David A. Johns

Curriculum Vitae

A. Personal Data

Name:	David A. Johns
Date of Birth:	January 13, 1958
Birthplace:	Ottawa, Ontario, Canada
Citizenship:	Canadian
Office Address:	Dept. of Electrical Engineering University of Toronto Toronto, Ontario Canada M5S 1A4 Tel: (416) 978-6695 Fax: (416) 978-7423 e-mail: johns@eecg.toronto.edu

B. Degrees and Academic Positions

Degrees:	B.A.Sc., Toronto, 1980 (Eng. Science) M.A.Sc., Toronto, 1983 (Elec. Eng.) Ph.D., Toronto, 1989 (Elec. Eng)
Academic Positions Held:	University of Toronto, Dept. of Electrical and Computer Engineering: Professor, July 1998 - present Associate Professor, July 1994 - July 1998 Assistant Professor, March 1989 - July 1994 Lecturer, Sept. 1988 - March 1989

C. Awards and Honours

- Elected to IEEE Fellow in 2001 “For contributions to the theory and design of analog integrated circuits used in digital communications”.
- Co-recipient of the 1999 IEEE Darlington Best Paper Award (with H. Shakiba and K. Martin)
- Recipient of the 1999 Gordon Slemon Teaching Award
- Co-recipient of 1993 CMC Design Award (with A. Shoval and M. Snelgrove)

D. Publications

Textbooks

[1] D.A. Johns and K.W. Martin, *Analog Integrated Circuit Design*, Wiley, New York, NY, N.Y., 1997. **Adopted by over 40 universities.**

Chapters in Textbooks

[2] Anthony Carusone and D.A. Johns, "Analogue adaptive filters," chapter 6, pp. 161-195, *Design of High Frequency Integrated Analogue Filters,* published by The Institution of Electrical Engineers, Circuits, Devices and Systems Series 14, London, United Kingdom, 2002.

Refereed Journal Publications

[3] A. Chan Carusone and D.A. Johns, "Digital LMS adaptation of analog filters without gradient information", accepted for publication in *IEEE Trans. on Circuits and Systems* — II: *Analog and Digital Signal Processing* (acceptance date: Feb. 2003).

[4] B. Zand and D.A. Johns, "High-speed CMOS analog Viterbi detector for 4-PAM partial response signalling," *IEEE Journal of Solid-State Circuits*, vol. 37, pp. 895-903, July, 2002.

[5] T. Zourntos and D.A. Johns, "Variable-structure compensation of delta-sigma modulators: Stability and performance," *IEEE Trans. on Circuits and Systems* — I: *Fundamental Theory and Applications,* vol. 49, pp. 41-53, January 2002.

[6] A. Carusone, K. Farzan and D.A. Johns, "Differential signalling with a reduced number of signal paths," *IEEE Trans. on Circuits and Systems* — II: *Analog and Digital Signal Processing*, vol. 48, pp. 294-300, March 2001.

[7] R. Mahadev and D.A. Johns, "A differential 160MHz self-terminating adaptive CMOS line driver," *IEEE Journal of Solid-State Circuits*, vol. 35, pp. 1889-1894, Dec. 2000.

[8] A. Carusone and D.A. Johns, "Analogue adaptive filters: Past and present," IEE Proceedings - Circuits, Devices and Systems, pp. 82-90, Feb. 2000.

[9] K. Phang and D.A. Johns, "A CMOS optical preamplifier for wireless infrared communications", *IEEE Trans. on Circuits and Systems* — II: *Analog and Digital Signal Processing*, vol. 46, pp. 852-859, July 1999.

[10] M.H. Shakiba, D.A. Johns and K.W. Martin, "BiCMOS circuits for analog Viterbi decoders," *IEEE Trans. on Circuits and Systems* — II: *Analog and Digital Signal Processing*, vol. 45, pp. 1527-1537, Dec. 1998. ***This paper won the IEEE Darlington Best Paper Award for IEEE Trans. on Circuits and Systems.***

[11] M.H. Shakiba, D.A. Johns and K.W. Martin, "An integrated 200MHz 3.3V BiCMOS class-IV partial-response analog Viterbi decoder," *IEEE Journal of Solid-State Circuits*, vol. 33, pp. 61-75, Jan. 1998.

[12] D.A. Johns and D. Essig, "Integrated circuits for data transmission over twisted-pair channels," *IEEE Journal of Solid-State Circuits*, vol. 32, pp. 398-406, March 1997.

