August 2017

MONA ELWAKKAD ZAGHLOUL
Ph.D., IEEE Life Fellow

POSITION: Professor, Department of Electrical and Computer Engineering
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CITIZENSHIP: U.S.A.

EDUCATION:

Ph.D. Electrical Engineering, 1975
University of Waterloo, Waterloo, Ontario, Canada

M. Math. Applied Analysis and Computer Science, 1971
University of Waterloo, Waterloo, Ontario, Canada

M.A.Sc. Electrical Engineering, 1970
University of Waterloo, Waterloo, Ontario, Canada

B.Sc. Electrical Engineering, 1965
Cairo University, Cairo, Egypt

PROFESSIONAL EXPERIENCE

The George Washington University (01/1980-Present):

1980-Present Professor (1989-present), Associate Professor (1983-1989), Assistant Professor (1980-1983) Department of Electrical and Computer Engineering, the George Washington University, Washington, DC.

1996-Present Director of the *Institute of MEMS and VLSI Technology*, the George Washington University, Washington DC.

2014-2016 Program Director, IPA at Engineering Division: Electrical, Communications, and Cyber Systems, The National Science Foundation (NSF), supervising panels on MEMS/NEMS, Nano-sensors, Biosensors, and Nanotechnology, and involved in several Brain Initiatives at the national level.

2009-2014 Chair, Department of Electrical and Computer Engineering, the George Washington University. Under her leadership, the ECE Department was awarded 6-year ABET accreditation for the three programs of Electrical, Computer, and Biomedical Engineering. The Department hired several new faculty members in Biomedical, and Electrical Engineering, and several research initiatives were implemented, which resulted in an increase in the total research for the ECE Department.

2003-2004 Sabbatical at the Army Research Laboratory (ARL), Adelphi, MD, working on MEMS Mechanical resonators, and RF-MEMS integration.

1999-2004 Member of the George Washington University Faculty Senate Committee.

1999 Sabbatical with the Laboratory of Electronic Instrumentation at the Technical University of Delft, TU Delft, The Netherlands, working on sensors, devices, and their circuit interfaces.

1994-998 Chair, Department of Electrical Engineering and Computer Science, the George Washington University. Under her leadership the EECS Department was awarded 6-year ABET accreditation for the programs of Electrical Engineering and Computer Engineering. The Department hired several new faculty members and several research initiatives were implemented, which resulted in an increase in the total research for the EECS Department.

1988 Sabbatical with the National Institute of Standards and Technology (formerly the National Bureau of Standards), Gaithersburg, MD.

1987 Summer Faculty, NASA/ASEE Goddard Space Flight Center, research activities included VLSI, analog circuit design and analysis (in particular the design of X-Ray detectors and particle detectors (analog MOS chips) on board of space ships).

1984-2006 Faculty Hire, Guest Researcher, and at the Semiconductor Electronics Division, National Institute of Standards and Technology (NIST), Gaithersburg, MD.

Prior Positions (09/1968-01/1980):

1978-1980 Senior Member of Technical Staff, Computer Sciences Corp., Silver Spring, MD. Research and development of software engineering systems and programming languages for NASA Goddard Space Flight Center.

1977-1978 Research Associate, University of Waterloo, Waterloo, Ontario, Canada. Research in circuits and systems theory, computer aided analysis, and design of electronic circuits.

1976-1977 Visiting Scientist, Aalborg University, Aalborg, Denmark. Research in computer aided analysis and design of electronic circuits.

1968-1976 Research Assistant, University of Waterloo, Waterloo, Ontario, Canada. Research and teaching in electronic engineering, computer sciences, and circuit and system theory.

