Ezzeldin Hussein Hamed

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Research Interests

Hardware/Software Co-Design, Digital Design for FPGA and ASIC, High Speed Communication, Wireless Networks and IoT, Computer Architecture, Signal Processing.

Education

Massachusetts Institute of Technology (MIT) 2015-2018
Ph.D. in Electrical Engineering and Computer Science
Advisor: Dina Katabi

Massachusetts Institute of Technology (MIT) 2012-2015
Masters of Science in Electrical Engineering and Computer Science
Thesis: LTE Radio Analytics Made Easy and Accessible
Advisor: Dina Katabi

Cairo University 2010-2012
Masters of Science in Electronics and Electrical Communication Engineering
Thesis: ASIC Design of All Digital PLL's for Processor-Clock Generation
Advisors: Serag El-Din Habib, and Hanan Kamal

Cairo University 2003-2008
Bachelor of Engineering in Electronics and Electrical Communication Engineering

Awards & Honors

MOBICOM S3 Workshop Best Poster Award 2014
ICEAC Best Student Paper Award 2010
IEEE Egyptian Engineering Day, best graduation project in electronics and communications 2008
The first place in the Egyptian Math Olympiad (for high school) 2001

Research and Work Experience

SW/HW Engineer 2018-present
Microsoft, Azure Networks
Developing algorithms and implementations on FPGA for speeding up the Data Center Networks.

PhD Student 2012-2018
Department of Electrical Engineering and Computer Science, MIT
Advisor: Dina Katabi
Worked on multiple projects related to high speed networks and signal processing:

- **MM-Wave imaging for smart cars**: Design and implementation of signal processing algorithms for imaging using mm-Wave.
- **Chorus**: Design and implemention (on FPGA) of a Distributed Multi-User MIMO system for LTE small cells.
- **MegaMIMO 2.0**: Design and implemention (on FPGA) of the full physical layer of an 802.11n compatible transceiver that is capable of performing Distributed Multi-User MIMO beam-forming.
- **LTEye**: LTEye is the first open platform to throw light into the LTE radio layer, without operator support. It discovers the locations of users in the network as well as their service quality. LTEye also found deficiencies in production AT&T and Verizon networks, including unprecedented inter-cell interference and inefficient usage of expensive licensed spectrum.
- **Hardware Implementation for the Sparse Fourier Transform Algorithm**: Design, ASIC implemention and fabrication (IBMs 45nm SOI technology), for an energy efficient 0.75 million point sparse Fourier transform.

- **Fully synthesizable All Digital PLL**: Design, ASIC implemention and fabrication (IBMs 45nm SOI technology), for a fully synthesizable All Digital PLL. The whole design is implemented in verilog.

Summer Intern 2016
Analog Devices Inc. Norwood MA, wideband RF transceiver group
Advisor: Chris Mayer
Digital design and integration of signal processing blocks inside the Digital Pre-Distorion engine.

Summer Intern 2015
Intel Hudson MA, New Devices Group (NDG)
Advisors: Mondira Pant (Mandy), and Yang Xue (Sharon)
Worked on developing and demonstrating an indoor localization algorithm using WiFi signals. The platform consisted of an Intel WiFi card attached to Intel Galileo board to act as a user device.

Full Year Intern 2009-2010
Intel Hillsboro OR, Circuits Research Lab (CRL)

Project 1 Advisor: Tanay Karnik
Worked on the design and implementation of a low power speech recognition engine.

Project 2 Advisors: Frank O'Mahony, and Bryan Casper
Worked on digital calibration for High-Speed I/O circuits, was responsible for both the interface and programming of an on-chip microcontroller that is used for calibration.

Research Assistant 2011-2012
Department of Electrical Engineering, American University in Cairo (AUC)
Advisor: Yehea Ismail
Worked on developing new techniques for on-chip high speed links.

Research Assistant 2008-2011
Department of Electrical Engineering, Nile Universitly
Advisor: Yehea Ismail
Worked on developing new techniques for on-chip high speed links.

