

ASSEM HUSSEIN

Research Associate | University of Waterloo

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SUMMARY OF QUALIFICATIONS

- 5+ years of experience in digital circuit design.
- Experienced with the digital design flow for both ASIC and FPGA.
- 2+ years of teaching experience of circuit design courses under the supervision of seven different supervisors.
- Excellent ability to communicate well with diverse audience through writing research articles and presenting them at prestigious international venues in addition to weekly meetings with industrial partners and research supervisors.
- Imaginative problem solver demonstrating strong analytical skills who enjoys collaborating with colleagues.
- Recognized for my research, academic and teaching skills with various awards and funds.

EXPERIENCE

Research Associate

University of Waterloo

June 2017 - Ongoing Waterloo, ON

- Worked on a joint project with Huawei Technologies Canada on the design of modulation schemes using large constellations robust to phase noise.
- Design and implementation of a test platform for an implemented stochastic LDPC decoder chip during the MASc.
- Mentoring an MASc student designing high performance circuits for convolutional neural networks (CNN).

Graduate Research Student

University of Waterloo

Jan 2015 - May 2017 Waterloo, ON

Supervisors: Prof. Vincent Gaudet and Prof. Mohamed Elmasry

- Worked on my thesis: Fault Tolerance of Stochastic Decoders for Error Correcting Codes.
- Designed and implemented a full chip of a stochastic LDPC decoder. The chip is currently under testing for post silicon validation.
- Took 5 academic courses: Digital CMOS ICs, Advanced Analog ICs, RTL Digital Systems, Digital Signal Processing and Introduction to optimization.
- Wrote two conference papers and presented them in prestigious international venues.
- Worked on different course projects in addition to a joint project with Huawei Technologies Canada apart from my thesis work.

Teaching Assistant

University of Waterloo

May 2015 - August 2017 Waterloo, ON

- Explained concepts of digital and analog circuits to students in weekly tutorials.

EDUCATION

M.A.Sc in Electrical and Computer Engineering

University of Waterloo

Jan 2015 - May 2017

B.Sc. with honors in Electronics and Electrical Communications Engineering

Cairo University

Sept 2009 - July 2014

TECHNICAL SKILLS

VHDL Verilog

Programming in C++ TCL(basics)

Matlab

Cadence Virtuoso Cadence Encounter

Synopsys Design compiler Calibre

ModelSim

Quartus Xilinx Proteus Multisim

Eagle L-edit

VOLUNTEERING

IEEE TCAS-I Reviewer

Reviewer at IEEE Transactions on Circuits and Systems I: Regular Papers (TCAS-I).

ECE GSA Chairman

Chairman of the Graduate Student Association of the Electrical and Computer Engineering Department at the University of Waterloo. (May 2015 - April 2016).

TA Mentor for ExpecTations

Volunteered as a teaching assistant mentor at the expectATIONS workshop for the new teaching assistants at the University of Waterloo in spring 2016.

- Designed course projects for Integrated Digital and Analog Electronics courses.
- Invited to give lectures in the Integrated Digital Electronics course.
- Introduced and trained students on using Cadence Virtuoso.
- Modifying and updating scripts required to run the physical design flow for the course projects of the graduate RTL Digital Systems course.
- Took part in developing a new undergraduate course.
- Mentored students in lab experiments to design different electronic circuits.
- Evaluating students' work in projects, quizzes, midterms and final exams.

Research Assistant

Cairo University

📅 August 2014 - Dec 2014 📍 Cairo, Egypt

- Worked on an FPGA tile design project.
- Invited to give lectures to graduate students in the "Digital Circuit Design" course on using Cadence Virtuoso.

Digital Design Intern

Mentor Graphics Egypt (Mentor Emulation Division)

📅 August 1, 2013 - Sept. 15, 2013 📍 Cairo, Egypt

- Implementing HW IPs on FPGA.

Digital Design Intern

ARTEC (ASEC Research and Technology)

📅 Aug. 2, 2010 - Sept. 8, 2010 📍 Cairo, Egypt

Engineering Intern

Arabian Cement Company

📅 July. 1, 2012 - Aug. 31, 2012 📍 Suez, Egypt

RELEVANT PROJECTS

MASc Thesis: Fault Tolerance of Stochastic Decoders for Error Correcting Codes (Published)

University of Waterloo

📅 Jan 2015 - Ongoing 📍 Waterloo, ON

- Developed software simulators in C++ of different LDPC decoding algorithms (stochastic decoding and Sum-product Algorithms) for various communication standards.
- Developed two models to emulate circuit soft errors in stochastic decoding at the system level. We apply our models to two standardized LDPC codes (10GBASE-T and WiMAX).
- Proved that stochastic decoding is very tolerant to faults and errors. Hence, it can be very useful in systems with very low power or high-performance requirements where we can push the limits of power or speed by lowering the supply voltage or highly overclocking the system while maintaining good performance.
- Designed and implemented a full chip of a stochastic LDPC decoder for an LDPC code of the WiMAX standard to verify our models of the fault tolerance of stochastic decoders.