AWARDS, RECOGNITIONS, AND PROFESSIONAL ACTIVITIES

1. Awards and Recognitions:

a) **Certificate of Appreciation from the National Science Foundation, 2017, for serving as Program Director at the Division of Electrical, Communications and Cyber Systems (ECCS).**

b) **First Prize, GWU Research and Development Show February 19, 2014**, for SEAS Graduate Students. Gradate Student: Bhaven Mehta, Research Project**:** Highly sensitive gas sensor using plasmonic antennas, Advisor**:** Prof. Mona Zaghloul.

c) **Third Prize, GWU Research and Development Show February 19, 2014,** for SEAS Graduate Students. Graduate Student Hasan Goktas, Research Project: The novel resonator cell (RC) for both portable biosensor and high quality filter for cell phones, Advisor**:** Prof. Mona Zaghloul.

d) **IEEE Life Fellow 2013, IEEE Fellow1996,** for leadership in education and research in integrated circuit design and their application to neural networks

e) **Second Prize, GWU School of Engineering Research Show Case, April 2012,** Graduate Student Ritu Bajpai, Topic: UV-Assisted ZnO functionalized GaN nanowire devices for Chemical Gas Sensors. Advisor: Prof. Mona Zaghloul.

f) **Distinguished Research Award 2010**, School of Engineering and Applied Science, the George Washington University, Washington DC, AY 2010-2011.

g) **Best Paper Award by Department of the Navy**, **2010** Annual Research Publications Award Dinner, paper title "Design and performance of simple, room temperature gallium Oxide Nanowire Gas Sensor", paper published in the Applied Physical Letters 95,103102, 2009.

h) **Elected IEEE Sensors Council President 2008-2009.**

i) **Graduate Student Mazdak Taghioskoui received the following awards on the Micro-Plasma work**, Co-Supervisors: Mona Zaghloul and A. Montaser:

- First-Prize Award for Washington Society of Engineers/Young Engineer Prize 2008 Paper Competition
- 2008 First-Prize Award for DCCEAS (District of Columbia Council of Engineering and Architectural Societies) Paper Competition
- Best Poster Award (out of 300 posters), 2008 Winter Conference on Plasma Spectrochemistry, Temecula, CA

j) Honorary Doctorate of Engineering, honoris causa, University of Waterloo, Canada, June 2007, in recognition of academic career in the international electrical engineering community and in celebration of the University 50th anniversary. **Dr. Zaghloul was the first woman to earn PhD in Engineering at University of Waterloo, Canada, in 1975.**

k) **2007 Best Paper Award in IEEE Sensors Journal**: I. Voiculoescu, M.E. Zaghloul, A. McGill, G. Fedder, " Electrically Actuated Resonant Micro cantilever in CMOS Technology for Detection of Chemical Weapons" the *IEEE Sensors Journal, Special Issue on Sensors for Prevention of Terrorist Acts*, Vol. 5, No. 4, August 2005, pp. 641-647.

l) Recipient of the IEEE Circuits and Systems Jubilee Golden Medal for outstanding contribution to the IEEE Circuits and Systems Society, May 2000

m) **Distinguished Lecturer, IEEE Circuits and Systems Society**, 2000-2002.

n) Recipient – Certification of Appreciation from IEEE Circuits and Systems Society for Service as General Chair of the Midwest Symposium on Circuits and Systems 1992.

2. Professional Activities:

- Associate Editor For IEEE BIOCAS Journal 2016-Present.
- Arranged For Special Session "Brain Inspired Circuits and Systems", IEEE International Symposium of Circuits and Systems (ISCAS), 2017, Baltimore MD, May 2017.
- President of the IEEE Sensors Council, two-years term, 2008, 2009, Past President of the IEEE Sensors Council 2010-2011.
- Member of the IEEE Fellow selection committee for the IEEE Sensors Council, 2009-2010. 2013-2014.
- Distinguished Lecturer in DLP for IEEE Sensors council, 2010-2012.
- Member of the IEEE Sensors Conference Technical Program Committee, 2010-present.
- Member of the IEEE Midwest Symposium on Circuits and Systems steering Committee 1992-present.
- Associate Editor of the *IEEE Journal of Sensors*, 2000- 2007.
- Associate Editor of the *IEEE- Transactions on Circuits and Systems (CAS) I*, 2006-2007.
- Member, Fellow Committee for IEEE Circuits and Systems Society, 2007.
- Chair, Fellow Committee for IEEE Sensors Council 2005, 2006.
- Vice President for Technical Activities, IEEE Circuits and Systems Society, 2000-2002.
- Chair, IEEE-CAS Forum on Nanotechnology and Microsystems**,** May 23-24, 2004
- Member, IEEE Circuits and Systems Society Board of Governors, 1995-1998.
- Associate Editor of *IEEE Transactions on Circuits and Systems (CAS) II for Sensors*, 2000-2002.
- Editor of the *IEEE Circuits and Devices Magazine*, 1999-2000.
- Chair of the IEEE Circuits and Systems Society's Technical Committee of Neural Networks, 1998-1999.
- Founder Chair of the IEEE Circuits and Systems Society's Technical Committee on Micro-Sensors and Actuators, 1999-2000.
- Associate Editor, *IEEE Transactions on Circuits and Systems I for Neural Networks,* 1993-1995.

