
Personal information

Surname(s) / First name(s)

Address(es)

Telephone(s)

Email(s)

Date of birth

Snelgrove, Martin

Kapik Integration
118 Euclid Ave., Suite 218,
Toronto, ON M6J 2J9,
Canada

+1.416.276.0222

snelgar@kapik.com

1954, Oct 5



Career Summary

A technology-focussed 16-year academic career followed by a move into entrepreneurship with a pattern of leading high-performance technical teams in aggressive developments of disruptive technologies, largely derived from the academic research.

Technologies Developed

bandpass $\Delta\Sigma$

The first rigorous work on bandpass $\Delta\Sigma$ converters and on continuous-time $\Delta\Sigma$ loops (originally bandpass, but later generalized) led to prototype converters clocking at GHz rates. Commercial versions are now in radars, digital receivers and RF power amplifiers.

switching RF power amplifiers

An asynchronous type of bandpass $\Delta\Sigma$ converter allowed switched feedback techniques to operate at RF, giving high efficiency and small form-factor power amplifiers at 2GHz and 200W.

complex analog filters

Developing a rigorous theory for I/Q filtering allowed generalization of older Hilbert-filter circuits to provide circuit structures well suited to integration; commercial embodiments are in receiver IF strips and RF power amplifiers.

adaptive analog filters

A range of techniques, specifically adapted to integration, for controlling analog filters; resulted in high-volume commercial products in wireline data and storage read channels.

A/D diagnosis and trim

Early contributions to diagnosis and test of pipeline A/D converters led to new "on-line" automatic trimming techniques now being commercialized for commodity data communications products.

Martin Snelgrove

Parallel Processing

Early work on "smart memory" SIMD computing, and particularly for video signal processing, led to a family of five US patents sold to MO-SAID and licensed on from there. The technology is the basis for Untether AI's architecture.

Chronology

2018 - .	Founder & CTO, Untether AI; developing high-efficiency inference engines
2008 - .	Founder & CEO, Kapik Integration; a design services firm specializing in "smart analog"
2004 - 2008	Founder & CTO, Dissonance Inc.; which has done consulting for Pulse-Wave RF (linearizing switching RF PAs), Isco Int'l. (new DSP-based interference management system for basestations), Snowbush Inc. (various, but principally disk-drive read channels), et al.; concurrently Chief Technologist at PulseWave RF
1998/07 - 2003/12	Cofounder & CTO, Soma Networks, Inc.; took the company to first product shipment of a full wireless local loop system
1998/07-1999/07	Chief Scientist, Philsar Electronics, Ottawa; spin-out of Carleton lab, patents and chips based on lab technologies of bandpass delta-sigma and adaptive correction of I/Q circuits; company sold to Conexant
1992/07 - 1999/06	Professor and holder of the OCRI/NSERC Industrial Research Chair in High-Speed Integrated Circuits, Dept. of Electronics, Carleton University, Ottawa; collaborations with Nortel & Mitel; theory and GHz realizations for continuous-time $\Delta\Sigma$ and for self-trim in multistep A/D
1987/07 - 1992/07	Associate Professor, Dept. of Electrical Engineering, University of Toronto; invention of complex $\Delta\Sigma$
1991/03 & 04	Visiting Professor, Oulu University, Finland
1989/01-07 & 1990/01-07	Resident Visitor, AT&T Bell Labs, Reading, PA; first work on bandpass $\Delta\Sigma$
1982/07-1987/06	Assistant Professor, Dept. of Electrical Engineering, University of Toronto; developed technologies in SIMD and MIMD signal processing
1982/01-07	Visiting Investigator, Instituto Nacional de Astrofisica, Optica y Electronica, Tonantzintla, Pue., Mexico
1982	Ph.D. thesis: initial theory for state-space filter synthesis and self-trim and for complex analog filtering

Martin Snelgrove

Patents

- [1] K. Sato, W. M. Snelgrove, S. Saijagan, and J. F. Rohlman, “Low-power static random access memory,” Apr-9 2024, US Patent 11,955,170. [Online]. Available: <http://www.dissonance.com/archive/patents/pat11955170.pdf>
- [2] W. M. Snelgrove and D. J. Wiebe, “Computational memory,” Mar-26 2024, US Patent 11,941,405. [Online]. Available: <http://www.dissonance.com/archive/patents/pat11941405.pdf>
- [3] W. M. Snelgrove, “Computational memory,” Mar-19 2024, US Patent 11,934,482. [Online]. Available: <http://www.dissonance.com/archive/patents/pat11934482.pdf>
- [4] —, “Computational memory with zero disable and error detection,” Jan-23 2024, US Patent 11881872. [Online]. Available: <http://www.dissonance.com/archive/patents/pat11881872.pdf>
- [5] W. M. Snelgrove and D. Wiebe, “Computational memory,” Mar-28 2023, US Patent 11,614,947. [Online]. Available: <http://www.dissonance.com/archive/patents/US11614947.pdf>
- [6] —, “System and method for energy-efficient implementation of neural networks,” Nov-29 2022, US Patent 11,514,294. [Online]. Available: <http://www.dissonance.com/archive/patents/US11514294.pdf>
- [7] W. M. Snelgrove and J. Scobbie, “Computational memory with cooperation among rows of processing elements and memory thereof,” Oct-11 2022, US Patent 11,468,002. [Online]. Available: <http://www.dissonance.com/archive/patents/US11468002.pdf>
- [8] W. M. Snelgrove, “Computational memory with zero disable and error detection,” May-22 2022, US Patent 11,342,944. [Online]. Available: <http://www.dissonance.com/archive/patents/US11342944.pdf>
- [9] T. Chandler, W. M. Snelgrove, and J. D. Wiebe, “Computational memory,” Feb 22 2022, US Patent 11256503. [Online]. Available: <http://www.dissonance.com/archive/patents/pat11256503.pdf>
- [10] C. I. Peddle, W. M. Snelgrove, R. N. McKenzie, and X. Snelgrove, “Solid state drive architectures,” June 15 2021, US Patent 11037625. [Online]. Available: <http://www.dissonance.com/archive/patents/US11037625.pdf>
- [11] —, “Solid state drive architectures,” Oct 6 2020, US Patent 10796762. [Online]. Available: <http://www.dissonance.com/archive/patents/US10796762.pdf>
- [12] R. N. McKenzie, W. M. Snelgrove, and W. T. Ng, “Amplifiers with delta-sigma modulators using pulse-density modulations and related processes,” September 29 2020, US Patent 10790790. [Online]. Available: <http://www.dissonance.com/archive/patents/pat107908790.pdf>
- [13] A. Srivastava, M. I. Ahmed, D. T. Dunwell, W. M. Snelgrove, A. Hasan, and M. D. James, “Highly configurable front end for touch controllers,” June 25 2019, US Patent 10331282. [Online]. Available: <http://www.dissonance.com/archive/patents/pat10331282.pdf>
- [14] —, “Highly configurable front end for touch controllers,” January 8 2019, US Patent 10175839. [Online]. Available: <http://www.dissonance.com/archive/patents/pat10175839.pdf>

