FURKAN ERCAN

Cambridge, MA ◇ (617) · 417 · 4761 ◇ furkanercan88@gmail.com ◇ **furkanercan.github.io**

EDUCATION

McGill University *October 2020*
Ph.D., Electrical & Computer Engineering
Research: Advanced Polar Code Decoder Algorithms & Implementations for the 5G New Radio

Middle East Technical University *June 2015*
M.Sc., Sustainable Environment & Energy Systems
Research: Energy-Efficient Multiplier VLSI Architectures & Design

Middle East Technical University *June 2011*
B.Sc., Electrical & Electronics Engineering (1^{st} Rank in Department)

WORK EXPERIENCE

Intel Corporation December 2022 - present
Research Scientist/Engineer *Hillsboro, OR, USA*

- Algorithms, development & hardware implementations for next-generation advanced reconfigurable communication systems.
- Design and optimization of multiple error-correcting code architectures hosted in a single communication node to support and future-proof commonly used communication standards.

Boston University November 2021 - December 2022
Postdoctoral Associate *Boston, MA, USA*

- Algorithms, software development & hardware implementations for next-generation universal decoding algorithms.
- Developed a software framework for the GRAND algorithm family in C++ with configurable ECC, channel, modulation and decoder settings. Used in algorithm development, statistics, profiling, hardware testbenching/metadata in bit-exact forms, and memory/runtime optimization.
- Physical layer security algorithm development in software against complicated channel conditions such as jamming and interference, using novel in-decoder detection and estimation techniques based on random processes.
- Advisor/management in chip development for the next-generation ultra low-energy universal decoder, with experience in hardware resource optimization, pre-silicon validation & critical features testing.

Octasic Inc. June 2020 - August 2021
5G PHY Senior Algorithm Developer *Montréal, QC, Canada*

- Design and optimization of 5G PHY Wireless Protocol Systems, including development of MATLAB reference models to optimized embedded C/ASM DSP implementations, with experience in memory & runtime profiling.
- MATLAB/C co-development using MEX subroutines for development and testbenching of in-house wireless chips.
- Development of the full 5G polar encoder and decoder chain in downlink and uplink channels.
- Optimization of the 5G polar decoder at multiple levels from algorithm to SIMD, making it flexible and several orders of magnitude faster than existing in-house solutions.
- Experience in PDCCH, PBCH, PUCCH channels in 5G PHY as well as LDPC codes.
- Personal track record on fast learning, taking initiatives, adaptation to new challenges, efficient debugging.

McGill University September 2015 - October 2020
Teaching & Research Assistant *Montréal, QC, Canada*

- Created a C++ framework for numerous polar code decoder algorithms and bit-exact editions with quantization for hardware development, debugging and testing.

· Developed several post-synthesis polar decoder architectures in hardware, with outperforming metrics in throughput, latency, area/energy-efficiency, and error correction.

Middle East Technical University September 2012 - June 2015
Teaching & Research Assistant *Ankara, Turkey*

· Designed and performed coursework for Digital Logic, Electronics, Computer Architecture, VLSI Design.

Intel Corporation July 2011 - July 2012
Graduate Intern (Full-Time) *Hillsboro, OR, USA*

· System-level energy-aware power management policy description, implementation and verification on Nehalem architecture targeting CPUs and RAMs.

· Hands-on experience with Intel server/PC architecture platforms, SPEC CPU benchmark.

ASELSAN Summer 2010
Summer Intern (Full-Time) *Ankara, Turkey*

· Wireless signal processing software optimization on SDR radio products.