ADDITIONAL PROJECTS

- Low-Power MDAC Design for the First-Stage Pipelined ADC
- Optimization of Two-Player Zero Sum Games: Connect-4
- A Two-Stage Single-Ended Op-Amp
- Automated and Wireless-Controlled Via Computer Line Tracking Vehicle
- Successive Approximation Register ADC Design and Implementation

TEACHING EXPERIENCE

Courses Taught: (1,000+ hours of teaching)

- ECE445 Integrated Digital Electronics with Profs. **Vincent Gaudet & Lan Wei** (twice) (Spring 2016 & Spring 2017)
- ECE444 Integrated Analog Electronics with Prof. **Adel Sedra** (twice) (Winter 2016 & Winter 2017)
- ECE 627 Register-transfer-level Digital Systems (Improvement of ASIC design flow scripts) with Prof. **Mark Aagaard** (Spring 2017)
- ECE 493 Non-Linear Electronics (Course Development) with Prof. **B. Leung** (Fall 2016 & Half of Spring 2016)
- ECE 242 Electronic Circuits 2 with Prof. **David Nairn** (Fall 2015)
- ECE 124 Digital Circuits and Systems with Prof. **Catherine Gebotys** (Spring 2015)

Courses Taken:

- Fundamentals of University Teaching Program
- ExpectAtions Workshop

AFFILIATIONS

IEEE Member

Institute of Electrical and Electronics Engineers

📅 Aug 2014 - Ongoing 📍 Waterloo, ON

Member at:

- IEEE Circuits and Systems Society
- IEEE Signal Processing Society
- IEEE Solid-State Circuits Society
- IEEE Computer Society

Design of modulation schemes using large constellations robust to phase noise

Huawei Technologies Canada and NSERC | University of Waterloo

📅 Feb 2017 – July 2017 📍 Waterloo, ON

- This is a joint project between Huawei Technologies Canada and our research group at the University of Waterloo, supervised by Professor Vincent Gaudet.
- Developed new large constellation schemes robust to phase noise.
- Tested the performance of these modulation schemes under AWGN and phase noise after decoding using LDPC codes and showed that our new modulation schemes are more robust to phase noise than conventional schemes like QAM or APSK.

VHDL Implementation of Kirsch Edge Detector

University of Waterloo

📅 Winter 2016 📍 Waterloo, ON

A 16-bit High Speed Low Power Hybrid Adder (Published)

University of Waterloo

📅 Fall 2015 📍 Waterloo, ON

BSc Graduation Project: A 4-bit 5GS/s Time-Based Analog-to-Digital Converter "TADC" (Published)

Cairo University

📅 Sept 2013 – July 2014 📍 Cairo, Egypt

A Full-Custom Implementation of a 6-bit Wallace Tree Multiplier

Cairo University

📅 Fall 2013 📍 Cairo, Egypt

A 40-instruction Microprocessor Designed in VHDL and tested on an Altera Cyclone FPGA

Cairo University

📅 Winter 2012 📍 Cairo, Egypt

PUBLICATIONS

👤 Publications

- Hussein, Assem, Mohamed Elmasry, and Vincent Gaudet (2017). "On the fault tolerance of stochastic decoders". In: *Multiple-Valued Logic (ISMVL), 2017 IEEE 47th International Symposium on*. IEEE, pp. 219–223.
- Hussein, Assem, Vincent Gaudet, et al. (2016). "A 16-bit high-speed low-power hybrid adder". In: *Microelectronics (ICM), 2016 28th International Conference on*. IEEE, pp. 313–316.
- Hussein, Assem S et al. (2014). "A 4-bit 6GS/s time-based analog-to-digital converter". In: *Microelectronics (ICM), 2014 26th International Conference on*. IEEE, pp. 92–95.

ACHIEVEMENTS



Sandford Fleming Teaching Excellence Award

University of Waterloo

Won in Nov. 2016 due to exceptional teaching of Integrated Analog Electronics course in Winter 2016.



Graduate Research Studentship Scholarship

(\$39,669)

University of Waterloo



International Master's Student Award

(\$11,360)

University of Waterloo



Nominated for Amit & Meena Chakma Award for Exceptional Teaching by a Student

University of Waterloo



Graduate Studies Research Travel Assistantship

(twice) (2×\$500)

University of Waterloo



NTRA's Sponsorship and financial support For my BSc graduation project

(10,000 L£)

Cairo University



Award of excellence for all undergraduate years of study

Cairo University



Ranked the 69th at the level of Republic of Egypt

General Secondary Certificate

(Scientific section of Mathematics)



Ranked the 5th at the level of Cairo Governorate

(top 0.0039%)

General Preparatory Certificate



3-year Scholarship from M.F.Khamis Foundation

(100 L£ Monthly)

Academic Excellence in General Preparatory Stage

REFEREES

Prof. Vincent Gaudet

Professor and Department Chair

University of Waterloo

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Prof. Adel Sedra

Distinguished Professor Emeritus

University of Waterloo

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