[13] R. Khoini-Poorfard, L.B. Lim and D.A. Johns, "Time-interleaved oversampling A/D converters: Theory and practice", *IEEE Trans. on Circuits and Systems* — II: *Analog and Digital Signal Processing*, vol. 44, pp. 634-645, Aug. 1997.

[14] A. Shoval, W.M. Snelgrove and D.A. Johns, "A 100Mb/s BiCMOS adaptive pulse-shaping filter", *IEEE Journal on Selected Areas in Communications: Special issue on Copper Wire Access Technologies for High Performance Networks*, vol. 13, pp. 1692-1702, Dec. 1995.

[15] R. Khoini-Poorfard and D.A. Johns, "Analysis of $\Delta\Sigma$ modulators with zero mean stochastic inputs," *IEEE Trans. on Circuits and Systems* — II: *Analog and Digital Signal Processing*, vol. 42, pp. 164-175, March 1995.

[16] A. Shoval, D.A. Johns and W.M. Snelgrove, "Comparison of DC offset effects in four LMS adaptive algorithms," *IEEE Trans. on Circuits and Systems* — II: *Analog and Digital Signal Processing*, vol. 42, pp. 176-185, March 1995.

[17] A.K. Lu, G.W. Roberts and D.A. Johns, "A high-quality analog oscillator using oversampling D/A conversion techniques," *IEEE Trans. on Circuits and Systems* — II: *Analog and Digital Signal Processing*, vol. 41, pp. 437-444, July 1994.

[18] Shoval, D.A. Johns and W.M. Snelgrove, "A wide-range tunable BiCMOS transconductor," *Microelectronics Journal*, vol. 24, pp. 555-564, Elsevier Science Publishers, UK, Aug. 1993.

[19] D.A. Johns and D.M. Lewis, "Design and analysis of delta-sigma based IIR filters," *IEEE Trans. on Circuits and Systems* — II: *Analog and Digital Signal Processing*, vol. 40, pp. 233-240, April 1993.

[20] K. A. Kozma, D. A. Johns and A.S. Sedra, "Tuning of continuous-time filters in the presence of parasitic poles," *IEEE Trans. on Circuits and Systems* — I: *Fundamental Theory and Applications*, vol. 40, pp. 13-20, Jan. 1993.

[21] K.A. Kozma, D.A. Johns, A.S. Sedra, "Automatic tuning of continuous-time integrated filters using an adaptive filter technique," *IEEE Trans. on Circuits and Systems*, vol. 38, pp. 1241-1248, Nov. 1991. ***This paper is included in an IEEE Press Book entitled "Integrated Continuous-Time Filters".***

[22] D.A. Johns, W.M. Snelgrove and A.S. Sedra, "Continuous-time LMS adaptive recursive filters," *IEEE Trans. on Circuits and Systems*. vol. 38, pp. 769-778, July 1991.

[23] D.A. Johns, W.M. Snelgrove and A.S. Sedra, "Adaptive recursive state-space filters using a gradient based algorithm," *IEEE Trans. on Circuits and Systems,* vol. 37, pp. 673-684, June 1990.

[24] D.A. Johns, W.M. Snelgrove and A.S. Sedra, "Orthonormal ladder filters," *IEEE Trans. on Circuits and Systems*, vol. CAS-36, pp. 337-343, March 1989.

[25] D.A. Johns and A.S. Sedra, "State-space simulation of LC ladder filters," *IEEE Trans. on Circuits and Systems*, vol. CAS-34, pp. 986-988, August 1987.

Refereed Journal Brief Publications

[26] S. Crapanzano and D.A. Johns, "2V fully-differential SC integrator in standard CMOS", *Electronic Letters*, vol. 31, No. 23, pp. 1995-1996, Nov. 1995.

[27] M.H. Shakiba, D.A. Johns and K.W. Martin, "General approach for implementing analogue Viterbi decoders," *Electronic Letters*, vol. 30, pp. 1823-1824, Oct. 1994.

[28] R. Khoini-Poorfard and D.A. Johns, "Time-interleaved oversampling converters," *Electronic Letters*, vol. 29, pp. 1673-1674, Sept. 1993.

[29] D.A. Johns and D.M. Lewis, "IIR filtering on sigma-delta modulated signals," *Electronic Letters*, vol. 27, pp. 307-308, Feb. 1991.

