fields
- Transmission Lines, Waveguides and Cavity Resonators
- Electronics Lab I
- Electronics Lab III
- Microwaves and Laser Lab for Senior Students

## **INDUSTRY EXPERIENCE**

**1- Intern, Framatome/Siemens, Erlangen Germany (August 2002)**

Practical training in hydraulic software and simulations by the nuclear reactors manufacturing company Framatome/Siemens Erlangen Germany August 2002.

**2- Intern, STAWAG, Aachen, Germany (July. 2001-Aug. 2001).**

The training at the power providing company STAWAG composed of handling several software packages needed in the control and monitoring of the electricity grid in addition to attending practical courses in the electronics lab of the company.

## **PUBLICATIONS**

### **Journals**

1. Ahmed. M. Hassan and M. El-Shenawee, "Diffusion-Drift Modeling of a Growing Breast Cancerous Cell," *IEEE Trans. on Biomed. Eng.*, vol. 56, no. 10, pp. 2370-2379, 2009.
2. Ahmed. M. Hassan, M. R. Hajihashemi, M. El-Shenawee, A. Al-Zoubi, and A. Kishk, "Drift De-noising of Experimental *TE* Measurements for Imaging 2D PEC Cylinder Using the Level Set Algorithm" *IEEE Antennas and Wireless Propagation Letters*, vol. 8, pp. 1218-1222, 2009.
3. D. A. Woten, M. R. Hajihashemi, Ahmed. M. Hassan and M. El-Shenawee, "Experimental Microwave Validation of Level-Set Reconstruction Algorithm," *IEEE Trans. Antennas and Propagation*, vol. 58, no. 1, pp. 230-233, Jan. 2010.
4. Ahmed. M. Hassan and M. El-Shenawee, "Modeling Biopotential Signals and Current Densities of Multiple Breast Cancerous Cells," *Accepted for Publication in the IEEE Transactions of Biomedical Engineering*, 2010.
5. Ahmed. M. Hassan and M. El-Shenawee, "The MPI parallelization of the diffusion-Drift Algorithm for Quantitative Analysis of Breast Tumor Electric Signals," *To be Submitted to the IEEE Transactions of Biomedical Engineering*

### **Peer Reviewed Conference Papers**

1. Ahmed M. Hassan, S. Burkett, and M. El-Shenawee, "Parametric Investigation of Hilbert Based Artificial Magnetic Conductors" *Proceedings of the Annual Review of Progress in Applied Computational Electromagnetics*, pp. 1040-1045, Niagara Falls, Canada, March 30 - April 4, 2008.
2. Ahmed M. Hassan and M. El-Shenawee, "Mathematical Modeling of Breast Lesion Growth" *Proceedings of the Annual Review of Progress in Applied Computational Electromagnetics*, pp. 86-91, Niagara Falls, Canada, March 30 -April 4, 2008.
3. D. A. Woten, O. Kegege, R. Hajihashimi, Ahmed M. Hassan and M. El-Shenawee, "Microwave Detection using Real Measurement Data," *Proceedings of the Annual Review of Progress in Applied Computational Electromagnetics*, pp. 650-655, Niagara Falls, Canada, March 30 -April 4, 2008.
4. Ahmed. M. Hassan and M. El-Shenawee, "Modeling Electrical Activities of a Growing Breast Cancerous Cell Based on a Semiconductor Approach," *Proceedings of the 31<sup>st</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, Minneapolis, Minnesota, USA, pp. 3905-3908, September, 2-6, 2009.
5. Ahmed M. Hassan and M. El-Shenawee, "Modeling Electromagnetic Signals of Multiple Breast Cancerous Cells," *Proceedings of the URSI National Radio Science Meeting*, Boulder, CO, January 6-9, 2010.
6. Ahmed. M. Hassan and M. El-Shenawee, "The MPI Parallelization of the Diffusion-Drift Algorithm for Quantitative Analysis of Breast Tumor Electric Signals," *Proceedings of the IEEE International Symposium on Antennas and Propagation and USNC/URSI National Radio Science Meeting*, Toronto, Canada, July 11-17, 2010.

### **Peer Reviewed Conference Abstracts**

1. Ahmed M. Hassan, M. El-Shenawee, and H. Eswaran, "A Feasibility Study for Passive Detection of Breast Tumors using Naturally Generated Magnetic Fields," *Proceedings of the*

*IEEE International Symposium on Antennas and Propagation and USNC/URSI National Radio Science Meeting*, San Diego, USA, July 5-12, 2008.

2. Ahmed M. Hassan, D. Woten, R. Hajihashemi, A. Al-Al-Zoubi, M. El-Shenawee and A. Kishk, "Experimental Microwave Imaging Using Ultra-Wideband Dielectric Resonator Antennas," *Proceedings of the IEEE International Symposium on Antennas and Propagation and USNC/URSI National Radio Science Meeting*, Charleston, SC, USA, June 1-5, 2009.
3. F. Deek, J. Rutledge, R. Hajihashemi, Ahmed M. Hassan, D. Woten, M. El-Shenawee, "Automated GPR Surface Scanning System for Investigation of Defects in Buried Pipes," *Proceedings of the IEEE International Symposium on Antennas and Propagation and USNC/URSI National Radio Science Meeting*, Charleston, SC, USA, June 1-5, 2009.
4. Ahmed M. Hassan, M. Hajihashemi, M. El-Shenawee, A. Al-Zoubi, and A. Kishk, "Spatial Low Pass Filter for *TE* Experimental Measurements for Microwave Image Enhancement," *Proceedings of the URSI National Radio Science Meeting*, Boulder, CO, January 6-9, 2010.

### **AWARDS**

- The University of Arkansas Doctoral Academy Fellowship (DAF) for distinguished Ph.D. students. (\$40,000)
- The 2010 URSI Student Travel Award (\$600)
- The 2008 John A. White Award for Faculty-Student Collaboration (\$1000)
- The Cairo University faculty prize of excellence during 5 years of my undergraduate studies.
- "Shlumberger" Award for being ranked in the top 3 out of 500 students of the Department of Electronics and Communications Engineering in Cairo University in 2004.
- "Mobinil" Award for ranking second out of 500 students of the Department of Electronics and Communications Engineering in Cairo University in 5 years at the undergraduate level.

### **SOFTWARE**

- **Expert:** ANSOFT, FEKO, MATLAB, FORTRAN, C++, MPI, Word, PowerPoint, VISIO
- **Very Good:** PSPICE, Excel, MS Project
- **Basic:** COMSOL

### **PROFESSIONAL MEMBERSHIP**

- Member of the IEEE Microwave Theory and Techniques Society.
- Member of the IEEE Engineering in Medicine and Biology Society.
- Member of the IEEE Antennas and Propagation Society.
- Member of the Phi-Kappa-Phi honors society.