

May 2016

Curriculum vitae of P. P. Vaidyanathan

Address: Department of Electrical Engineering 136-93, California Institute of Technology, Pasadena, CA 91125

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Date and place of birth: October 16, 1954; Calcutta, India.

Education: B. Sc (with honors in Physics), 1974, B. Tech., Radiophysics and Electronics, 1977, M. Tech., Radiophysics and Electronics, 1979, all from University of Calcutta. Ph. D., Electrical and Computer Engineering, Univ. of California, Santa Barbara, 1982.

Occupation: Currently Full Professor of Electrical Engineering, California Institute of Technology, Pasadena, CA. Been on the faculty since 1983. Served as the Executive officer of Electrical Engineering (Department Head) from 2002 to 2005.

Research interests: Signal representations, sparse signal reconstruction, multirate signal processing, digital filter banks, genomic signal processing, data compression, image processing, adaptive filters, wavelet transforms, multidimensional systems, fast algorithms, sparse array signal processing, and applications of filter banks in digital communications.

Honors and Awards

- 1) Receptient of the IEEE Gustav Robert Kirchhoff Award, 2016 (an IEEE Technical Field Award).
- 2) Receptient of the *Education Award* of the IEEE Signal Processing Society, 2012 (one of the major awards of the society).
- 3) Six of Prof. Vaidyanathan's doctoral students have received the Charles Wilts prize for the best doctoral dissertation in the EE Department at Caltech.
- 4) Eliahu I. and Joyce Jury Award, University of Miami, 2007.
- 5) Distinguished speaker award, Dept. of Electrical and Computer Engr., Texas A&M University, 2006.
- 6) Receptient of the *Technical Achievement Award* of the IEEE Signal Processing Society, 2002 (one of the major awards of the society).
- 7) Receptient of the *Golden jubilee medal* of the IEEE Circuits and Systems Society, 2000.
- 8) Chosen as a *distinguished lecturer* for the IEEE Signal Processing Society for the year 1996-97.

- 9) Receptient of the 1995 *F. E. Terman Award* of the American Society of Engineering Education (ASEE), sponsored by the Hewlett-Packard company.
- 10) Fellow of the IEEE since 1991.
- 11) Receptient of National Science Foundation's Presidential Young Investigator Award, 1986.
- 12) Award for *Excellence in Teaching* from the *Associated students of California Institute of Technology*, 1983. This is an undergraduate student body at Caltech.
- 13) Award for *Exceptional Teaching* from the *Graduate student council*, California Institute of Technology, 1993.
- 14) Award for *Excellence in Teaching* from the *Associated students of California Institute of Technology*, 1994.
- 15) University Fellowship, Univ. of California, Santa Barbara, for Ph. D studies, 1981-82.
- 16) Outstanding Teaching Assistant Award, College of Engineering, UCSB, 1980-81.
- 17) Directorate of Public Instruction (Government of West Bengal, India) stipend for the two-year M. Tech studies (1977-79).
- 18) University of Calcutta stipend for the three-year duration of study of B. Tech (1974-77).

Selected plenary talks

- 1) Plenary speaker at the International Conference on Computers and Devices for Communication (CODEC), Kolkata, India, December, 2015.
- 2) Plenary speaker at the Asia Pacific Signal and Information Processing Association (APSIPA) Annual Summit Conference, Siem Reap, Cambodia, December, 2014.
- 3) Plenary speaker at the National Symposium on Mathematical Methods and Applications, Chennai, India, Dec. 2013. This is held to honor the late Srinivasa Ramanujan every year.
- 4) Plenary speaker at the International Conf. on Comm. and Signal Processing (ICCSP), Calicut, India, 2011.
- 5) Plenary speaker at the INAE and IIT Workshop on Image and Speech Processing (WISP), Chennai, India, 2006.
- 6) Plenary speaker at the IEEE International Symposium on Circuits and Systems (ISCAS), Vancouver, BC, Canada, 2004.
- 7) Plenary speaker at the *Fourth International Conference on Sampling Theory and Applications (SAMPTA)*, Orlando, May, 2001.

- 8) Plenary speaker at the *Conference on Image Processing, Multiresolution analysis, and Statistics, sponsored by Georgia Institute of Technology*, Sept. 1999.
- 9) Plenary speaker at the Digital Filters and Signal Processing (DFSP'98), Victoria, Canada, June 1998.
- 10) Plenary speaker at the Eusipco '98, Rhode Island, Greece, 1998.
- 11) Plenary speaker at the IEEE sponsored conference, SPCOM'95, Bangalore, India, 1995.
- 12) Plenary speaker at the IEEE sponsored Asilomar Conference on Signals, Systems and Computers, 1988.