[30] X.F. Wania, D.A. Johns and A.S. Sedra, "Programmable multiplexed switched-capacitor filters," *Electronic Letters*, vol. 26, pp. 1051-1053, July, 1990.

Submitted Journal Publications

[31] K. Phang and D.A. Johns, "A 1V, 1mW CMOS transimpedance amplifier with dynamic gate biasing", submitted to *IEEE Journal of Solid-State Circuits*, Oct, 2002.

[32] K. Farzan and D.A. Johns, "Power-Efficient Chip-to-Chip Signaling Schemes," submitted to *IEEE Trans. on Circuits and Systems, Part II,* December, 2002.

Conference Papers

[33] K. Farzan and D.A. Johns, "A low complexity power-efficient signaling scheme for chip-to-chip communication", *IEEE International Symposium on Circuits and Systems*, Bangkok, Thailand, May, 2003.

[34] K. Farzan and D.A. Johns, "A power-efficient architecture for high-speed D/A converters", *IEEE International Symposium on Circuits and Systems*, Bangkok, Thailand, May, 2003.

[35] K. Farzan and D.A. Johns, "A CMOS 7-Gb/s Power Efficient 4-PAM Transmitter," *European Solid-State Circuits Conference*, Firenze, Italy, Sept. 2002.

[36] A. Chan Carusone and D.A. Johns, "Analog filter adaptation using a dithered linear search algorithm," *IEEE International Symposium on Circuits and Systems*, Scottsdale, Arizona, May, 2002.

[37] A. Chan Carusone and D.A. Johns, "A 5th order Gm-C filter in 0.25um CMOS with digitally programmable poles and zeros," *IEEE International Symposium on Circuits and Systems*, Scottsdale, Arizona, May, 2002.

[38] K. Farzan and D.A. Johns, "Power efficient chip-to-chip signaling schemes," *IEEE International Symposium on Circuits and Systems*, Scottsdale, Arizona, May, 2002.

[39] B. Zand and D.A. Johns, "High speed CMOS analog Viterbi detector for 4-PAM partial response signalling," *European Solid-State Circuits Conference*, Austria, Sept. 2001.

[40] B. Zand, K. Phang, and D.A. Johns, "A transimpedance amplifier with dc-coupled differential photodiode current sensing for wireless optical communications," pp. 455-458, *IEEE Custom Integrated Circuits Conference*, San Diego, California, May, 2001.

[41] K. Phang and D.A. Johns, "A 1V 1mW CMOS front-end with on-chip dynamic gate biasing for a 75Mb/s optical receiver," *IEEE International Solid-State Circuits Conference (ISSCC)*, San Francisco, CA, Feb. 2001.

[42] A. Hadji-Abdolhamid and D.A. Johns, "ADC resolution enhancement by an analog decorrelator," *IEEE International Symposium on Circuits and Systems*, Geneva, June, 2000.

[43] R. Mahadev and D.A. Johns, "A differential 160MHz self-terminating adaptive CMOS line driver," pp. 436-437, *IEEE International Solid-State Circuits Conference (ISSCC)*, San Francisco, CA, Feb. 2000.

[44] J. Cheng and D.A. Johns, "A 100MHz partial analog equalizer for use in wired data transmission," *European Solid-State Circuits Conference*, Duisburg, Germany, Sept. 1999.

[45] A. Carusone and D.A. Johns, "Obtaining digital gradient signals for analog adaptive filters," *IEEE International Symposium on Circuits and System*s, Florida, May, 1999.

[46] S. Hranilovic and D.A. Johns, "A multilevel modulation scheme for high-speed wireless infrared communications," *IEEE International Symposium on Circuits and System*s, Florida, May, 1999.

[47] B. Zand, K. Phang and D.A. Johns, "Transimpedance amplifier with differential photodiode current sensing," *IEEE International Symposium on Circuits and System*s, Florida, May, 1999.

[48] T. Zourntos, and D.A. Johns, "Stable one-Bit delta-sigma modulators based on switching control", *IEEE International Conference on Acoustics, Speech and Signal Processing*, Seattle, WA, May, 1998.

[49] K. Phang and D.A. Johns, "A 3-V CMOS optical preamplifier with dc photocurrent rejection," *IEEE International Symposium on Circuits and System*s, Monterey, CA, May, 1998.