Martin Snelgrove

- [15] W. M. Snelgrove, "System and method for sensing touches in capacitive panels," Apr 17 2018, US Patent 9946418. [Online]. Available: <http://www.dissonance.com/archive/patents/US9946418.pdf>
- [16] C. I. Peddle, W. M. Snelgrove, R. N. McKenzie, and X. Snelgrove, "Solid state drive architectures," Apr 10 2018, US Patent 9941007. [Online]. Available: <http://www.dissonance.com/archive/patents/US9941007.pdf>
- [17] K. B. Roberts, S. O. Gharan, W. M. Snelgrove, and M. Taherzadehboroujeni, "Frequency domain combination of parallel signal paths," May 30 2017, US Patent 9667348. [Online]. Available: <http://www.dissonance.com/archive/patents/pat9667348.pdf>
- [18] I. Ahmed, J. Cherry, and W. M. Snelgrove, "Sigma delta modulator," Dec. 6 2016, US Patent 9513651. [Online]. Available: <http://www.dissonance.com/archive/patents/pat9513651.pdf>
- [19] W. M. Snelgrove, "System and method for processing a signal with a filter employing FIR and IIR elements," Aug. 2 2016, US Patent 9407236. [Online]. Available: <http://www.dissonance.com/archive/patents/pat9407236.pdf>
- [20] —, "System and method for high speed analog to digital data acquisition," August 18 2015, US Patent 9112524. [Online]. Available: <http://www.dissonance.com/archive/patents/pat9112524.pdf>
- [21] —, "System and method for digitally correcting mismatches in multipath ADCs," September 16 2014, US Patent 8836550. [Online]. Available: <http://www.dissonance.com/archive/patents/pat8836550.pdf>
- [22] W. M. Snelgrove, K. B. Roberts, B. Leesti, S. O. Gharan, and M. Taherzadehboroujeni, "System and apparatus for distributing a signal to the front end of a multipath analog to digital converter," August 26 2014, US Patent 8818209. [Online]. Available: <http://www.dissonance.com/archive/patents/pat8818209.pdf>
- [23] W. M. Snelgrove, "System and method for high speed analog to digital data acquisition," August 12 2014, US Patent 8803724. [Online]. Available: <http://www.dissonance.com/archive/patents/pat8803724.pdf>
- [24] —, "System and method for processing a signal with a filter employing FIR and IIR elements," January 29 2014, US Patent 8655936. [Online]. Available: <http://www.dissonance.com/archive/patents/US8655936.pdf>
- [25] M. Snelgrove, M. Stumm, and M. De Simone, "Method and system of teleconferencing," November 23 2010, US Patent 7839803. [Online]. Available: <http://www.dissonance.com/archive/patents/pat7839803.pdf>
- [26] W. M. Snelgrove and K. M. Mekechuk, "Radio frequency power amplifier and method using a controlled supply," Jan. 6 2009, US Patent 7474149. [Online]. Available: <http://www.dissonance.com/archive/patents/pat7474149.pdf>
- [27] W. Snelgrove, K. Mekechuk, D. Kelly, and R. Wilson, "Radio frequency power amplifier and corresponding method," Apr. 1 2008, US Patent 7352237. [Online]. Available: <http://www.dissonance.com/archive/patents/pat7352237.pdf>
- [28] M. Stumm, W. M. Snelgrove, B. Preiss, M. Frazer, and M. de Simone, "Telecommunication architecture," Mar. 27 2007,

Martin Snelgrove

- US Patent 7,197,128. [Online]. Available: <http://www.dissonance.com/archive/patents/pat7197128.pdf>
- [29] J. A. Bailey, M. E. Butenhoff, R. Chik, A. McLaren, and M. Snelgrove, "Systems and methods for creating complex poles," Mar. 27 2007, US Patent 7196573. [Online]. Available: <http://www.dissonance.com/archive/patents/pat7196573.pdf>
- [30] F. van Heeswyk, R. Mantha, and W. M. Snelgrove, "Control channel for a wireless digital subscriber line system," Jan. 30 2007, US Patent 7,170,943. [Online]. Available: <http://www.dissonance.com/archive/patents/pat7170943.pdf>
- [31] D. Elliott and W. M. Snelgrove, "Method and apparatus for an energy efficient operation of multiple processors in a memory," Dec. 26 2006, US Patent 7,155,581. [Online]. Available: <http://www.dissonance.com/archive/patents/pat7155581.pdf>
- [32] M. Snelgrove, M. Stumm, and T. Moat, "Subscriber stations," May 23 2006, US Patent 7,050,757. [Online]. Available: <http://www.dissonance.com/archive/patents/pat7050757.pdf>
- [33] M. Frazer, F. van Heeswyk, F. Kschischang, R. Mantha, and W. M. Snelgrove, "Communication structure with channels configured responsive to reception quality," May 23 2006, US Patent 7,050,407. [Online]. Available: <http://www.dissonance.com/archive/patents/pat7050407.pdf>
- [34] Y. Pathak, M. Stumm, and W. M. Snelgrove, "Wireless local loop," Mar. 21 2006, US Patent 7,016,317. [Online]. Available: <http://www.dissonance.com/archive/patents/pat7016317.pdf>
- [35] M. Frazer, F. van Heeswyk, F. Kschischang, R. Mantha, and W. M. Snelgrove, "Communication structure for multiplexed links," Feb. 14 2006, US Patent 6999471. [Online]. Available: <http://www.dissonance.com/archive/patents/pat6999471.pdf>
- [36] W. M. Snelgrove, M. Stumm, M. De Simone, and B. Preiss, "Telecommunication services," Jan. 10 2006, US Patent 6985722. [Online]. Available: <http://www.dissonance.com/archive/patents/pat6985722.pdf>
- [37] N. Birkett, J. Cherry, W. M. Snelgrove, and F. Balteanu, "Complex filtering/AGC radio receiver architecture for low-IF or zero-IF," Dec. 20 2005, US Patent 6977976, European Patent EP 1230738. [Online]. Available: <http://www.dissonance.com/archive/patents/pat6977976.pdf>
- [38] L. Yu and W. M. Snelgrove, "Signal processor for reducing undesirable signal content," Oct. 12 2004, US Patent 6804359; Canadian Patent 2244446. [Online]. Available: <http://www.dissonance.com/archive/patents/pat6804359.pdf>
- [39] M. de Simone, W. Snelgrove, and M. Stumm, "System and method for conducting an auction over a communications network," Mar. 26 2003, EP Patent 1,116,374. [Online]. Available: <https://www.google.com/patents/EP1116374B1>
- [40] D. Elliott and W. Snelgrove, "Method and apparatus for an energy efficient operation of multiple processors in a memory," May 6 2003, US Patent 6560684. [Online]. Available: <http://www.dissonance.com/archive/patents/pat6560684.pdf>
- [41] W. M. Snelgrove, "Establishing and managing communications over telecommunication

Martin Snelgrove

networks,” Mar. 18 2003, US Patent 6535592. [Online]. Available: <http://www.dissonance.com/archive/patents/pat6535592.pdf>

[42] W. M. Snelgrove, F. van Heeswyk, F. Kschischang, M. Frazer, and R. Mantha, “Communication structure for multiplexed links,” Feb. 12 2003, EP Patent 1,282,987.

[43] A. Swaminathan, E. MacRobbie, and W. M. Snelgrove, “Method and apparatus for minimizing mismatch in a complex filter,” Dec. 11 2001, US Patent 6329939, Canadian Patent 2262209. [Online]. Available: <http://www.dissonance.com/archive/patents/pat6329939.pdf>

[44] D. Elliott and W. M. Snelgrove, “Memory device with multiple processors having parallel access to the same memory area,” Aug. 21 2001, US Patent 6,279,088. [Online]. Available: <http://www.dissonance.com/archive/patents/pat6279088.pdf>

[45] W. M. Snelgrove, M. Stumm, and M. de Simone, “Method and system of teleconferencing,” Apr. 6 2000, WO/2000/019,693.

[46] W. M. Snelgrove, M. Stumm, M. de Simone, and C. Trudeau, “Connection manager for telecommunications,” Apr. 6 2000, WO/2000/019,677.