Prize papers

- 1) Winner of the IEEE Acoustics, Speech and Signal Processing Society's Senior Award for the paper "Theory and design of M -channel maximally decimated quadrature mirror filters with arbitrary M , having the perfect reconstruction property," IEEE Trans. ASSP, pp. 476-492, April 1987.
- 2) Winner of the S. K. Mitra Memorial award, 1990, awarded by the Institution of Electronics and Telecommunications Engineers (IETE), India, for the paper "Compression of two-dimensional band-limited signals using sub-sampling theorems," published in the IETE journal in Sept-Oct. 1988.
- 3) Coauthor of a paper for which the first author (former Ph.D student) received a prize from the IEEE Signal Processing Society in 1992. The paper is *T. Q. Nguyen and P. P. Vaidyanathan, "Structures for M -channel perfect reconstruction FIR QMF banks which yield linear-phase analysis filters," IEEE Trans. on Acoustics, Speech and Signal Processing, vol. 38, pp. 433-446, Mar. 1990.*
- 4) Coauthor of a paper for which the first author (Ph.D student) received the best student-paper prize from the IEEE Signal Processing Society: Byung-Jun Yoon and P. P. Vaidyanathan, "Improved estimation of discrete probability density functions using multirate models", Proc. 37th Asilomar Conference on Signals, Systems, and Computers, Monterey, CA, Nov. 2003.
- 5) Coauthor of a paper for which the first author (Ph.D student) received the best student-paper prize from the IEEE Signal Processing Society: Chun-Yang Chen and P. P. Vaidyanathan, "A subspace method for MIMO radar space-time adaptive processing", Proc. IEEE Int. Conf. Acoust. Speech, and Signal Proc., Honolulu, Hawaii, April 2007.
- 6) Winner of the IETE Students' Journal Award, 2009, awarded by the Institution of Electronics and Telecommunications Engineers (IETE), India, for the paper "Eigenfunctions of the Fourier transform" published in the IETE journal in 2008.

- 7) Coauthor of a paper for which the first author (Ph.D student) received the best student-paper prize from the IEEE Signal Processing Society: *P. Pal and P. P. Vaidyanathan, "Copriime sampling and the MUSIC algorithm," IEEE Signal Processing Workshop, held in Sedona, AZ, 2011.*
- 8) Coauthor of a paper for which the first author (Ph.D student) received the best student-paper prize from the IEEE Signal Processing Society: *Piya Pal and P. P. Vaidyanathan, "Non Uniform Linear Arrays For Improved Identifiability in Cumulant Based DOA Estimation," Proc. 45th Asilomar Conference on Signals, Systems, and Computers, Monterey, CA, Nov. 2011.*
- 9) Coauthor of a paper for which the first author (Ph.D student) received the best student-paper prize from the IEEE Signal Processing Society: *Srikanth Tenneti and P. P. Vaidyanathan, "Minimal Dictionaries For Spanning Periodic Signals," Proc. 49th Asilomar Conference on Signals, Systems, and Computers, Monterey, CA, Nov. 2015.*
- 10) Coauthor of a paper for which the first author (Ph.D student) received the best student-paper prize from the IEEE Signal Processing Society: *Chun-Lin Liu and P. P. Vaidyanathan, "Super nested arrays : sparse arrays with less mutual coupling than nested arrays," Proc. IEEE Int. Conf. Acoust. Speech, and Signal Proc., Shanghai, China, March 2016.*

Publications

There are about 490 publications. The googlescholar h-index is 63.

- 1) **Papers.** Over 490 papers have been authored or coauthored. Of these, about 180 are journal articles and the others are articles in various Conference Proceedings. Eight papers have received prizes for technical quality. Six of the conference papers are plenary papers.
- 2) **Text books.** Author or coauthor of four text books.
 - a) P. P. Vaidyanathan, *Multirate systems and filter banks*, Prentice Hall, 1993. This has been used for graduate level courses at many Universities, including Caltech.
 - b) P. P. Vaidyanathan, *The theory of linear prediction*, Morgan & Claypool publishers, 2008.
 - c) P. P. Vaidyanathan, S.-M. Phoong, and Y.-P. Lin, *Signal processing and optimization for transceiver systems*, Cambridge University Press, 2010.
 - d) Y.-P. Lin, S.-M. Phoong, and P. P. Vaidyanathan, *Filter bank transceivers for OFDM and DMT systems*, Cambridge University Press, 2010.
- 3) **Chapters.** More than 10 chapters have been written for various books (edited collections).