[50] A. Abdolhamid and D.A. Johns, "A comparison of CAP/QAM architectures," *IEEE International Symposium on Circuits and System*s, Monterey, CA, May, 1998.

[51] D.A. Johns and D. Essig, "Integrated circuits for data transmission over twisted-pair channels,"' *IEEE Custom Integrated Circuits Conference*, pp. 5-12, San Diego, California, May, 1996 (invited paper).

[52] M.H. Shakiba, D.A. Johns and K.W. Martin, "A 200MHz 3.3V BiCMOS class-IV partial-response analog Viterbi decoder," *Custom Integrated Circuits Conference*, pp. 567-570, Santa Clara, California, May, 1995.

[53] K. Kozma, D.A. Johns and A.S. Sedra, "An approach for tuning high-Q continuous-time bandpass filters," *IEEE International Symposium on Circuits and System*s, pp. 1037-1040, Seattle, Washington, May, 1995.

[54] R. Khoini-Poorfard and D.A. Johns, "Mismatch effects in time-interleaved oversampling converters," *IEEE International Symposium on Circuits and System*s, pp. 5.429-5.432, London, England, May 1994.

[55] M.H. Shakiba, D.A. Johns and K.M. Martin, "Analog implementation of class-IV partial-response Viterbi detector," *IEEE International Symposium on Circuits and System*s, pp. 4.91-4.94, London, England, May 1994.

[56] A. Munshi, D.A. Johns, A.S. Sedra, "Adaptive impedance matching," *IEEE International Symposium on Circuits and System*s, pp. 2.69-2.72, London, England, May 1994.

[57] A. Shoval, D.A. Johns, and W.M. Snelgrove, "DC offset performance of four LMS adaptive algorithms," *IEEE International Symposium on Circuits and System*s, 2.409-2.412, London, England, May 1994.

[58] A.K. Lu, G.W. Roberts and D.A. Johns, "A high-quality analog oscillator using oversampling D/A conversion techniques," *IEEE International Symposium on Circuits and System*s, pp. 1298-1301, Chicago, May 1993.

[59] D.A. Johns, D.M. Lewis and D. Cherepacha, "Highly selective "analog" filters using delta-sigma based IIR filtering," *IEEE International Symposium on Circuits and System*s, pp. 1302-1305, Chicago, May 1993.

[60] R. Khoini-Poorfard and D.A. Johns, "On the effect of comparator hysteresis in interpolative delta-sigma modulators," *IEEE International Symposium on Circuits and System*s, pp. 1148-1151, Chicago, May 1993.

[61] A.S. Munshi, D.A. Johns and A.S. Sedra, "Equalization and linearization via linear negative feedback," *IEEE International Symposium on Circuits and System*s, pp. 2502-2505, Chicago, May 1993.

[62] A.S. Munshi and D.A. Johns, "Adaptive IIR filtering of delta-sigma modulated signals," *IEEE International Conference on Acoustic, Speech and Signal Processing*, Vol. III, pp. 356-359, Minneapolis, Apr. 1993.

[63] A. Shoval, D.A. Johns and W.M. Snelgrove, "A wide-range tunable BiCMOS transconductor," *CCVLSI*, pp. 81-88, Halifax, Oct. 1992.

[64] R. Khoini-Poorfard and D.A. Johns, "Stabilizing adaptive lattice IIR structures by projection of constraints," *IEEE Midwest Symposium on Circuits and Systems,* pp. 1481-1484, Washington, DC, Aug. 1992.

[65] K.A. Kozma, D.A. Johns and A.S. Sedra, "On the tuning of continuous-time integrated filters, including parasitic effects," *IEEE International Symposium on Circuits and Systems*, pp. 835-838, San Diego, May 1992.

[66] A. Shoval, D.A. Johns and W.M. Snelgrove, "Median-based offset cancellation circuit technique," *IEEE International Symposium on Circuits and Systems*, pp. 2033-2036, San Diego, May 1992.

[67] B.R. Owen and D.A. Johns, "A single-column structure for delta-sigma based IIR filters," *IEEE International Symposium on Circuits and Systems*, pp. 2413-2416, San Diego, May 1992.

[68] D.A. Johns and D.M. Lewis, "Sigma-delta based IIR filters," *Midwest Symposium on Circuits and Systems*, pp. 210-213, Monterey, California, May, 1991.