- General Chair, IEEE Midwest Symposium on Circuits and Systems, Washington, DC, August 1992.
- Member of the IEEE Midwest Symposium on Circuits and Systems Conference Steering Committee, and Microelectronic Education Conference Steering Committees.
- Reviewer – *IEEE Transactions on Circuits and Systems, IEEE CAS Special Issue on Neural Networks, IEEE Computer Magazine,* and *The Circuit and Systems and Signal Processing Journal, IEE Circuits Journal*, NRL, and NIH Technical Panels.

3. Invited Talks:

1. Invited for talk about Chemical Gas sensing, to Pierre an Mary Curie School of Engineering, University of Paris, Paris France, February 2017. . Professor Mona Zaghloul presented the talk. The Title of the talk is "Nano Structures Sensors for Chemical and Biological Systems".
2. Invited For DAugust, 17istinguished Lecturer Series, Department of Electrical and Computer Engineering, Virginia Common Wealth University (VCU), April 26, 2016. Professor Mona Zaghloul presented the talk. The Title of the talk is "Nano Structures Sensors for Chemical and Biological Systems".
3. Invited For Lectures on Chemical and Biosensors Design and their Nano-Implementation, to the Department Electrical Engineering and Computer Science Department, Colorado School of Mines, 310D Brown Building, 1610 Illinois Street Golden, CO 80401. August 5th, 2015.
4. Invited to be Keynote Speaker for SYLICA Workshop, Brno University of Technology, Czech Republic on October 16, 2014. The trip and the invitation were sponsored by Central European Institute of Technology CEITEC, a scientific center of excellence in the fields of life sciences, advanced materials and technologies. Professor Zaghloul visited the research facilities of CEITEC and toured the clean room and Nano and Micro research laboratories. The groups are working on bio and chemical sensors and there is considerable research overlap between Professor Zaghloul research and the CEITEC researchers. Talk Title: "Nanostructured Sensors for Chemical and Biological Systems"
5. Invited to National Science Foundation to talk about Sensors/ MEMS-NEMS Research Activities, November 19, 2013.
6. Invited to European Space Agency (ESA) to talk about High Power GaN Circuits in Space Applications, September 2, 2013.
7. Invited to Special Session on Bio-Inspired Technology, IEEE MIDWEST Symposium on Circuits and System, August 2013.
8. M.E. Zaghloul, " Flexible Wearable Smart Sensors with Wireless Transmitting and Receiving Signals", Army Research Labs, October 2012.
9. M.E. Zaghloul, " Nanotechnology Realizations of MEMS/NEMS Structures with Applications to Chemical and Bio Sensors", talk to George Town University, November 2012.
10. M.E. Zaghloul Talk to TAU BETA PI, Engineering Honor Society, District 4 Conference, Keynote Speaker, Trends in Nanotechnology, April 16, 2011, The George Washington University, Washington DC.
11. M.E. Zaghloul, Talk to The National Nanotechnology Initiative Network (NNIN), Use of NNIN for fabrication of CMOS –SAW Integrated Devices, April 29th 2008, Stanford University, Palo Alto, CA.
12. M. E. Zaghloul Key note Speaker at the University of Waterloo Graduation Ceremony and Celebration of the 50th year, June 16 2007.
13. M.E. Zaghloul Presented talk at NSF workshop Tunis Titled "Micro Cantilever Gas Sensors ", Tunis, December 2006.
14. Invited to Plenary Lecture to the 2nd International Meeting on Micro sensors and Microsystems, National Cheng Kung University, Tainan, Taiwan, January 15-16, 2006.