[47] D. Elliott and W. M. Snelgrove, “Memory device with multiple processors having parallel access to the same memory area,” Sep. 21 1999, US Patent 5956274. [Online]. Available: <http://www.dissonance.com/archive/patents/pat5956274.pdf>

[48] —, “Method and apparatus for a single instruction operating multiple processors on a memory chip,” Aug. 13

1996, US Patent 5,546,343. [Online]. Available: <http://www.dissonance.com/archive/patents/pat5546343.pdf>

Journal Papers

- [1] J. A. Cherry, W. M. Snelgrove, and W. Gao, “On the design of a fourth-order continuous-time LC $\Delta\Sigma$ modulator for UHF A/D conversion,” *IEEE Transactions on Circuits and Systems Part II*, vol. 47, no. 6, pp. 518–530, Jun. 2000.
- [2] L. Yu and M. Snelgrove, “A novel adaptive mismatch cancellation system for quadrature IF radio receivers,” *IEEE Transactions on Circuits and Systems Part II*, vol. 46, no. 6, pp. 789–801, Jun. 1999.
- [3] J. Cherry and W. Snelgrove, “Excess loop delay in continuous-time delta-sigma modulators,” *IEEE Transactions on Circuits and Systems Part II*, vol. 46, no. 4, pp. 376–389, Apr. 1999.
- [4] —, “Clock jitter and quantizer metastability in continuous-time delta-sigma modulators,” *IEEE Transactions on Circuits and Systems Part II*, vol. 46, no. 6, pp. 661–676, Jun. 1999.
- [5] D. Elliott, M. Stumm, W. M. Snelgrove, C. Cojocar, and R. McKenzie, “Computational RAM: Implementing processors in memory,” *IEEE Design & Test Magazine*, vol. 16, no. 1, pp. 32–41, 1999. [Online]. Available: http://portal.acm.org/ft_gateway.cfm?id=622878&type=external&coll=Portal&dl=GUIDE&CFID=14050317&CFTOKEN=83303308
- [6] S. Bazarjani and W. M. Snelgrove, “A 160-MHz fourth-order double-sampled SC bandpass sigma-delta modulator,” *IEEE Transactions on*

- Circuits and Systems Part II*, vol. 45, no. 5, pp. 547–555, May 1998.
- [7] J. Cherry and W. Snelgrove, “On the characterization and reduction of distortion in bandpass filters,” *IEEE Transactions on Circuits and Systems Part I*, vol. 45, no. 5, pp. 523–537, May 1998.
- [8] W. Gao and W. Snelgrove, “A 950-MHz IF second-order integrated LC bandpass delta-sigma modulator,” *IEEE Journal of Solid-State Circuits*, vol. 33, no. 5, pp. 723–732, May 1998. [Online]. Available: <http://www.dissonance.com/archive/journals/WGao98.pdf>
- [9] —, “A linear integrated LC bandpass filter with Q-enhancement,” *IEEE Transactions on Circuits and Systems Part II* [see also *Circuits and Systems II: Express Briefs, IEEE Transactions on*], vol. 45, no. 5, pp. 635–639, May 1998.
- [10] N. Tarr, Y. Wang, R. Soreefan, W. Snelgrove, B. Manning, S. Bazarjani, and T. MacElwee, “Limitations on threshold adjustment by backgating in fully depleted silicon-on-insulator metal-oxide-semiconductor field effect transistors,” *Journal of Vacuum Science & Technology A: Vacuum, Surfaces, and Films*, vol. 16, p. 838, 1998.
- [11] J. Cherry, W. M. Snelgrove, and P. Schvan, “Signal-dependent timing jitter in continuous-time sigma-delta modulators,” *Electronics Letters*, vol. 33, no. 13, pp. 1118–1119, June 1997.
- [12] O. Shoaie and W. Snelgrove, “Design and implementation of a tunable 40 MHz–70 MHz Gm-C bandpass $\Delta\Sigma$ modulator,” *IEEE Transactions on Circuits and Systems Part II*, vol. 44, no. 7, pp. 521–530, Jul. 1997. [Online]. Available: <http://www.dissonance.com/archive/journals/Shoaie97.pdf>
- [13] W. Gao, W. Snelgrove, and S. Kovacic, “A 5-GHz SiGe HBT return-to-zero comparator for RF A/D conversion,” *IEEE Journal of Solid-State Circuits*, vol. 31, no. 10, pp. 1502–1506, Oct. 1996. [Online]. Available: <http://www.dissonance.com/archive/journals/WGao96.pdf>
- [14] N. Tarr, R. Soreefan, T. MacElwee, W. Snelgrove, and S. Bazarjani, “Simple backgated MOSFET structure for dynamic threshold control in fully depleted SOI CMOS,” *Electronics Letters*, vol. 32, no. 12, pp. 1093–1095, Dec. 1996. [Online]. Available: <http://www.dissonance.com/archive/journals/Tarr96.pdf>
- [15] A. Shoval, W. M. Snelgrove, and D. Johns, “A 100 Mb/s BiCMOS adaptive pulse-shaping filter,” *Selected Areas in Communications, IEEE Journal on*, vol. 13, no. 9, pp. 1692–1702, Dec. 1995. [Online]. Available: <http://www.dissonance.com/archive/journals/Shoval95.pdf>
- [16] F. Singor and W. M. Snelgrove, “Switched-capacitor bandpass delta-sigma A/D modulation at 10.7 MHz,” *IEEE Journal of Solid-State Circuits*, vol. 30, no. 3, pp. 184–192, Mar. 1995. [Online]. Available: <http://www.dissonance.com/archive/journals/Singor95.pdf>
- [17] A. Shoval, D. Johns, and W. Snelgrove, “Comparison of DC offset effects in four LMS adaptive algorithms,” *IEEE Transactions on Circuits and Systems Part II*, vol. 42, no. 3, pp. 176–185, Mar. 1995. [Online]. Available: <http://www.dissonance.com/archive/journals/Shoval95a.pdf>
- [18] S. Lewis, R. Ramachandran, and W. M. Snelgrove, “Indirect testing of digital-correction circuits in analog-to-digital converters with redundancy,” *IEEE Transactions on Circuits and Systems Part II [Express Briefs]*,

Martin Snelgrove

- vol. 42, no. 7, pp. 437–445, Jul. 1995. [Online]. Available: <http://www.dissonance.com/archive/journals/Shoval95.pdf>
- [19] F. Gao and W. M. Snelgrove, “Adaptive nonlinear recursive state-space filters,” *IEEE Transactions on Circuits and Systems Part II [Express Briefs]*, vol. 41, no. 11, pp. 760–764, Nov. 1994. [Online]. Available: <http://www.dissonance.com/archive/journals/FGao94.pdf>
- [20] S. Jantzi, W. M. Snelgrove, and P. Ferguson, “A fourth-order bandpass sigma-delta modulator,” *IEEE Journal of Solid-State Circuits*, vol. 28, no. 3, pp. 282–291, Mar. 1993. [Online]. Available: <http://www.dissonance.com/archive/journals/Jantzi93.pdf>
- [21] A. Shoval, D. Johns, and W. M. Snelgrove, “Wide-range tunable BiCMOS transconductor,” *Microelectronics Journal*, vol. 24, no. 5, pp. 555–564, 1993. [Online]. Available: <http://www.dissonance.com/archive/journals/Shoval93.pdf>
- [22] W. Snelgrove and A. Shoval, “A balanced 0.9- μm CMOS transconductance-C filter tunable over the VHF range,” *IEEE Journal of Solid-State Circuits*, vol. 27, no. 3, pp. 314–323, Mar. 1992. [Online]. Available: <http://www.dissonance.com/archive/journals/Snelgrove92.pdf>
- [23] X. Y. Gao and W. M. Snelgrove, “An adaptive backpropagation cascade IIR filter,” *IEEE Transactions on Circuits and Systems Part II*, vol. 39, no. 9, pp. 606–610, Sep. 1992. [Online]. Available: <http://www.dissonance.com/archive/journals/FGao92.pdf>
- [24] —, “Adaptive linearization of a loudspeaker,” *IEEE International Conference on Acoustics, Speech and Signal Processing*, pp. 3589–3592, May 14–17 1991. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/XGao91a.pdf>
- [25] S. Jantzi, R. Schreier, and W. M. Snelgrove, “Bandpass sigma-delta analog-to-digital conversion,” *IEEE Transactions on Circuits and Systems (Express Letter)*, vol. 38, no. 11, pp. 1406–1409, Nov 1991. [Online]. Available: <http://www.dissonance.com/archive/journals/Jantzi91.pdf>
- [26] D. Johns, W. Snelgrove, and A. Sedra, “Continuous-time lms adaptive recursive filters,” *Circuits and Systems, IEEE Transactions on*, vol. 38, no. 7, pp. 769–778, 1991. [Online]. Available: <http://www.dissonance.com/archive/journals/Johns91.pdf>
- [27] —, “Adaptive recursive state-space filters using a gradient-based algorithm,” *Circuits and Systems, IEEE Transactions on*, vol. 37, no. 6, pp. 673–684, 1990. [Online]. Available: <http://www.dissonance.com/archive/journals/Johns90.pdf>
- [28] R. Schreier and W. M. Snelgrove, “Bandpass sigma-delta modulation,” *Electronics Letters*, vol. 25, no. 23, pp. 1560–1561, Nov 1989. [Online]. Available: <http://www.dissonance.com/archive/journals/Schreier89.pdf>
- [29] D. Johns, W. Snelgrove, and A. Sedra, “Orthonormal ladder filters,” *Circuits and Systems, IEEE Transactions on*, vol. 36, no. 3, pp. 337–343, 1989. [Online]. Available: <http://www.dissonance.com/archive/journals/Johns89.pdf>
- [30] J. Rose, W. Snelgrove, and Z. Vranesic, “Parallel standard cell placement algorithms with quality equivalent to simulated annealing,” *Computer-Aided Design of Integrated*