[69] X.F. Wania, D.A. Johns and A.S. Sedra, "Programmable multiplexed switched-capacitor filters," *Midwest Symposium on Circuits and Systems*, pp. 973-976, Calgary, Alberta, Aug., 1990.

[70] D.A. Johns, W.M. Snelgrove and A.S. Sedra, "Performance improvements for fine-tuned adaptive recursive filters," *IEEE International Symposium on Circuits and Systems*, pp. 1951- 1954, New Orleans, Louisiana, May 1990.

[71] K.A. Kozma, D.A. Johns, and A.S. Sedra, "An adaptive tuning circuit for integrated continuous-time filters," *IEEE International Symposium on Circuits and Systems*, pp. 1163-1166, New Orleans, Louisiana, May 1990.

[72] D.A. Johns, W.M. Snelgrove and A.S. Sedra, "DC offsets in analogue adaptive IIR filters," *European Conference on Circuit Theory and Design*, pp. 137-141, Brighton, UK, Sept., 1989.

[73] D.A. Johns, W.M. Snelgrove and A.S. Sedra, "Continuous-time analog adaptive recursive filters," *IEEE International Symposium on Circuits and Systems*, pp. 667-670, Portland, Oregon, May, 1989. ***This paper is included in an IEEE Press Book entitled "Integrated Continuous-Time Filters".***

[74] X.Y. Gao, W.M. Snelgrove and D.A. Johns, "Nonlinear IIR adaptive filtering using a bilinear structure," *IEEE International Symposium on Circuits and Systems*, pp. 1740-1743, Portland, Oregon, May, 1989.

[75] D.A. Johns, W.M. Snelgrove and A.S. Sedra, "State-space adaptive recursive filters," *IEEE International Symposium on Circuits and Systems*, pp. 2153-2156, Helsinki, Finland, June, 1988.

[76] D.A. Johns, W.M. Snelgrove and A.S. Sedra, "Orthogonal filters and singly-terminated LC ladder filters," *Midwest Symposium on Circuits and Systems*, pp 761-764, Syracuse, NY, August, 1987.

[77] D.A. Johns, W.M. Snelgrove and A.S. Sedra, "Nonideal effects in analog adaptive IIR filters," *Midwest Symposium on Circuits and Systems*, pp 594-597, Champaign-Urbana, Illinois, Aug. 1989 (invited)

E. Graduate Students Supervised

Summary:

Degree	Successfully Completed	In Progress
Ph.D.	8	3
M.A.Sc.	20	6

Ph.D. Theses in Progress

1. Amir Hadji-Abdolhamid, "Wired CAP/QAM digital communications".
2. Kamran Farzan, "High speed chip-to-chip interconnect".
3. Ahmed Gharbiya, "Continuous-time delta-sigma modulation".

M.A.Sc. Theses in Progress

1. Trevor Caldwell, "Continuous-time delta-sigma modulation".
2. Samira Naraghi, "High speed chip-to-chip interconnect".
3. Paul-Hugo Lamarche, "Programmable delta-sigma processing".
4. Imran Ahmed, "Analog-to-digital conversion with scalable power".
5. Navid Yaghini, "Complex delta-sigma conversion".
6. Robert Wang, "Low voltage pipelined A/D conversion".

Ph.D. Theses Completed

1. Takis Zourntos, "Compensation of delta-sigma modulators: Stabilization, signal restoration, and integrated circuits," 2003.
2. Anthony Chan Carusone, "Digital algorithms for analog adaptive filters," 2002.

3. Bahram Zand, "High-speed optical wireless communications using reduced-state sequence detection," 2002
4. Khoman Phang, "CMOS optical preamplifier design using graphical circuit analysis," 2001.
5. Hossein Shakiba, "Analog Viterbi detection for partial-response signalling", 1997. Jointly supervised with Prof. K. Martin.
6. Karen Kozma, "Theory and application for the adaptive tuning of continuous-time integrated filters," 1996. Jointly supervised with Prof. A.S Sedra.
7. Ayal Shoval, "Analog adaptive filtering techniques for high-speed data communications," 1995. Jointly supervised with Prof. W.M. Snelgrove.
8. Ramin Khoini-Poorfard, "Analysis methods and time-interleaved architectures for oversampling modulators," 1994.

