
Patrick Mercier

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(a web resume - please email for full C.V.)

Education

- Ph.D. **Massachusetts Institute of Technology**, Electrical Engineering, Expected June 2012
Thesis title: *Connected Health: Communication and Power Delivery Architectures for Personal Medical Devices*
Advisor: Anantha P. Chandrakasan
Current GPA: 5.0/5.0
- S.M. **Massachusetts Institute of Technology**, Electrical Engineering, June 2008
Thesis title: *An All-Digital Transmitter for Pulsed Ultra-Wideband Communication*
Advisor: Anantha P. Chandrakasan
GPA: 5.0/5.0
- B.Sc. **University of Alberta**, Electrical and Computer Engineering, May 2006
GPA: 4.0/4.0

Research Experience

Massachusetts Institute of Technology
MICROSYSTEMS TECHNOLOGY LABORATORY

Cambridge, MA

Research Assistant, Ph.D. Candidate (2008-Present)

Investigated and developed a sub-nW, sub-cm² radio transmitter and antenna system for highly duty-cycled implantable electronics. Additionally, designed a system-on-chip (SoC) that utilizes an electronic textiles network as a medium for both communication and power delivery, resulting in the most energy efficient means of communicating data around the human body.

Research Assistant, S.M. Candidate (2006-2008)

Implemented an all-digital pulse-shaping ultra-wideband transmitter, which, at the time of publication, was the most energy efficient transmitter in the literature. In addition, designed a digital baseband modem as part of a receiver SoC that minimizes the energy per *useful* bit by improving packet synchronization speeds.

Intel Corporation
CIRCUITS RESEARCH LAB

Hillsboro, OR

Graduate Technical Intern (Summer 2008)

Investigated and designed low-swing and spatially encoded circuit solutions to improve energy efficiencies of on-chip data busses in many-core microprocessors.

Scanimetrix Inc.

Edmonton, AB

Technical Consultant (Summer 2006)

Designed digital driver circuitry in amorphous silicon for wireless LCD testing applications.

University of Alberta
iDSP LAB / HIGH CAPACITY DIGITAL COMMUNICATIONS LAB

Edmonton, AB

NSERC Research Assistant/Undergraduate Researcher (2005/06)

Developed a genetic algorithm for the design and optimization of FIR filters in canonical signed-digit and double base number systems spaces. Designed several building blocks for an all-analog FFT chip suitable for combination with an analog decoder for an all-analog OFDM front-end.

Selected Awards

- **Jack Kilby Award** – One awarded per year for outstanding student paper at the *International Solid-State Circuits Conference (ISSCC)* – received 2010
- **Intel Foundation Ph.D. Fellowship** – awarded to 26 applicants across the US – 2009
- **Post Graduate Scholarship** – Natural Sciences and Engineering Council of Canada (NSERC) – 2007, 2009
- **Best Presentation Award**, Microsystems Technology Lab Annual Research Conference – 2008, 2010
- **Julie Payette Postgraduate Research Fellowship** – Awarded to the top 24 Master’s NSERC applicants in Canada – 2006
- **APEGGA Medal** – Highest undergraduate GPA in Electrical Engineering – 2006
- **Atco Electric Centennial Award** – March 2005
- **Schlumberger Scholarship** in Electrical Engineering – 2004, 2005
- **Dean’s Research Award**, University of Alberta – 2003, 2004, 2005
- **Shell Canada Dean of Engineering Academic Excellence Scholarship** – 2002
- **Governor General’s Academic Medal** – 2002

Publications

JOURNAL PAPERS

- [1] **P. Mercier** and A.P. Chandrakasan, "A Supply-Rail-Coupled eTextiles Transceiver for Body-Area Networks," *IEEE Journal of Solid-State Circuits (JSSC)*, vol. 46, no. 6, pp 1284-1295, Jun. 2011.
- [2] **P. Mercier** and A.P. Chandrakasan, "A Low-Voltage Energy-Sampling IR-UWB Digital Baseband Employing Quadratic Correction," *IEEE Journal of Solid-State Circuits*, vol. 45, no. 6, pp 1209-1219, Jun. 2010.
- [3] D.C. Daly, **P. Mercier**, M. Bhardwaj, A.L. Stone, Z.N. Aldworth, T.L. Daniel, J. Voldman, J.G. Hildebrand, A.P. Chandrakasan, "A Pulsed UWB Receiver SoC for Insect Motion Control," *IEEE Journal of Solid-State Circuits*, vol. 45, no. 1, pp 153-166, Jan. 2010.
- [4] **P. Mercier**, D.C. Daly, and A.P. Chandrakasan, "An Energy-Efficient All-Digital UWB Transmitter Employing Dual Capacitively-Coupled Pulse-Shaping Drivers," *IEEE Journal of Solid-State Circuits*, vol. 44, no. 6, pp. 1679 - 1688, Jun. 2009.
- [5] A.P. Chandrakasan, F.S. Lee, D.D. Wentzloff, V. Sze, B.P. Ginsburg, **P. Mercier**, D.C. Daly, and R. Blazquez, "Low-Power Impulse UWB Architectures and Circuits," *Proceedings of the IEEE*, vol. 97, pp. 332-352, Feb. 2009.
- [6] **P. Mercier**, S. M. Kilambi, and B. Nowrouzian, "Optimization of FRM FIR digital filters over CSD and CDBNS multiplier coefficient spaces employing a novel genetic algorithm," *Journal of Computers*, vol. 2, pp. 20–31, Sep. 2007.