Martin Snelgrove

Circuits and Systems, IEEE Transactions on, vol. 7, no. 3, pp. 387–396, 1988. [Online]. Available: <http://www.dissonance.com/archive/journals/Rose88.pdf>

- [31] G. Roberts, W. Snelgrove, and A. Sedra, “Switched-capacitor realization of nth-order transfer function using a single multiplexed op-amp,” *Circuits and Systems, IEEE Transactions on*, vol. 34, no. 2, pp. 140–148, 1987. [Online]. Available: <http://www.dissonance.com/archive/journals/Roberts87.pdf>
- [32] W. Snelgrove and A. Sedra, “Synthesis and analysis of state-space active filters using intermediate transfer functions,” *IEEE Transactions on Circuits and Systems*, vol. 33, no. 3, pp. 287–301, Mar. 1986, guillemain-Cauer best paper award, 1986). [Online]. Available: <http://www.dissonance.com/archive/journals/Snelgrove86.pdf>
- [33] W. M. Loucks, W. M. Snelgrove, and S. Zaky, “A vector processor based on one-bit microprocessors,” *IEEE Micro*, vol. 2, no. 1, pp. 53–62, feb 1982. [Online]. Available: <http://www.dissonance.com/archive/journals/Loucks82.pdf>
- [34] M. Snelgrove and A. S. Sedra, “On state-variable biquads with optimum integrator sensitivities,” *IEE Proceedings G. Electronic Circuits and Systems*, vol. 128, no. 4, pp. 173–5, aug 1981. [Online]. Available: <http://www.dissonance.com/archive/journals/Snelgrove81.pdf>
- [2] I. Ahmed, D. Halupka, B. Leesti, J. A. Cherry, R. McKenzie, A. Nilchi, H. Mazhab-Jafari, W. M. Snelgrove, and R. Chik, “A 3-axis PZT-based MEMS gyroscope in 0.18 μm cmos,” *ESSCIRC’12*, pp. 241–244, 2012.
- [3] A. Swaminathan, N. Fong, P. Lauzon, H. K. Yang, M. Maliepaard, and W. M. Snelgrove, “A low power $\Sigma\Delta$ analog-to-digital modulator with 50MHz sampling rate in a μm SOI CMOS technology,” *IEEE International SOI Conference*, 1999.
- [4] P. Nyasulu, R. Mason, W. Snelgrove, and D. Elliott, “Minimizing the effect of the host bus on the performance of a computational RAM logic-in-memory parallel-processing system,” *IEEE Custom Integrated Circuits Conference*, pp. 631–634, May 1999. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Nyasulu99.pdf>
- [5] J. Cherry and W. M. Snelgrove, “Approaches to simulating continuous-time delta sigma modulators,” *IEEE International Symposium on Circuits and Systems*, vol. 1, pp. 596–599, 1998.
- [6] L. Yu and W. M. Snelgrove, “Mismatch cancellation for double-sampling $\Sigma\Delta$ modulators,” *IEEE International Symposium on Circuits and Systems*, vol. 1, pp. 356–359, 1998.
- [7] J. Cherry and W. M. Snelgrove, “Loop delay and jitter in continuous-time $\Delta\Sigma$ modulators,” *IEEE International Symposium on Circuits and Systems*, vol. 1, pp. 587–590, 1998.
- [8] T. Le, W. Snelgrove, and S. Panchanathan, “SIMD processor arrays for image and video processing: a review,” *SPIE - Multimedia Hardware Architectures ’98*, vol. 3311, pp. 30–41, Mar. 8–14 1998. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Le98sim.pdf>

Refereed Conference Papers

- [1] I. Ahmed, J. Cherry, A. Hasan, A. Nafee, D. Halupka, Y. Allasasmeh, and M. Snelgrove, “A low-power Gm-C-based CT $\Sigma\Delta$ audio-band ADC in 1.1V 65nm CMOS,” *VLSIC’15*, 2015.

Martin Snelgrove

- [9] W. Gao, J. Cherry, and W. Snelgrove, "A 4 GHz fourth-order SiGe HBT band pass $\Delta\Sigma$ modulator," *IEEE International Symposium on VLSI Circuits*, pp. 174–175, May 1998. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/WGao98.pdf>
- [10] T. Le, W. Snelgrove, and S. Panchanathan, "Fast motion estimation using feature extraction and XOR operations," *SPIE Proceedings of Multimedia Hardware Architectures*, pp. 108–118, 1998.
- [11] D. Elliott, W. Snelgrove, C. Cojocaru, and M. Stumm, "Computing RAMs for media processing," *SPIE Multimedia Hardware Architectures*, p. 66, Feb. 8–14 1997.
- [12] W. Gao, O. Shoaie, and W. Snelgrove, "Excess loop delay effects in continuous-time delta-sigma modulators and the compensation solution," *IEEE International Symposium on Circuits and Systems*, vol. 1, 1997.
- [13] W. Gao and W. Snelgrove, "A linear active Q-enhanced monolithic LC filter," *IEEE International Symposium on Circuits and Systems*, vol. 1, 1997.
- [14] L. Yu and W. M. Snelgrove, "mismatch cancellation for complex bandpass sigma-delta modulators," *IEEE International Symposium on Circuits and Systems*, vol. 2, pp. 814–817, 1997.
- [15] S. Bazarjani and W. M. Snelgrove, "A 40MHz IF fourth-order double-sampled SC bandpass modulator," *IEEE International Symposium on Circuits and Systems*, vol. 1, pp. 73–76, Jun. 10–12 1997.
- [16] S. Bazarjani, W. M. Snelgrove, T. Monson, and T. MacElwee, "1V mixed-signal circuits in a CMOS technology," *IEEE International Symposium on Circuits and Systems*, vol. 3, pp. 1860–1863, Jun 10–12 1997.
- [17] T. Le, W. Snelgrove, and S. Panchanathan, "Computational RAM implementation of MPEG-2 for real-time encoding," *Proc. SPIE Vol. 3021, Multimedia Hardware Architectures*, pp. 182–193, Feb. 8–14 1997. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Le97.pdf>
- [18] W. Gao and W. Snelgrove, "A 950MHz second-order integrated LC bandpass $\Delta\Sigma$ modulator," *IEEE International Symposium on VLSI Circuits*, pp. 111–112, 1997. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/WGao97c.pdf>
- [19] H. Yang and W. Snelgrove, "High speed polyphase CIC decimation filters," *IEEE International Symposium on Circuits and Systems*, vol. 2, pp. 229–232, 1996. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/HKYang96.pdf>
- [20] H. K. Yang and W. M. Snelgrove, "Symbol timing recovery using oversampling techniques," *International Conference on Communications (ICC)*, Jun. 23-27 1996. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/HKYang96b.pdf>
- [21] T. Varelas, S. Bazarjani, and W. Snelgrove, "A bipolar sampled-data bandpass delta-sigma A/D modulator," *IEEE Custom Integrated Circuits Conference*, pp. 205–208, 1996. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Varelas96.pdf>
- [22] N. Tarr, R. Soreefan, T. MacElwee, W. Snelgrove, and S. Bazarjani, "A simple implanted backgate MOSFET for dynamic threshold