M.A.Sc. Theses Completed

1. Sherif Abdalla, "Incremental Signalling," 2002.
2. Rajeevan Mahadevan, "Front-end circuit for full-duplex transmission over coaxial cable", 1999.
3. Steve Hranilovic, "Modulation and contrained coding techniques for wireless infrared communications channels", 1999. Jointly supervised with F. Kschischang.
4. Cameron Lacy, "Design of a programmable switched-capacitor analog FIR filter", 1999.
5. Kasra Ardalan, "Fractional-N clock synthesis", 1998.
6. Jasmine Cheng, "Adaptive equalization system for data transmission over coaxial cables", 1998.
7. Rod Zavari, "A high-speed CMOS A/D converter employing variable nonuniform quantization", 1998.
8. Kapil Kamra, "Cable equalization using adaptive analog filters", 1996.
9. John Sandhu, "Digitally control of switch mode power supplies using delta-sigma modulation", 1996.
10. Salvatore Crapanzano, "A 2V fully-differential switched-capacitor integrator technique in standard CMOS," 1995.
11. Khiem Nguyen, "Delta-sigma signal processing: Applications and implementations," 1995. Jointly supervised with Prof. D.M. Lewis.
12. Lysander Lim, "Design and implementation of time-interleaved delta-sigma A/D converters," 1994.
13. Tony Poon, "Implementation of a pipelined delta-sigma filter," 1994. Jointly supervised with Prof. D.M. Lewis.
14. Bryn Owen, "The design of delta-sigma modulator based IIR filters," 1993.
15. Dennis Au, "An integrated delta-sigma based IIR filter," 1993. Jointly supervised with Prof. D.M. Lewis.
16. Khoman Phang, "Adaptive microphone arrays using FIR and IIR filters", 1992.
17. Jane Xin, "A high-resolution digital-to-analog converter for tuning applications", 1992. Jointly supervised with Prof. A.S. Sedra.
18. Karen A. Kozma, "Tuning integrated continuous-time filters using an adaptive technique", 1990. Jointly supervised with Prof. A.S. Sedra.
19. Ayal Shoval, "Median-based offset cancellation circuits for integrated analog circuits", 1991. Jointly supervised with Prof. W.M. Snelgrove.
20. Xerxes F. Wania, "Programmable multiplexed switched-capacitor filters, 1990. Jointly supervised with Prof. A.S. Sedra.

F. Research Grants

Currently Held

2001-05 NSERC — Programmable delta-sigma signal processing 39,000/yr

2002-03	MICRONET — High speed communication circuits	38,000/yr
2000-02	SRC — Integrated circuit and systems sciences	64,534/yr
Past		
1997-2001	NSERC — High speed digital comm over wireless channels (research grant)	21,000/yr
1993-97	NSERC — Signal processing integrated circuits (operating grant)	13,000/yr.
1990-93	NSERC — Analog adaptive recursive filtering (operating grant)	13,285/yr.
1997	NSERC — Server for compute and data intensive research (equipment grant) with 7 others	90,330.00
2001-02	CITO — High speed free space optical communication systems	30,000/yr
2001-02	MICRONET — High speed communication circuits	62,000/yr
1999-2000	MICRONET — High-speed digital communication circuits (held with K. Martin)	140,000/yr
1998-99	MICRONET — High-speed digital communication circuits (held with K. Martin)	210,000/yr
1997-98	MICRONET — High-speed digital communication circuits (held with K. Martin)	160,000/yr
1995-1997	MICRONET — High-speed data communication circuits (held with A. Sedra)	$100,000/yr
1994-95	MICRONET — High-speed analog circuits for signal processing (held with A. Sedra)	$72,250/yr.
1990-94	MICRONET — Programmable and current-mode filters (held with A. Sedra and E. El-Masry)	80,000/yr.
1995-97	ITRC — Rapid analogue and mixed system design and prototyping (held with K. Martin, and G. Gulak)	100,000/yr.
1993-95	ITRC — Rapid analogue and mixed system design and prototyping (held with K. Martin, A. Sedra and G. Gulak)	100,000/yr.
1991-93	ITRC — Algorithms and hardware for digital audio applications (held with M. Snelgrove, P. Chow and A. Sedra)	85,000/yr.
1989-91	ITRC — Integrated filter and equalizer design (held with A. Sedra and M. Snelgrove)	80,000/yr

G. Administration and Committees

1997-2002	Eng. Sci. option chair for Elec. Eng.
1997-1999	Director of Electrical Engineering
1997-1999	First-year admission director for Elec. Eng.
1996-1999	Electronics group chairman
1990-1995	Electronics group graduate coordinator
continuous	Member of various committees such as undergrad curriculum, search committee for electronics and waves faculty, etc.