15. Invited to the Institute for Computing, Information and Cognitive Systems ICICS, University of British Columbia, Vancouver, BC, Canada, Distinguished Lecture Series Spring 2003, "MicroElectroMechanical Systems Technology", March 27, 2003.
16. Member of the IEEE-CAS Distinguished Lecturer in the IEEE Distinguished Lecture Program, 2000-2002.
17. M.E. Zaghloul, " Overview of MEMS Technology with applications to RF Communication "' presented as IEE-CAS DLP, for Southeastern Michigan Section, Chapter I, March 27, 2002.
18. M.E. Zaghloul, "CMOS Implementation of Gas Sensors and their Circuits Interfaces", Presented to the Department of Electrical and Computer Engineering, Oakland University, MI, March 2002.
19. M.E. Zaghloul, " Overview o MEMS Technology with applications to RF Communication", Presented to the Department of Electrical and Computer Engineering, Virginia Tech, VA, April 2002.
20. M.E. Zaghloul, "MEMS, Microsystems and Nanosystems", Plenary Keynote Speaker at the 7th International Workshop on Cellular Neural Networks and their Applications, Frankfurt, Germany, July 2002.
21. Presented Plenary talk "MEMS Strctures and Sensors", at the IEEE MIDWEST Symposium on Circuits and Systems, Dayton, Ohio, August 2001.

4. Member Of Technical Committees and Technical Reviewers Activities:

1. IEEE Transaction of BIOCAS Associate Editor 2016-present.
2. Reviewer member of European Funding agency H2020-FET-OPEN 2016-present.
3. Reviewer for Research Funds for Natural Technology, Quebec Canada, 2016.
4. IEEE Sensors Conference Member of the technical Committee for the years 2010, 2011, 2012, 2013, 2014, 2015. 2016.
5. IEEE Transaction of BIOCAS, reviewer 2014, 2015, 2016
6. IEEE Education Award Committee member, 2012, 2013
7. ECEDHA (ECE Department Head Association) member of award committee, 2011, 2012, 2013, 2014.
8. National Science Foundation, Proposals Reviewer January 2012, May 2012.
9. IEEE Transaction for Circuits and Systems Journal part I reviewer.
10. IEEE Sensor Journal reviewer.
11. IEEE Electron Device Letters reviewer.
12. IEEE Microwave Wireless Components Journal reviewer.
13. The National Children Hospital Proposals Panel reviewer.
14. IEEE MIDWEST Symposium reviewer, Member of the technical Committee, and member of the steering Committee.
15. IEEE International Symposium of Circuits and Systems (ISCAS), Member of the technical Committee 2012, 2013, 2014,2015,2016.

Collaboration with National Laboratories

1984-2006 – Faculty Hire at The National Institute of Standards and Technology (NIST), Semiconductor Electronic Technology Division. Responsibilities include research and development of VLSI circuits and testing. Neural network algorithms are used to classify chip test structure, and measurements data and identify various patterns of faulty chips. Design of testing structure circuits for GaAs circuits, SOI circuits. Building wafers for reliability. Designing MicroElectroMechanical Systems (MEMS) for RF-MEMS and microfluidic MEMS. Micro-machining, techniques to develop CMOS sensors implementation and design their interface circuits, other technology for Sensors and Biosensors. Test Structures for Nanometer interconnects of VLSI chips.

2006-Present- Working on Joint projects with National Institute of Standards and Technology (NIST), which include Chemical Gas sensors using nanotechnology.
2004-Present-Working on Joint projects with Army Research laboratory, working on Nano-electronics, Phase Changing Materials (PCM), and design of electronics RF circuits for Army needs.

RESEARCH ACTIVITIES

Research Interests:

Integrated Sensors and Nanodevices, process technology to realize MEMS/NEMS devices, novel designs of MEMS/NEMS devices and Nano-sensors, RF-MEMS and MEMS Sensors with applications to Biosensors, Biological and Chemical Sensors using Surface Acoustic Wave (SAW) devices and Micro/Nano sensors for Biomedical applications and Chemical Gas Sensors. Smart Sensors and their interface Integrated circuits, digital and analog CMOS Circuits design and analysis, Neural Circuits to study the Brain, Neuromorphic circuits. GHz circuits design and their implementations; semiconductor devices, design and simulations.
Taught MEMS/NEMS courses at GWU for the past many years, and worked with the industry on MEMS Sensors devices; familiar with the clean room micro-fabrication and Nano-fabrications to realize MEMS/NEMS sensors, and Nano electronics devices.