Martin Snelgrove

- control infully-depleted SOI CMOS,” *IEEE International SOI Conference*, pp. 76–77, 1996. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Tarr96.pdf>
- [23] O. Shoaie and W. Snelgrove, “A wide-range tunable 25 MHz-110 MHz BiCMOS continuous-time filter,” *IEEE International Symposium on Circuits and Systems*, vol. 1, May 12–15 1996. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Shoaei96.pdf>
- [24] S. Bazarjani, M. Snelgrove, and T. MacElwee, “1V switched-capacitor sigma-delta modulator,” *IEEE Symposium on Low Power Electronics*, pp. 70–73, Oct. 1995. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Seyfi95d.pdf>
- [25] S. Bazarjani and W. M. Snelgrove, “A 4th order SC bandpass sigma-delta modulator designed on a digital CMOS process,” *IEEE Midwest Symposium on Circuits and Systems*, vol. 2, Aug. 1995. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Seyfi95b.pdf>
- [26] S. Bazarjani, T. MacElwee, and W. M. Snelgrove, “optimizing the natural MOSFETs in a process for 1V mixed-signal applications,” *European Solid-State Device Research Conference (ESSDERC)*, Sep. 25–27 1995. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Seyfi95c.pdf>
- [27] B. Korst-Fagundes, J. Xie, and W. M. Snelgrove, “multipoint equalization with the condition number,” *IEEE Midwest Symposium on Circuits and Systems*, Aug. 1995. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/BKF95.pdf>
- [28] J. Cherry and W. M. Snelgrove, “Analog filter banks with low intermodulation distortion,” *IEEE International Symposium on Circuits and Systems*, vol. 2, pp. 1195–1198, April 1995. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Cherry95.pdf>
- [29] S. Bazarjani and W. M. Snelgrove, “Low voltage SC circuit design with low-V_t MOSFETs,” *IEEE International Symposium on Circuits and Systems*, vol. 2, pp. 1021–1024, Apr. 1995. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Seyfi95a.pdf>
- [30] O. Shoaie and W. M. Snelgrove, “A multi-feedback design for LC bandpass delta-sigma modulators,” *IEEE International Symposium on Circuits and Systems*, vol. 1, pp. 171–174, apr 29–May 3 1995. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Shoaei95.pdf>
- [31] W. Gao, W. M. Snelgrove, T. Varelas, S. Kovacic, and D. Hame, “A 5-GHz SiGe HBT return-to-zero comparator,” *Bipolar/BiCMOS Circuits and Technology Meeting, 1995., Proceedings of the 1995*, pp. 166–169, 1995. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/WGao95.pdf>
- [32] W. Gao and W. M. Snelgrove, “Floating gate charge-sharing: a novel circuit for analog trimming,” *IEEE International Symposium on Circuits and Systems*, vol. 4, pp. 315–318, May 30–Jun 2 1994. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/WGao94.pdf>
- [33] F. Singer and W. M. Snelgrove, “10.7 MHz bandpass sigma-delta A/D modulators,” *IEEE Custom Integrated Circuits Conference*, pp. 163–166, May 1–4 1994. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Singer94.pdf>

Martin Snelgrove

- [34] W. Gao and W. Snelgrove, “the floating gate mos device as an analog trimming element,” *Microelectronics Journal*, vol. 25, pp. 353–61, 1994. [Online]. Available: <http://www.dissonance.com/archive/journals/WGao94.pdf>
- [35] T. M. Le, S. Panchanathan, and W. M. Snelgrove, “computational RAM implementation of vector quantization for image compression,” *IEEE Conf. on Visual Signal Processing and communications, Rutgers, NJ*, pp. 157–162, sep 19-20 1994. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Le94.pdf>
- [36] S. Bazarjani, W. M. Snelgrove, N. Tarr, and K. Howlett, “low-voltage SC circuit design using short-channel MOSFET switches,” *asicon, Beijing*, oct 1994. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Seyfi94.pdf>
- [37] Z. Gu and W. M. Snelgrove, “Frequency-domain analysis of A/D converter nonlinearity,” *IEEE International Symposium on Circuits and Systems*, vol. 5, pp. 373–376, May 30–Jun 2 1994. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Gu94a.pdf>
- [38] —, “analysis and design of adaptive self-trimming technique for A/D converters,” *IEEE International Symposium on Circuits and Systems*, vol. 5, pp. 457–460, May 30–Jun 2 1994. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Gu94b.pdf>
- [39] A. Shoval, D. Johns, and W. Snelgrove, “Dc offset performance of four lms adaptive algorithms,” *IEEE International Symposium on Circuits and Systems*, vol. 2, pp. 409–412, May 30–Jun 2 1994. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Shoval94.pdf>
- [40] O. Shoaie and W. M. Snelgrove, “Optimal (bandpass) continuous-time sigma delta modulator,” *IEEE International Symposium on Circuits and Systems*, vol. 5, pp. 489–492, May 30–Jun 2 1994. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Shoaie94.pdf>
- [41] E. Distefano and W. M. Snelgrove, “an efficient synchronization mechanism for a multi-DSP application,” *ICSPAT*, nov 2–5 1992.
- [42] C. Ouslis, W. M. Snelgrove, and A. S. Sedra, “Multirate switched-capacitor filter design: filterX in action,” *IEEE International Symposium on Circuits and Systems*, pp. 1183–1186, May 10–13 1992. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Ouslis92a.pdf>
- [43] D. Elliott, W. M. Snelgrove, and M. Stumm, “Computational RAM: A memory-simd hybrid and its application to dsp,” *IEEE Custom Integrated Circuits Conference*, vol. 30, pp. 30.6.1–4, May 3–6 1992. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Elliott92.pdf>
- [44] A. Shoval, D. Johns, and W. M. Snelgrove, “Median-based offset cancellation circuit technique,” *IEEE International Symposium on Circuits and Systems*, vol. 4, pp. 2033–2036, May 10–13 1992. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Shoval92a.pdf>
- [45] S. Jantzi, W. M. Snelgrove, and P. Ferguson, “A fourth-order bandpass sigma-delta modulator,” *IEEE Custom Integrated Circuits Conference*, pp. 16.5.1–4, May 3–6 1992. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Jantzi92.pdf>

Martin Snelgrove

- [46] Z. Gu and W. M. Snelgrove, "A novel self-calibrating scheme for video-rate 2-step A/D converter," *IEEE International Symposium on Circuits and Systems*, vol. 2, pp. 601–604, May 10–13 1992. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Gu92a.pdf>
- [47] —, "Application of a novel self-calibrating scheme to a video-rate pipelined multi-stage A/D converter," *IEEE Midwest Symposium on Circuits and Systems*, pp. 64–67, Aug. 9–12 1992.
- [48] X. Y. Gao and W. M. Snelgrove, "An efficient adaptive cascade iir filter," *IEEE International Symposium on Circuits and Systems*, pp. 444–447, Jun. 11–14 1991. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/XGao91b.pdf>
- [49] R. Schreier and W. Snelgrove, "Sigma delta modulation is a mapping," *IEEE International Symposium on Circuits and Systems*, pp. 2415–2418, jun 11–14 1991. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Schreier91b.pdf>
- [50] R. Schreier and M. Snelgrove, "Stability in a general sigma delta modulator," *IEEE International Conference on Acoustics, Speech and Signal Processing*, pp. 1769–1772, May 14–17 1991. [Online]. Available: http://portal.acm.org/ft_gateway.cfm?id=1171264&type=external&coll=Portal&dl=GUIDE&CFID=14050317&CFTOKEN=83303308
- [51] S. Jantzi, R. Schreier, and W. M. Snelgrove, "a bandpass $\Sigma\Delta$ convertor for a digital AM receiver," *Intl. Conf. A/D and D/A Conversion, Swansea*, pp. 75–80, sep 1991. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Jantzi91.pdf>
- [52] C. Ouslis, W. M. Snelgrove, and A. S. Sedra, "a filter designer's filter design aid: filterX," *IEEE International Symposium on Circuits and Systems*, pp. 376–379, jun 11–14 1991. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Ouslis91.pdf>
- [53] R. Schreier and W. M. Snelgrove, "stability in sigma-delta modulators," *ICIAM, Washington DC*, 1991. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Schreier91c.pdf>
- [54] —, "Decimation for bandpass sigma-delta analog-to-digital conversion," *IEEE International Symposium on Circuits and Systems*, pp. 1801–1804, May 1990. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Schreier90.pdf>
- [55] X. Y. Gao and W. M. Snelgrove, "Adaptive linearization schemes for weakly nonlinear systems using adaptive linear and nonlinear fir filters," *IEEE Midwest Symposium on Circuits and Systems*, pp. 3122–3125, Aug. 1990. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/XGao90b.pdf>
- [56] —, "adaptive nonlinear state-space filters," *IEEE International Symposium on Circuits and Systems*, pp. 3122–3125, May 1990.
- [57] D. Johns, W. Snelgrove, and A. Sedra, "Performance improvements for fine-tuned adaptive recursive filters," *IEEE International Symposium on Circuits and Systems*, pp. 1951–1954, May 1990. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Johns90.pdf>
- [58] X. Gao, W. Snelgrove, and D. Johns, "Nonlinear iir adaptive filtering using a bilinear structure," *Circuits and Systems, 1989., IEEE International Symposium on*, pp. 1740–1743, May 1989.