H. Professional Activities

- Elected member of Advisory Committee for the IEEE Solid-State Circuits Society (I am the Secretary of the adcom)
- Member of technical program committee for ISSCC in San Francisco, 2001-03
- Associate editor for *IEEE Trans. on Circuits and Systems - Part I: Fundamental Theory and Applications* (July, 1995 - July, 1997).
- Associate editor for *IEEE Trans. on Circuits and Systems - Part II: Analog and Digital Signal Processing* (July, 1993 - July, 1995).
- Session chairman for two oversampling sessions at the IEEE International Symposium on Circuits and Systems, Seattle, May 1995.
- Member of the technical program committees for the IEEE International Symposium on Circuits and Systems in both Chicago, May 1993 and Seattle, May 1995.
- Member of the Analog Signal Processing (ASP) committee (1994 - present).
- Session chairman for session on "Adaptive Filters" at the Canadian Conference on Electrical and Computer Engineering, Toronto, Sept. 1992.
- Reviewer for various publications including IEEE Trans. on Circuits and Systems, IEE Electronic Letters, and IEEE Trans. on Signal Processing.
- Fellow, IEEE

I. Teaching

Years	**Undergraduate Course**	**Approx. Enrollment**
1997-2001	ECE231S Introductory Electronics	120; 190; 300; 200
96	ECE334F Digital Electronics	105
91, 94, 95	ECE331S Electronic Circuits	90
92-94, 96-98,	ECE512F Analog Filters	80, 40
92, 93	ELE436S Electronic Instrumentation	40
87-90	ELE430F Analog Circuits	30
89-91	ELE251S Introductory Electronics	100

Years	**Graduate Course**	**Approx. Enrollment**
96,99-00	ECE1392S Integrated Circuits for Digital Communications	20
93, 94	ECE1360F Selected Topics in Instrumentation: "Data Converters"	10
91-95,96	ELE1362S Filter Theory and Design II	10
89, 91, 97	ELE1352F Analog Circuit Design	15
90	ELE1814F Selected Topics in Solid-State Circuit Design: "State-Space and Adaptive Filters"	15
89	ELE1821S Advanced Analog Circuit Design	15

Years	**Continuing Education Course**	**Approx. Enrollment**
88, 89	Electronics II	20

J. Related Industrial Experience

May, 1997-Aug. 1998	Visiting researcher with Lucent, Allentown, PA
July, 1995-July, 1996	Visiting researcher with Brooktree Corp. (now Rockwell) in San Diego, California. Worked in the area of high-speed digital communications
May 1980 to July 1981	Applications Engineer Mitel Corp., Ottawa, Ont.
Sept. 1983 to July 1985	IC Design Engineer Pacific Microcircuits, Vancouver, B.C.

Industrial Short Courses

- Presented a quarter day lecture on "Analog Filters" in Lausanne, Switzerland, June 1999 (approx 50 participants)
- Presented a quarter day lecture on "Passband HDSL and ADSL" at a 1 day short course on xDSL at ISSCC, Feb. 1998 in SF, California. (350 participants)
- Technical organizer for a course on "Digital Communications" in Monterey, CA, 1996 as well as lecturing for one day. — approx 40 participants.
- Presented a 3 day course on "Digital Communications" to Lucent, PA in July, 1997 and repeated again in Sept. 1997 — approx 40 participants for each session.
- Invited to present a 3 day course on "Analog Integrated Circuits" to Lucent, PA in Jan. 1998.
- Presented 1 day in a "Disk-drive Electronics" course in Monterey (1997), San Jose (1996) Austin (1995) — approx 51 participants at each course
- Presented 0.5 day lecture in an "Analog Circuit Design" course in Portland (1997) — approx 100 participants. Other lecturers included E. Vittoz, B. Gilbert, G. Temes, P. Brokaw.
- Presented 3 graduate level courses to Brooktree employees (Signal Processing, Analog Circuits, Data Communications) while on 1 year research leave with Brooktree (20 participants).
- Presented a 3 day course on "Analog Circuits" to IBM, Vermont in Fall, 1994 (30 participants).
- Technical program organizer and 1 of 6 lecturers in the short course "Modern Analog Integrated Circuit Design" held May 26-28, 1993 in Toronto (37 participants at a registration fee of about $750 each).