Theses and Dissertations Supervised:

Doctoral Dissertations Supervised at The George Washington University: Total 36 Theses

1. M. Saidahmed, Analysis of Generalized State-Space for Singular Systems, April 1983.
2. N. Matta, Analysis and Design of Large Scale Interconnected System, April 1985.
3. A. Said, Design of Switched Capacitor Filters, July 1985.
4. E. Konechny, Iterative Improvement in the Design of a Restricted Class of VLSI Macrocells, March 1986.
5. C. Aissi, Testing of Physical Failures in NMOS and CMOS VLSI Combinational and Sequential Circuits, July 1988.
6. Dessa Gobovic, New Physical Fault Simulator for VLSI CMOS Circuits, November 1988.
7. A. K. Elmusrati, Systolic Arrays for Solving Linear Time Invariant Singular Systems, October 1990.
8. F. 1. Hamama, Design of an Adaptive Neural Network, November 1990.
9. G. Moon, VLSI Design of Neural Networks Using Pulse Coded Weights with On Chip Learning Capability, March 1993.
10. H. Ali, CMOS Dynamic Retina with Associative Memory Capabilities, September 1993.
11. C. Hsu, Chaotic Neural Networks Analysis and Implementation, July 1995.
12. S. Habib, Continuous Time Neural Networks for System Identification and Control, July 1996
13. V. Milanovic, Broadband Microwave Power Sensor in CMOS Technology, December 1998.
14. P. Thaker, Register Transfer Level Fault-Modeling for VLSI Design Validation and Test, March 2000.
15. M. Ozgur, CMOS-Based Monolithic MEMS Technology and its Application in Microwave Systems, April 2000.
16. J. Wiley, Convex Hull Metrics and Neural Classifiers, April 2001.
17. Angela Rasmussen, Implementation and Modeling of Microfluidic Components realized Using CMOS Technology, May 2001.
18. Nadine Guillame, Non Contact Electrical Metrology Sensor for Chrome Photo Masks, May 2002.

19. M. Afridi, Monolithic CMOS Gas Sensor with Interface Circuits, August 2002
20. Ioana Voiculesco, Design and Development of MEMS Devices for Detection of Hazardous materials, December 2004.
21. Arif Emre Yrimbock, Modeling, Simulation, and Measurements of Nano-Scale Copper thin Films, June 2007.
22. Onur Tigli, Novel SAW Devices in CMOS for Biosensor Applications: Design, Modeling, fabrication and Characterization, December 2007.
23. Anis Nordin, Design, Implementation and Characterization of Temperature Compensated SAW Resonators in CMOS technology for RF Oscillators, January 2008.
24. Jerry C. Wu, Systematic Analysis of CMOS-MEMS Inductors with Application to Mixer Matching Circuits, November 2008.
25. Shumin Zhang, Design and Development of RF CMOS MEMS Switches for Configurable RF circuits, January 2009
26. S. Arnold, Silicon Nanometer wire for enhanced Gas Sensors in CMOS technology (with NRL), January 2010.
27. Thomas Farmer, Millimeter Wave High Voltage High Power Amplifier Implementation in Silicon Germanium Technology, April 2010.
28. Hsu-Cheng Ou, Design of the One –Pole Synchronous LINB3 Surface Acoustic Wave Resonator with Sensing Applications, April 2010.
29. Chia-Pin Chang, Design Development and Testing of Fluorescence-based Microfluidic System for Uric Acid Analysis of Clinical Samples, December 2010.
30. Robert Proie, Development of a Piezoelectric MEMS Switch Architecture for Low Power, Radiation Hardened and Highly Integrable Mechanical Logic, May 2011.
31. M. Taghioskoui, Design and Implementation of Microdevices for Plasma Generation, September 2011.
32. R. Bajpai, UV-Assisted GaN Nanowire Devices for Alcohol Sensing, May 2012.
33. Bowei Zhang, CMOS Biosensors for Portable Molecular Diagnostic System, August 2012.
34. Bhaven Mehta, Chemical Gas sensor based on Optical Nano antennas using Graphene, January 2015.
35. Hasan Goktas, Design, Fabrication and Characterization of CMOS-MEMS Novel Resonator with Embedded Heater for Filter, and Temperature Sensors Applications, January 2015.
36. Kevin Dobson, High Frequency Analog to Digital Converters with application to RF Receiver/Transmitters, October 2015.