Martin Snelgrove

- [59] D. Johns, W. Snelgrove, and A. Sedra, "Continuous-time analog adaptive recursive filters," *Circuits and Systems, 1989., IEEE International Symposium on*, pp. 667–670, May 1989.
- [60] D. Johns, W. M. Snelgrove, and A. S. Sedra, "Nonideal effects in continuous-time adaptive recursive filters," *IEEE Midwest Symposium on Circuits and Systems*, pp. 594–597, 1989.
- [61] D. Johns, W. Snelgrove, and A. Sedra, "Dc offsets in analogue adaptive iir filters," *ecctd*, pp. 137–141, sep 1989. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Johns89c.pdf>
- [62] E. Distefano and W. Snelgrove, "A multi-dsp board for a parallel computer using a packet switched, pipelined bus," *Communications, Computers and Signal Processing, 1989. Conference Proceeding., IEEE Pacific Rim Conference on*, pp. 156–160, jun 1989.
- [63] D. Johns, W. Snelgrove, and A. Sedra, "State-space adaptive recursive filters," *Circuits and Systems, 1988., IEEE International Symposium on*, pp. 2153–2156, jun 1988.
- [64] G. V. Eaton, D. G. Nairn, W. M. Snelgrove, and A. S. Sedra, "SiCOMP: a silicon compiler for switched-capacitor filters," *IEEE International Symposium on Circuits and Systems*, pp. 321–324, May 1987.
- [65] G. W. Roberts, W. M. Snelgrove, and A. S. Sedra, "SC circuit simulations of state-space formulations derived from LC ladder network prototypes," *IEEE International Symposium on Circuits and Systems*, pp. 722–725, May 1987.
- [66] J. Rose, D. R. Blythe, W. M. Snelgrove, and Z. G. Vranesic, "Fast, high quality VLSI placement on an MIMD multiprocessor," *iccad*, pp. 42–45, nov 10–13 1986.
- [67] D. R. Blythe, J. Kitamura, D. R. Galloway, and W. M. Snelgrove, "virtual patchcords for the Katosizer," *Intl. Computer Music Conference, Amsterdam*, pp. 359–363, oct 20–22 1986. [Online]. Available: <http://dissonance.com/archive/rcpapers/Blythe86.pdf>
- [68] T. H. Yeap, T. H. Szymanski, W. M. Snelgrove, and S. Zaky, "an automated diagnostician for hardware faults in digital systems," *IASTED Intl Conf. on Applied Simulation and Modelling, Vancouver, B.C.*, pp. 510–514, jun 4–6 1986.
- [69] Q. L. Liu, W. M. Snelgrove, and A. S. Sedra, "Switched-capacitor implementation of complex filters," *IEEE International Symposium on Circuits and Systems, San Jose*, vol. 3, pp. 1121–1124, May 5–7 1986.
- [70] G. W. Roberts, W. M. Snelgrove, and A. S. Sedra, "switched-capacitor state-space filters using intermediate-function synthesis," *IEEE International Symposium on Circuits and Systems*, pp. 614–617, May 5–7 1986.
- [71] T. H. Yeap, W. M. Loucks, W. M. Snelgrove, and S. Zaky, "implementing the VASTOR architecture using a VLSI array of 1-bit processors," *Int'l. Conf. on Computer Design, Port Chester*, pp. 494–499, oct 1985.
- [72] J. Kitamura, W. S. Buxton, and W. M. Snelgrove, "music synthesis by simulation using a general-purpose signal processing system," *Int'l. computer music conference, Burnaby*, pp. 155–158, aug 1985. [Online]. Available: <http://www.billbuxton.com/katosizer.swf>
- [73] G. W. Roberts, W. M. Snelgrove, and A. S. Sedra, "switched-capacitor realization of an nth-

Martin Snelgrove

order transfer function using a multiplexed op-amp,” *IEEE Midwest Symposium on Circuits and Systems*, pp. 621–624, Aug. 1985.

- [74] A. Sedra, W. Snelgrove, and R. Allen, “Analogue bandpass filters designed by linearly shifting real low-pass prototypes,” *IEEE International Symposium on Circuits and Systems, Tokyo*, pp. 1223–1226, 1985.
- [75] W. Snelgrove and A. Sedra, “State-space synthesis of complex analog filters,” *ecctd, Den Haag*, pp. 420–424, aug 1981.
- [76] M. Snelgrove and A. S. Sedra, “Optimization of dynamic range in cascade active filters,” *IEEE International Symposium on Circuits and Systems, New York*, pp. 151–155, May 1978.
- [77] —, “a novel approach to transfer-function error modelling with application to filter approximation,” *IEEE International Symposium on Circuits and Systems, Rome*, pp. 1127–1131, May 1982.
- [78] W. M. Loucks, W. M. Snelgrove, and S. Zaky, “VASTOR: a microprocessor-based associative vector processor for small-scale applications,” *Intl. Conf. on Parallel Processing*, pp. 37–46, aug 1980. [Online]. Available: <http://dissonance.com/archive/rcpapers/VASTOR1980.pdf>
- [79] M. Snelgrove and A. S. Sedra, “a novel synthesis method for state-space active networks,” *IEEE Midwest Symposium on Circuits and Systems*, pp. 196–200, Aug. 1980.

Workshops

- [1] J. Liu, Y. Allasasmeh, S. Gregori, B. Leesti, and M. Snelgrove, “An envelope tracking h-

bridged audio amplifier with improved efficiency and THD less than 0.1Engineering, 2012.

- [2] A. Swaminathan, W. M. Snelgrove, S. Jantzi, and S. Bazarjani, “a monolithic complex sigma-delta modulator for digital radio,” *IEEE-CAS Region 8 Workshop, Pavia, Italy*, Sep 13–14 1996. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Swami96.pdf>
- [3] A. Shoval and W. M. Snelgrove, “a wide-range tunable BiCMOS transconductor,” *CCVLSI*, pp. 81–88, oct 18–20 1992. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Shoval92b.pdf>
- [4] W. Gao and W. M. Snelgrove, “floating-gate MOS device as an element for analog trimming,” *ccvlsi*, pp. 147–154, oct 18–20 1992. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/WGao92.pdf>
- [5] C. Ouslis, S. Good, W. M. Snelgrove, and A. S. Sedra, “FiltorX: computer-aided filter design and industry,” *ccvlsi*, pp. 180–187, oct 18–20 1992. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Ouslis92b.pdf>
- [6] S. Zhou, T. McInerny, W. M. Snelgrove, M. Stumm, and D. Wortman, “shared virtual memory: a simple model for implementing distributed applications,” *ccece, Montreal*, pp. 716–719, sep 1989. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Zhou89.pdf>
- [7] E. Nowicki, W. M. Snelgrove, and A. S. Sedra, “Circuit and layout of a state-multiplexed switched-capacitor filter,” *Canadian Conference on VLSI*, pp. 43–48, Oct. 25–27 1987.