TECHNICAL STRENGTHS

Languages	C/C++, MATLAB, VHDL, LaTeX, Perl, ASM
Tools & Platforms	ASIC, FPGA, Quartus, Xilinx, Visual Studio, ModelSim, Cadence, Git, SVN, Agile

SELECTED PUBLICATIONS

1. **F. Ercan**, T. Tonnellier, N. Doan, W. J. Gross, "Practical Dynamic SC-Flip Decoders: Algorithm and Implementation", in *IEEE Transactions on Signal Processing* **(TSP)**, October 2020.
2. **F. Ercan**, T. Tonnellier, and W. J. Gross, "Energy-Efficient Hardware Architectures for Fast Polar Decoders,", in *IEEE Transactions on Circuits and Systems I - Regular Papers* **(TCAS-I)**, Oct. 2019.
3. **F. Ercan**, C. Condo, and W. J. Gross, "Improved Bit-Flipping Algorithm for Successive Cancellation Decoding of Polar Codes,", in *IEEE Transactions on Communications* **(TCOM)**, Jan. 2019.
4. A. Riaz, A. Solomon, **F. Ercan**, M. Medard, K. R. Duffy, and R. T. Yazicigil, "Interleaved Noise Recycling using GRAND", in *IEEE International Conference on Communications* **(ICC)**, 2022.
5. **F. Ercan**, C. Condo, T. Tonnellier and W. J. Gross, "Operation Merging for Hardware Implementations of Fast Polar Decoders,", *Journal of Signal Processing Systems (JSPS)*, (online). DOI, 2018.

LEADERSHIP & PROFESSIONAL ACTIVITIES

Ongoing Associate Editor in IEEE Communications Letters.
Ongoing Lead Guest Editor in MDPI Special Issue VLSI Architectures for Wireless Communications and Digital Signal Processing.
Ongoing Active member of IEEE Wireless Communications Technical Committee.
Ongoing Reviewer for numerous top-tier international conferences and journalsin multiple fields such as Wireless Communications, Circuits & Systems, Digital Signal Processing.
2022 Technical Committee Co-Chair of IEEE Future Networks World Forum 2022.
2022 Technical Program Chair of IEEE Vehicular Technology Conference - 2022 Spring & 2022 Fall.
2021 Vice-Chair of IEEE Montreal Section.
2021 Demos & Exhibits Co-Chair of IEEE 5G World Forum 2021.
2021 Lead organizer and panelist of IEEE Montreal Section Keynote Event 2021.
2021 Technical Organization Committee at IEEE ICC 2021 Women in Engineering Panel.
2018 Volunteer instructor at Montréal Turkish Community Center for pre-college education.
2017 Volunteer coordinator in 5^{th} IEEE Global Conference on Signal and Information Processing Conference.
2016 Chair of McGill IEEE Student Branch.
2013 Graduate Program Student Representative at Middle East Technical University NCC.

2012 Technical organization of 3^{th} IEEE International Conference on Energy Aware Computing Systems.
2011 Founder and chair of IEEE METU NCC Student Branch.
2010 Technical organization of Mediterranean Microwave Symposium (MMS).

AWARDS

2021 Exemplary Keynote Organization Award by the IEEE Montreal Section.
2020 IEEE Communications Society Student Grant Award for ICC 2020.
2020 Third place in the province at Quebec Engineering Competition Graduate Research Track.
2019 First place award at McGill Engineering Competition Graduate Research Track for the oral presentation featuring "Energy-efficient hardware architectures for fast polar decoders".
2019 Second place award at 6^{th} IEEE Montreal Research Boost for the poster presentation titled "Energy-efficient polar decoders for 5G and beyond".
2018 Outstanding Teaching Assistant Award from the Faculty of Engineering, McGill University for tutoring Digital System Design course.
2018 Graduate Research Enhancement and Travel (GREAT) award for conference paper in IEEE Wireless Communications and Networking Conference (WCNC), Barcelona, Spain.
2017 Exemplary Student Branch Award for chairing McGill IEEE Student Branch.
2015 McGill Engineering Doctoral Award (Roger Boudreault Doctoral Fellowship).
2015 Best Paper Award in 5th International Conference on Energy Aware Computing Systems & Applications (ICEAC) 2015, Cairo, Egypt.
2007-2011 Dean's List for 6 consecutive semesters throughout B.Sc. degree.

RESOURCES

Personal Webpage / **LinkedIn** / **Google Scholar** / **ResearchGate** / **Web of Science**