Master's Theses Supervised at The George Washington University, Total 20 Theses.

1. D. Gobovic, Fault Diagnosis of Nonlinear Circuits, May 1985.
2. D. Rhee, Computer Simulation Studies of Photomultiplier, December 1986.
3. K. Benatchba, Algorithm for Testing Physical Failures in VLSI Digital Circuits, December 1989.
4. G. Moon, VLSI Implementation of Neural Type Cell, July 1990.
5. K. Shaffer, Implementation of a Neural Network Based Intelligent Controller Using VLSI Technology, March 1991.
6. R. Yentis, VLSI Implementation of a Cellular Neural Network for Solving Partial Differential Equations, September 1994
7. C. Zincke, MicroElectroMechanical Heating Element Structure Characterization and Control, October 1995.
8. V. Milanovic, Design and Fabrication of Micromachined Microwave Transmission Lines in CMOS Technology, November 1996.
9. S. Arnold, Hardware Implementation of Complex SAR Software Algorithm, Dec.2001.

10. A. Nurashikin Nordin, CMOS Design and Implementation of Sigma – Delta Analog –to- Digital Data converter for MEMS Devices, July 2002
11. Harry Shaw, MEMS Structures for Electrophoretic and Dielectrophretic Separation of Particles by Contactless electrodes, December 2005.
12. Y. Wu, Field Programming Gate Array (FPGA) Security and Reliability, December 2005.
13. A. Gupta, A 400 MHz Delta –Sigma ADC for Band-Pass IF Digitization Around 100MHz with Excess Loop Delay Compensation, August 2010.
14. Ken McKnight, 5GHz Doherty Amplifier Designed in Triquent GaAs Process, December 2010.
15. Scott Trocchia, A RF Graphene FET Large -Signal Compact Model Compatible with Circuit Simulators, June 2012.
16. Qiuchen Yuan, A high Resolution Time- to- Digital Converter on FPGA for Time Correlated Single Photon Counting, August 2012.
17. Boqun Dong, Modeling and Simulation of InAS/GaAs Quantum Dot Solar Cells in Silvaco TCAD, October 11, 2013.
18. William Gibbs, Design For Test for OSU Standard Cell Library Used at GWU, May 18, 2014.
19. Chris Reilly, MEMS Capacitor Sensing for Position Detection of Movable Objects, September 29, 2014.
20. Sina PourJabar, Design and simulation of Nano Plasmonics Biosensors, Sina PourJabar master thesis, 2 May 2016.
21. Allan Morales, Highly Sensitive Wearable Piezoelectric Force Sensor with Quasi –Static Load Testing, MAY 2017.

Dissertations in Progress:

1. Ken McKnight, Design Of Integrated Microwave Circuits in GaAs, (collaboration with the ARL).
2. Asha Rani, 2-D Nano-electronics devices, New Materials and applications to Chemical Gas Sensors (collaboration with NIST).
3. Shiqi Guo, Chemical Gas Sensors Using 2-D materials (collaboration with NIST).
4. Boqun Dong, Using Surface Acoustic Wave to enhance Optical Photo-detector Devices
5. Leo De La Cruz, Modeling and Application of Two Phase materials in design of RF Switches devices (collaboration with the ARL).
6. Yangyang Zhae, Chemical Gas Sensing using Optical Nano Antenna Structures (collaboration with NIST)

TEACHING ACTIVITIES

The GW VLSI and MEMS, and Nano-electronics Educational Programs, 1984-Present:

Professor Zaghloul proposed and initiated the Integrated Circuits (IC) teaching program at the George Washington University and is teaching several of the analog and digital IC design and testing courses. She established a well-equipped IC laboratory at the Department of Electrical and Computer Engineering at GW. She is responsible for the IC education software tools, upgrading testing equipment to accommodate IC design and testing courses in the Electrical and Computer Engineering. The laboratory was initiated by Professor Zaghloul to educate GWU students in designing and testing IC chips, and to send chips to MOSIS since 1984-present. As part of this program, several projects with teaching as well as research chips were designed and fabricated through the MOSIS facility under her supervision. Successful analog and digital chips were designed and tested in the GW IC Laboratory as a part of this program. In addition, micro sensor chips were designed and