Martin Snelgrove

- [8] D. R. Galloway, D. R. Blythe, and W. M. Snelgrove, "Graphical CAD of digital filters," *IEEE Pacific Rim Conference, Victoria, B.C.*, pp. 303–305, jun 1987.
- [9] J. Culbert and W. M. Snelgrove, "a continuous-time 5-MHz biquad filter in BNR CMOS-1B," *Canadian Conference on VLSI*, pp. 247–252, Oct. 27–28 1986.
- [10] D. Rosati and W. Snelgrove, "A knowledge base for a vlsi design environment," *ccvlsi*, pp. 295–300, Oct. 27–28 1986.
- [11] G. V. Eaton, D. G. Nairn, W. M. Snelgrove, and A. S. Sedra, "SiCOMP: a silicon compiler for switched-capacitor filters," *ccvlsi*, pp. 349–352, Oct. 27–28 1986.
- [12] J. Rose, W. M. Snelgrove, and Z. G. Vranesic, "ALTOR: An automatic standard cell layout program," *Canadian Conf. on VLSI*, pp. 169–173, Nov 1985, joint winner, best paper award.
- [13] T. H. Szymanski and W. M. Snelgrove, "a semantic data model for VLSI," *ccvlsi, Toronto*, pp. 113–116, nov 1985.
- [14] L. J. McNaughton, V. C. Hamacher, and W. M. Snelgrove, "a multiprocessor fault simulator for VLSI circuits," *ccvlsi, Toronto*, pp. 93–96, nov 1985.
- [15] D. Elliott, W. M. Snelgrove, C. Cojocar, and M. Stumm, "A petaflop/s is currently feasible by computing in RAM," *PetaFLOPS Frontier Workshop*, Feb. 1995.
- [16] M. Snelgrove, "A/D architectures for wireless," *IEEE Solid-State Circuits and Technology Committee Workshop on Design Challenges for Wireless ICs, Toronto*, aug 25 1994.
- [17] S. Bazarjani and W. M. Snelgrove, "Single-battery mixed analog/digital signal processing with natural transistors," *Int'l. Workshop on Low-Power Design, Napa Valley*, Apr. 24–27 1994.
- [18] A. Shoval, W. M. Snelgrove, and D. Johns, "a 4.5 octave tunable BiCMOS biquad at VHF to demonstrate an adaptive analog pulse-shaping filter," *CMC Workshop, Queens Univ., Kingston*, May 1993.
- [19] D. Elliott and W. M. Snelgrove, "C* RAM: Memory with a fast simd processor," *CCVLSI*, pp. 3.3.1–3.3.6, Oct 21–23 1990. [Online]. Available: <http://www.dissonance.com/archive/rcpapers/Elliott90.pdf>
- [20] M. Snelgrove, "silicon compilation of switched-c filters," *IEEE International Symposium on Circuits and Systems Workshop on Expert System Tools for Analog Signal Processing*, Jun. 1988.
- [21] T. H. Yeap, W. H. Lo, W. M. Snelgrove, W. M. Loucks, and S. Zaky, "a VLSI implementation of a 1-bit processing element for the VASTOR array processor," *ccvlsi, Waterloo*, pp. 18–21, oct 1983.

Invited Conference Papers

- [1] M. Snelgrove, "Wideband sampling by decimation in frequency," *IEEE Radio-Frequency Integrated Circuit Symposium*, June 5-10 2011. [Online]. Available: <http://www.dissonance.com/archive/workshops/SnelgroveIMS2011WalshADC.pdf>
- [2] —, "Interference mitigation in receivers," *IEEE Radio-Frequency Integrated Circuit Symposium*, May 23-28 2010. [Online]. Available: <http://www.dissonance.com/archive/workshops/SnelgroveIMS2010.pdf>

Martin Snelgrove

- [3] —, “ADC architectures and technology,” *IEEE Compound Semiconductor Integrated Circuit Symposium*, 2004.
- [4] R. McKenzie, W. M. Snelgrove, and D. Elliott, “A 1024 processing-element computational RAM,” *TRIO, Kingston*, May 1997.
- [5] T. M. Le, S. Panchanathan, and W. M. Snelgrove, “computational RAM implementation of mean-average scalable vector quantization for real-time progressive image transmission,” *ccece*, pp. 442–445, 1996.
- [6] W. M. Snelgrove, “Panel discussion “on the future of analog circuits”,” *IEEE International Symposium on Circuits and Systems, Atlanta*, May 1996.
- [7] M. Snelgrove and D. Elliott, “(do some) computing in RAM,” *Int’l. Symposium on Future Information-Processing Technologies, Haikko*, Sep. 1995.
- [8] M. Snelgrove, “does engineering belong in the modern university?” *Carleton University Spring Conference*, May 1995.
- [9] X. Y. Gao and W. M. Snelgrove, “Adaptive linearization of a loudspeaker,” *aes convention*, oct 1–4 1992.
- [10] M. Snelgrove, “digital signal processing in audio,” *5o Simposium de Ingeniería Electrónica, Guadalajara*, May 20–23 1992, (presented in Spanish).
- [11] —, “zen and the art of analog design automation,” *IFIP World Computer Congress, panel*, p. 914, Aug. 1989.
- [12] —, “digital signal processing in audio,” *AES Int’l Conf. on Audio in Digital Times*, May 1989.
- [13] J. Kitamura, D. Blythe, and W. M. Snelgrove, “DSPs for music at Toronto,” *AES, NY*, 1987.

Books and Chapters

- [1] J. A. Cherry and W. M. Snelgrove, *Continuous-time delta-sigma modulators for high-speed A/D conversion: theory, practice and fundamental performance limits*. Norwell, MA, USA: Kluwer Academic Publishers, oct 1999.
- [2] S. Jantzi, R. Schreier, and W. M. Snelgrove, *Delta-Sigma Data Converters*. IEEE Press, Oct. 1996, ch. the design of bandpass delta-sigma ADCs.
- [3] A. S. Sedra and W. M. Snelgrove, *Design of MOS VLSI circuits for telecommunications*. Upper Saddle River, NJ, USA: Prentice-Hall, Inc., 1994, ch. Switched-capacitor filter synthesis, pp. 213–249.
- [4] M. Snelgrove, *McGraw-Hill Encyclopedia of Science and Technology*, 7th ed. McGraw-Hill, 1990, ch. Push-Pull Amplifiers; Oscillators; Negative-Resistance Circuits.
- [5] M. Ismail and J. Franca, Eds., *Introduction to VLSI design automation*. Kluwer Academic Publishers, 1990, ch. silicon compiler technology for SC filters, pp. 151–162.
- [6] W. M. Snelgrove, “Intermediate-function synthesis,” Ph.D. dissertation, University of Toronto, 1982. [Online]. Available: <http://www.dissonance.com/archive/phd/Martinthesis.pdf>
- [7] W. M. Snelgrove, A. S. Sedra, G. Lang, and P. O. Brackett, “Complex analog filters,” 1981. [Online]. Available: http://www.dissonance.com/archive/journals/snelgrove_cmplx.pdf