CONFERENCE PAPERS

- [7] **P. Mercier**, A.P. Chandrakasan, "A 110 μ W 10Mb/s eTextiles Transceiver for Body Area Networks with Remote Batter Power," in Proc. *IEEE International Solid-State Circuits Conference (ISSCC) Dig. Tech. Papers*, pp. 496-497, Feb. 2010.
- [8] **P. Mercier**, M. Bhardwaj, D.C. Daly, and A.P. Chandrakasan, "A 0.55V 16Mb/s 1.6mW Non-Coherent IR-UWB Digital Baseband with ± 1 ns Synchronization Accuracy," in Proc. *IEEE International Solid-State Circuits Conference (ISSCC) Dig. Tech. Papers*, pp. 252-253, Feb. 2009.

- [9] D.C. Daly, **P. Mercier**, M. Bhardwaj, A. L. Stone, J. Voldman, R. B. Levine, J. G. Hildebrand, A. P. Chandrakasan, "A Pulsed UWB Receiver SoC for Insect Motion Control," in *Proc. IEEE International Solid-State Circuits Conference (ISSCC) Dig. Tech. Papers*, pp. 200-201, Feb. 2009.
- [10] **P. Mercier**, D.C. Daly, and A.P Chandrakasan, "A 19pJ/pulse UWB Transmitter with Dual Capacitively-Coupled Digital Power Amplifiers," in *Proc. IEEE Radio Freq. IC Symp. (RFIC)*, Jun. 2008.
- [11] **P. Mercier**, D. C. Daly, M. Bhardwaj, D. D. Wentzloff, F. S. Lee, and A. P. Chandrakasan, "Ultra-low-power UWB for sensor network applications," in *Proc. IEEE International Conference on Circuits and Systems (ISCAS)*, May 2008.
- [12] D.C. Daly, M. Bhardwaj, F. S. Lee, **P. Mercier**, D. D. Wentzloff, J. Voldman, A. P. Chandrakasan, "Energy Efficient Pulsed-UWB Transceiver for Insect Flight Control," in *Government Microcircuit Applications & Critical Technology Conference (GOMACTech)*, pp. 401-404, Mar. 2008.
- [13] D. D. Wentzloff, F. S. Lee, D. C. Daly, M. Bhardwaj, **P. Mercier**, and A. P. Chandrakasan, "Energy efficient pulsed-UWB CMOS circuits and systems," in *Proc. IEEE Int. Conf. Ultra-wideband (ICUWB)*, Sep. 2007.
- [14] K. Boyle, **P. Mercier**, N. Sadeghi, V. Gaudet, C. Schlegel, C. Winstead, M. Kashyap, "Design and Implementation of an All-Analog Fast-Fourier Transform Processor," in *Proc. IEEE Midwest Symp. on Circuits and Systems (MWCAS)*, Aug. 2007, pp. 1532 – 1535.
- [15] **P. Mercier**, S. Singh, K. Iniewski, B. Moore, and P. O'Shea, "Yield and cost modeling for 3D chip stack technologies," in *Proc. IEEE Custom Integr. Circuits Conf. (CICC)*, Sep. 2006, pp. 357–360.
- [16] **P. Mercier** and B. Nowrouzian, "Design of FRM digital filters over the CSD multiplier coefficient space employing genetic algorithms," in *Proc. IEEE Int. Conf. on Acoust., Speech and Signal Process. (ICASSP)*, May 2006.
- [17] **P. Mercier** and B. Nowrouzian, "A genetic algorithm for the design and optimization of FRM digital filters over a canonical double-base multiplier coefficient space," in *Proc. IEEE International Conference on Circuits and Systems (ISCAS)*, May 2006.
- [18] K. Iniewski, C. Siu, S. Kilambi, S. Khan, B. Crowley, **P. Mercier**, and C. Schlegel, "Ultra-low power circuit and system design trade-offs for smart sensor network applications," in *Proc. IEEE Int. Conf. on Inf. and Comm. Tech.*, p. 309–321, Dec. 2005.

SELECTED PRESENTATIONS

- [19] **P. Mercier**, "Self-Powered Personal Microsystems for Medical Monitoring Applications," *Presented at TechConnect World*, Jun. 2011.
- [20] **P. Mercier**, "Attaining Extreme Energy Efficiency in Body-Area Networks Using Electronic Textiles," *Presented at the MEDRC Next Generation Medical Electronic Systems Workshop*, May, 2011.
- [21] **P. Mercier**, "Connected Health for Remote Patient Monitoring," *Presented at the MTL Annual Research Conference (MARC)*, Jan. 2010.
- [22] **P. Mercier**, "Energy Efficient Pulsed-UWB for Miniaturized Flying Vehicles," *Presented at the CMOS Emerging Technologies Workshop*, Feb. 2009.
- [23] **P. Mercier**, "A 22pJ/pulse All-Digital UWB Transmitter in 90nm CMOS," *Presented at the ISSCC Student Forum*, Feb. 2008.
- [24] **P. Mercier**, "Fully Integrated Pulsed-UWB Transceivers for Small Lightweight Flying Vehicles," *Presented at the MTL Annual Research Conference (MARC)*, Jan. 2008.
- [25] **P. Mercier**, "Cost Modeling for Vertically Integrated Chip Sets," *Presented at the CMOS Emerging Technologies Workshop*, Jul. 2006.