implemented using the facility at the Laboratory. The laboratory is equipped with commercial IC design CAD tools (CADENCE) as well as a testing facility that includes CASCADE probing machines and analog and digital testing equipment, as well as testing for sensors, Biosensors, and Chemical Sensors. In the Fall of 1999, Professor Zaghloul taught the first MEMS/NEMS course at the George Washington University. Students learn the design and technology of MEMS /NEMS sensors devices. Designs were sent to the micro-foundry for fabrication. Several other MEMS courses were introduced. All the courses result in projects to be fabricated through the outside companies and national laboratories. Professor Zaghloul has strong connections with several national clean room facilities and National and International Foundries.
In Fall 2011, Dr. Zaghloul introduced new course on Nano-Electronics as graduate/ Undergraduate course. The course was designed under NSF grant on Nanotechnology for Undergraduate Education. The course have laboratory in which the students learn the basic nanofabrication process and learn techniques to characterize Nano-structures in the lab. In addition to teaching lectures of the theoretical fundamental of Nano-electronics and introduction of the students to recent research topics for nanomaterial with applications to development of Nano-devices for future Nano-circuits and Nano-sensors applications.
Professor Zaghloul supervises the Computer Tools and Design software for teaching the MEMS /NEMS classes at GWU. In addition many research projects were implemented using the IC and MEMS/NEMS design tools under the supervision of Dr. Zaghloul.

Courses Taught and Introduced at GW:

Taught and introduced many courses at The George Washington University; more than 20 courses and course modifications such as: Basic Circuit Theory, Linear Systems, Nonlinear Circuits Theory, Neural Network Analysis and Design, Introduction to VLSI Design and Simulation, VLSI Fabrication Techniques, Testing and Simulation of VLSI Circuits tools, Linear Systems Theory, Graph Theory and Applications, Computer Aided Analysis and Design of VLSI System (using software such as Microsim, Verilog, CADENCE, Analog Artists, Tanner tools, and many other academic tools), Design, Analog MOS VLSI Circuits for Signal Processing, Digital Filters, RF- Microwave Circuits Design using software such as EDS, CADENCE- Specter, Introduction to MEMS/NEMS Design and Applications (using MEMS CAD tools such as Coventor, and Ansys). Introduced new area courses such as: Introduction to Nanotechnology, and Introduction to Nano electronics. The Following is a list of courses developed and taught:

Graduate Courses:

1. ECE 6240 Introduction to VLSI Systems.
2. ECE 62145 Introduction to Nano/Micro Fabrication
3. ECE 6250 Testing and ASIC Design of VLSI Systems.
4. ECE 6260 Introduction to Nano electronics.
5. ECE 6213 VLSI Circuits.
6. ECE 6214 Advanced VLSI System Designs.
7. ECE 6215 Introduction to MEMS/NEMS.
8. ECE 6216 RF CMOS Circuits.
9. ECE 6218 Introduction to Analog VLSI Design.

Undergraduate Courses:

1. ECE 2110 Circuit Theory.
2. ECE 2140 Design of Logic Systems- I.
3. ECE 3135 Design of Logic Systems-II.
4. ECE 4140 Introduction to VLSI Systems
5. ECE 4145 Introduction to Nano/Micro Fabrication

6. ECE 4160 Introduction to Nano Electronics.

NSF Activities as IPA January 2014-December 2016

Professor M. Zaghloul Joined the National Science Foundation from January 2014-December 2016 as IPA appointment in the Division of Electrical, Communications and Cyber Systems (ECCS). She managed the Program Circuits, Communications, and Sensors Systems (CCSS).
During her time as IPA she accomplished the following:

1. Selected Panel members for the assigned Unsolicited Proposals for 2014-2016. Attended and managed three panels for Unsolicited Proposals per year, and recorded all the outcomes and discussion of the panels, selected the top awardee based on the panels' discussions and recommendations, and managed all the documentations needed for each year for the total number of unsolicited proposals assigned to finalize the process.
2. Worked on CAREER 2014-2016 proposals. Selected panel members for Career Proposals, set the panel and recorded all the outcomes and discussion of the panel, selected the top awardee based on the panels' discussions and recommendations, and managed all the documentations needed for the total number of CAREER proposals during the IPA period, to finalize the process.
3. Worked with several Divisions at the NSF on the Brain Initiatives, and was member of across the foundation divisions program Directors. Worked on the Brain Solicitation, and on planning the panels (Three panels were running each year). Supervised Engineering Brain proposals. Worked with divisions Program directors on the decisions for funding for 2014, and 2016.
4. Joined the NSF Neuro Nex - Next Generation Networks for Neuroscience- attended the meetings for planning the panels. My name appeared on the solicitation NSF 16-569 for 2016, and was part of the team for answering email requests from the community on regular basis. Worked with the Group to sort out the received LOI and identified the Engineering Topics. I also worked on the Brain initiative during 2014-2015, attended the panels, and selected the panelists, and recorded the outcome and discussed the top awardee for 2014, and for 2016.
5. Worked with Dr. Michael Roco to prepare and support Intelligent Cognitive Assistants workshop, May 12-13, 2016 CA. The workshop final report was issued and is available.
6. Worked with Dr. Michael Roco to prepare and support the The 13th U.S. Korea Forum on Nanotechnology: Brain –Inspired Computing and Nano-Biomimetic for Energy & Water Sustainability.
7. Worked with Dr. Usha Vashney to support NSF Workshop on Papertronics: Paper-based Electronics for the 21stCentury. Workshop was held September 12-14, 2016 in Arlington, VA. Final Report is available
8. Lead the site visit team for the Engineering Research Center ASSIST, managed the meeting and prepared the questions to the ASSIST team and planned the interaction between the NSF team and ASSIST team. Prepared the site visit report for ASSIST ERC. The site visit was on May 3-4, 2016.
9. Prepare the Review Analysis for the ASSIST ERC (NSF Engineering Research Center on Health Sensors), and submitted and the review analysis report for the ASSIST –ERC fourth year renewal. Prepared all the documents needed for the fourth year renewal for the ASSIST Center in 2015.
10. Arranged for REU requests for summer 2014,2015,and 2016. Managed and approved R.E. U. requests for Principal Investigators.
11. Involved in EAGER proposals discussions and funded several EAGER proposals, during 2015, 2016.
12. Attended NSF Scalable Nano-Manufacturing (SNM) Program meetings, and shared with group the discussions and preparation for the solicitation 16-513. Arranged for the SNM panel 2015, and 2016,

and prepared the proposals review analysis, and the awards for the highly recommended proposals. My name appeared on the Solicitation.

FUNDED RESEARCH, PROPOSALS AND AWARDS at The George Washington University

Funding Agencies;
National Science Foundation, National Institute of Standard and Technology (NIST), NASA Langley Research Center, Martin Marietta Corp, Goddard Space Flight Center, NASA, RF Microsystems, Inc., GW Research Enhancement Funding for the Charter of the "Institute for MEMS and VLSI Technologies", Titan Systems Inc., Defense Advanced Research Projects Agency (DARPA), Space and Naval Warfare Systems Center, San Diego, America Online Inc., Naval Research Laboratory, National Security Agency (NSA), DoD SBIR, GWU /Children Hospital, Army Research Laboratory (ARL), Virginia Dominion Company, European Space Agency, through Euroconsult, The Center for Innovative Technology (CIT), VA., National Institutes of Health (NIH).

Total Funding;
TOTAL Funding to The George Washington University $7,721,768.00

PUBLICATIONS AND PATENTS

Books:

1. *"Silicon Implementation of Pulse Coded Neural Networks,"* co-editor, M. E. Zaghloul, J. Meador and R. W. Newcomb, Kluwer Academic Books, 1994.

2. *"Design and Testing Guides for the CMOS and Lateral bipolar-on SOI test Library";* National Institute of Standard and Technology, Washington, 1994.

3. " Nano cantilever Beams: Modeling, Fabrication and Applications", Ioana Voiculescu, and Mona Zaghloul (Editors), Pan Stanford Publishing, ISBN978-981-4613-23-1, 2016.

Book Chapters:

1. "Physical Fault Modeling and Simulation of VLSI MOS Circuits," Chapter 1 in *"VLSI Fault Modeling and Testing Techniques,"* G. W. Zobrist, editor, Ablex Publishing Corp., Norwood, NJ, 1993.

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