Teaching Experience

Computer Networks	Fall 2015, MIT
Introduction to VLSI	Spring 2010 and Spring 2011, Cairo University
Classic Control Theory	Fall 2010 and Fall 2011, Cairo University
Introduction to Modern Control Theory	Spring 2010 and Spring 2011, Cairo University

Publications

Conference Papers:

Ezzeldin Hamed, Hariharan Rahul, and Bahar Partov. *Chorus: Truly Distributed Distributed-MIMO*, SIGCOMM'18, ACM Conference on Data Communication, August 2018

Ezzeldin Hamed, Hariharan Rahul, Mohammed A. Abdelghany, and Dina Katabi. *Real-time Distributed MIMO Systems*, SIGCOMM'16, ACM Conference on Data Communication, August 2016

Abhinav Agarwal, Haitham Hassanieh, Omid Abari, **Ezz Hamed**, Dina Katabi, and Arvind. *High-Throughput Implementation of a Million-Point Sparse Fourier Transform*, FPL'14, IEEE International Conference on Field Programmable Logic and Applications, September 2014

Swarun Kumar, **Ezzeldin Hamed**, Dina Katabi, and Li Erran Li. *LTE Radio Analytics Made Easy and Accessible*, SIGCOMM'14, ACM Conference on Data Communication, August 2014

Haitham Hassanieh, Lixin Shi, Omid Abari, **Ezzeldin Hamed**, and Dina Katabi. *GHz-Wide Sensing and Decoding Using the Sparse Fourier Transform*, INFOCOM'14, IEEE International Conference on Computer Communications, April 2014

Omid Abari, **Ezz Hamed**, Haitham Hassanieh, Abhinav Agarwal, Dina Katabi, Anantha Chandrakasan, and Vladimir Stojanovic. *A 0.75 Million-Point Fourier Transform Chip for Frequency-Sparse Signals*, ISSCC'14, IEEE International Solid-State Circuits Conference, February 2014

Sally Safwat, **Ezz El-Din Hussein**, Maged Ghoneima, and Yehea Ismail. *A 12Gbps all digital low power SerDes transceiver for on-chip networking*, ISCAS'11, IEEE International Symposium on Circuits and Systems, May 2011

Ezz El-Din Hussein, Shoukry Shams, Mohamed Ali, Amr Suleiman, Khalid ElWazeer, Ehab Sobhy, Ahmad Ibrahim, Ahmed Ibrahim, Mohamed Khairy, Mohamed Fouda, Al-Hussein El-Shafie, Ahmed Hareedy, ElSayed Ahmed, Ahmed Zakaria, Khalid El-Galaind, Amr El Sherief, and S. E.-D. Habib. *CUSPARC IP Processor: Design, Characterization and Applications* , ICM'10, IEEE International Conference on Microelectronics , December 2010

Ezz El-Din Hussein, Sally Safwat, Maged Ghoneima, and Yehea Ismail. *A New Signaling Technique for a Low Power SerDes Transceiver*, ICEAC'10, IEEE International Conference on Energy Aware Computing Systems and Applications, December 2010

Ezz El-Din Hussein, and Yehea Ismail. *A Novel Variation Insensitive Clock Distribution Methodology*, ISCAS'10, IEEE International Symposium on Circuits and Systems, May 2010

Posters and Demos:

Ezzeldin Hamed, Hariharan Rahul, Mohammed A. Abdelghany, and Dina Katabi. *A Real-time 802.11 Compatible Distributed MIMO System*, SIGCOMM'15, ACM Conference on Data Communication, August 2015

Swarun Kumar, **Ezzeldin Hamed**, Dina Katabi, and Li Erran Li. *LTE Radio Analytics Made Easy and Accessible*,MOBICOM'14 S3 Workshop, Annual Workshop on Wireless of the Students, by the Students, for the Students, September 2014

Ezz El-Din Hussein, Sally Safwat, Maged Ghoneima, and Yehea Ismail. *A 16Gbps Low Power Self-Timed SerDes Transceiver for Multi-Core Communication*, ISCAS'12, IEEE International Symposium on Circuits and Systems, May 2012

Ezz El-Din Hussein, and Yehea Ismail. *Optimal interconnect termination for on-chip high speed signaling*, ICEAC'11, IEEE International Conference on Energy Aware Computing Systems and Applications, December 2011

Patents

Methods and Apparatus for Sensing and Decoding Respective Frequency Components of Time-Varying Signals Using Sub-Nyquist Criterion Signal Sampling 2014
Haitham Hassanieh, Lixin Shi, Omid Abari, **Ezzeldin Hamed**, and Dina Katabi

Integrated Circuit Architecture to Improve Fourier Transform Efficiency for Sparse Signals 2013
Omid Abari, **Ezzeldin Hamed**, Haitham Hassanieh, Dina Katabi,
Anantha Chandrakasan, Vladimir Stojanovic, Lixin Shi, and Abhinav Agarwal