Martin Snelgrove

Students' Doctoral Theses

- [1] P. A. Langner, "A robust, efficient physical layer transport protocol for packets," Ph.D. dissertation, University of Toronto, Ottawa, Ont., Canada, Canada, 2000, adviser-Ralph Mason and Martin Snelgrove. [Online]. Available: <http://www.dissonance.com/archive/phd/langner.pdf>
- [2] T. M. Le, "Visual communications on the memory-embedded array processor: The computational*RAM," Ph.D. dissertation, University of Ottawa and Carleton University, Mar. 2000. [Online]. Available: http://dissonance.com/archive/phd/thinh_le.pdf
- [3] P. M. Nyasulu, "System design for a computational-RAM logic-in-memory parallel-processing machine," Ph.D. dissertation, Carleton University, Ottawa, Ont., Canada, Canada, 1999, adviser-Ralph Mason and Martin Snelgrove. [Online]. Available: <http://www.dissonance.com/archive/phd/nyasulu.pdf>
- [4] J. A. Cherry, "Theory, practice and fundamental performance limits of high-speed data conversion using continuous-time $\Delta\Sigma$ modulators," Ph.D. dissertation, Carleton University, 1998. [Online]. Available: <http://www.dissonance.com/archive/phd/cherryPhD.pdf>
- [5] H.-K. Yang, "Low-power oversampled signal processing for digital radio receivers," Ph.D. dissertation, Carleton University, 1998. [Online]. Available: <http://www.dissonance.com/archive/phd/yanghk.pdf>
- [6] D. Elliott, "Computational RAM: A memory-SIMD hybrid," Ph.D. dissertation, University of Toronto, 1997.
- [7] S. Bazarjani, "mixed analog-digital design considerations in deep submicron CMOS technologies," Ph.D. dissertation, Carleton University, 1996. [Online]. Available: <http://www.dissonance.com/archive/phd/seyfithesis.pdf>
- [8] O. Shoaie, "continuous-time $\Delta\Sigma$ A/D converters for high-speed applications," Ph.D. dissertation, Carleton University, 1995. [Online]. Available: <http://www.dissonance.com/archive/phd/shoaeithesis.pdf>
- [9] A. Shoval, "analog adaptive filtering techniques for high-speed data communications," Ph.D. dissertation, University of Toronto, 1995. [Online]. Available: <http://www.dissonance.com/archive/phd/shoval.pdf>
- [10] X. Y. Gao, "adaptive linear and nonlinear filters," Ph.D. dissertation, University of Toronto, 1992. [Online]. Available: <http://www.dissonance.com/archive/phd/XGaothesis.pdf>
- [11] R. Schreier, "Noise-shaped coding," Ph.D. dissertation, University of Toronto, 1991. [Online]. Available: <http://www.dissonance.com/archive/phd/schreier.pdf>
- [12] D. Johns, "analog and digital state-space adaptive IIR filters," Ph.D. dissertation, University of Toronto, 1989. [Online]. Available: <http://www.dissonance.com/archive/phd/Johns.pdf>
- [13] T. H. Szymanski, "On interconnection networks for parallel processors," Ph.D. dissertation, University of Toronto, 1988, co-Supervisor-V. C. Hamacher and Co-Supervisor-W. M. Snelgrove.
- [14] J. Rose, "Fast, high quality VLSI placement on an MIMD multiprocessor," Ph.D. dissertation, University of Toronto, 1986.

Martin Snelgrove

Students' Master's Theses

- [1] D. Zupcau, "An approximate quantizer for high-speed sigma-delta modulators with carry-save arithmetic," M.Eng., Carleton University, 1999. [Online]. Available: <http://www.dissonance.com/archive/masters/zupcau.pdf>
- [2] S. Mocanita, "High-order bandpass sigma-delta modulators," M.Eng., Carleton University, 1998. [Online]. Available: <http://www.dissonance.com/archive/masters/mocanita.pdf>
- [3] P. Nyasulu, "Architecture and implementation of a computational RAM controller," M.Eng., Carleton University, 1995. [Online]. Available: <http://www.dissonance.com/archive/masters/nyasuluMEng.pdf>
- [4] L. Yu, "A novel adaptive mismatch cancellation system for quadrature if radio receivers," M.Eng., Carleton University, 1998. [Online]. Available: <http://www.dissonance.com/archive/masters/yulithesis.pdf>
- [5] D. Cartina, "Characterization and digital correction of multistage analog-to-digital converters," M.Eng., Carleton University, 1997. [Online]. Available: <http://www.dissonance.com/archive/masters/dragos.pdf>
- [6] A. Swaminathan, "A single-IF receiver architecture using a complex sigma-delta modulator," M.Eng., Carleton University, 1997. [Online]. Available: <http://www.dissonance.com/archive/masters/ASHthesis.pdf>
- [7] J.-M. Patenaude, "A methodology for analog circuit design and knowledge transfer," M.Eng., Carleton University, 1996. [Online]. Available: <http://www.dissonance.com/archive/masters/patenaude.pdf>
- [8] B. Korst-Fagundes, "Acoustical equalization at multiple listening positions," M.Eng., Carleton University, 1996. [Online]. Available: <http://www.dissonance.com/archive/masters/bruno.pdf>
- [9] T. M. Le, "Computational*RAM implementations of vector quantization for image and video compression," Master's thesis, University of Ottawa and Carleton University, Sep. 1995.
- [10] C. Cojocaru, "Computational RAM: implementation and bit-parallel architecture," M.Eng., Carleton University, 1995. [Online]. Available: <http://www.dissonance.com/archive/masters/cojocaru.pdf>
- [11] J. A. Cherry, "Distortion analysis of weakly nonlinear filters using Volterra series," M.Eng., Carleton University, 1994. [Online]. Available: <http://www.dissonance.com/archive/masters/jamesthesis.pdf>
- [12] F. W. Singor, "High-frequency bandpass delta-sigma analog-to-digital conversion," M.A.Sc., University of Toronto, 1994. [Online]. Available: <http://www.dissonance.com/archive/masters/Singor.pdf>
- [13] Z. Gu, "Self-calibrated high-speed A/D converters: analysis and design," M.A.Sc., University of Toronto, 1993.
- [14] W. Gao, "Analog trimming using floating-gate devices," M.A.Sc., University of Toronto, 1992.
- [15] E. Distefano, "A synchronization mechanism for audio digital signal processing applications," M.A.Sc., University of Toronto, 1992.
- [16] S. Jantzi, "Bandpass sigma-delta analog-to-digital conversion," M.A.Sc., University of Toronto, 1992.

Martin Snelgrove

- [17] A. Shoval, "Median-based offset cancellation circuits for integrated analog filters," M.A.Sc., University of Toronto, 1991.
- [18] S. Jundler, "An electronic pacemaker for the electrical control activity of the stomach," M.A.Sc., University of Toronto, 1991.
- [19] R. Lansdale, "Texture mapping and resampling for computer graphics," M.A.Sc., University of Toronto, 1991.
- [20] C. Sommerfeldt, "Optimal hypertorus configurations for wafer-scale multiprocessor interconnection networks," M.A.Sc., University of Toronto, 1990.
- [21] M. Moraes, "A hierarchical VLSI design-rule checker on an MIMD multiprocessor," M.A.Sc., University of Toronto, 1990.
- [22] A. Munshi, "Multi-loudspeaker multipoint room equalization," M.A.Sc., University of Toronto, 1990.
- [23] M. Mukhopadhyay, "Design and implementation of a global ring for Hector," M.A.Sc., University of Toronto, 1990.
- [24] A. Eivin, "Synchronous circuit verifier (SCV) - an artificial intelligence approach to incremental verification of sequential circuits," M.A.Sc., University of Toronto, 1989.
- [25] I. Osman, "Application of transconductance-c technology in ultrasound imaging systems," M.A.Sc., University of Toronto, 1989.
- [26] W. Song, "Test generation for static combinational logic circuits: analyses and algorithms," M.A.Sc., University of Toronto, 1988.
- [27] D. Elliott, "Circuit routing with iterative refinement," M.A.Sc., University of Toronto, 1988.
- [28] F. Gohh, "CMOS current conveyors," M.A.Sc., University of Toronto, 1988.
- [29] J. Culbert, "On transconductance-c filters," M.A.Sc., University of Toronto, 1988.
- [30] E. Nowicki, "Matrix switched-capacitor filters," M.A.Sc., University of Toronto, 1987.
- [31] R. P. Bicevskis, "Complex-valued phase-locked loops," M.A.Sc., University of Toronto, 1986.
- [32] L. J. McNaughton, "Fault simulation on multiprocessors," M.A.Sc., University of Toronto, 1986.
- [33] J. Kitamura, "A general-purpose signal processor for music synthesis," M.A.Sc., University of Toronto, 1986.
- [34] G. W. Roberts, "Switched-capacitor state-space filters," M.A.Sc., University of Toronto, 1985.
- [35] R. Schreier, "Transfer function design," M.A.Sc., University of Toronto, 1985.
- [36] Q. Liu, "Switched-capacitor complex filters," M.A.Sc., University of Toronto, 1985.
- [37] R. H. Allen, "Complex analog filters obtained from shifted lowpass prototypes," M.A.Sc., University of Toronto, 1985.
- [38] W. H. Lo, "VASTOR controller and its programming environment," M.A.Sc., University of Toronto, 1984.
- [39] T. H. Yeap, "Design of a VASTOR processing element suitable for VLSI layout," M.A.Sc., University of Toronto, 1984.
- [40] C. H. McQueen, "A data structure for VLSI layout," M.A.Sc., University of Toronto, 1984.

Martin Snelgrove

Internal Reports

- [1] W. M. Loucks and W. M. Snelgrove, "VASTOR 1978," University of Toronto, Tech. Rep., 1978. [Online]. Available: <http://dissonance.com/archive/vastor78.PDF>