Professional experience

- 1) Sept. 2002-2005: Executive officer and Full Professor of Electrical Engineering, California Institute of Technology, Pasadena, CA.
- 2) July 1993-present: Full Professor of Electrical Engineering, California Institute of Technology, Pasadena, CA.
- 3) March 1988-June 1993: Associate Professor of Electrical Engineering, California Institute of Technology, Pasadena, CA.
- 4) March 1983-Feb 1988: Assistant Professor of Electrical Engineering, California Institute of Technology, Pasadena, CA.
- 5) Fall 1982- Winter 1983: Post Doctoral Researcher, Dept. of Electrical and Computer Engineering, UCSB.
- 6) Summer 1980-Summer 1982: Research and Teaching Assistant, Dept. of Electrical and Computer Engineering, UCSB.
- 7) Winter 1980- Spring 1980: Teaching Assistant, Dept. of Electrical and Computer Engineering, UCSB.

Other Professional Activities

- 1) **Associate editor** for the IEEE Transactions on Circuits and Systems, 1999-2002.
- 2) **Guest editor** for the Special Issue “Applications of digital signal processing”, J. of the Franklin Institute, Nov. 1998.
- 3) **Guest editor** for the Special Issue “Multirate systems, filter banks, wavelets, and applications”, IEEE Circuits and Systems Transactions II, August 1998.
- 4) **Guest editor** for the Special Issue “Theory and application of filter banks and wavelet transforms”, IEEE Signal Processing Transactions, April 1998.
- 5) **Special session organizer and chairman** for a session on *Optimization of subband coders based on the input signal*, IEEE Int. Symp. on Circuits and Systems, Monterey, CA, May 1998.
- 6) **Editorial board member** for the journal *Applied and computational harmonic analysis*, 1993–
- 7) **Associate editor** for the new journal *The IEEE Signal Processing Letters*, 1993–
- 8) **Special session organizer and chairman** for a session on *Filter banks and wavelets* IEEE Int. Symp. on Circuits and Systems, Chicago, Illinois, May 1993.
- 9) **Technical Program Chairman**, IEEE International Symposium on Circuits and Systems, San Diego, CA, May 1992.
- 10) **Special Sessions Organizer and chairman**, for a session on *Multirate digital filters, filter banks*

and applications, IEEE Int. Symp. on Circuits and Systems, New Orleans, Louisiana, May 1990.

- 11) **Member**, Technical Committee on Digital Signal Processing, IEEE Signal Processing Society, 1990–
- 12) **Member**, Technical Committee on Digital Signal Processing, IEEE Circuits and Systems Society, 1987–
- 13) **Organizing editor** for a special mini-issue of the IEEE Transactions on Circuits and Systems, on *Complex Signal Processing*, April 1987.
- 14) **Special Sessions organizer and chairman** for a session on digital filters, Asilomar Conference on Signals, Systems and Computers, Pacific Grove, CA, Nov. 1987.
- 15) **Associate editor** for the IEEE Transactions on Circuits and Systems, 1985-87.
- 16) **Vice Chairman** for the Technical Program Committee, at the IEEE International Symposium on Circuits and Systems, Newport Beach, CA, May 1983.
- 17) **Editorial Reviewer** of textbook manuscripts for several leading publishers.
- 18) **Reviewer** for several journals including IEEE and IEE. Reviewer for proposals submitted for the National Science Foundation.
- 19) **Consultant** for several Companies in the US, in the Signal Processing technical area. This includes (i) Lockheed, (ii) Niravoice, (iii) Interstate electronics, and (iv) Aware, Inc., Boston. (v) the DSP group at the Jet Propulsion Laboratories (JPL) (vi) Sonix Technologies, Inc. Salt Lake city, Utah, (vii) Fish and Neave, Palo Alto, CA.
- 20) **Professional Societies**: Member of the IEEE Societies on Circuits and Systems, and Signal Processing.

Courses taught at Caltech

- 1) 1983-1984: EE112abc. Three term sequence on *passive and active filters*.
- 2) 1984-1987. EE112abc. Three term sequence on *digital signal processing*.
- 3) 1987-88: Fall and winter: EE32ab, *Linear Systems* (required EE junior level course); Spring: EE128 (new course), *Multirate signal processing*.
- 4) 1988-1989: Fall and winter: EE112ab; Spring: EE164 (new course), *Adaptive filters, linear prediction and optimal filters*.
- 5) 1990-1992: EE112ab and EE128 repeated.
- 6) 1992-1993: Fall and winter: Taught EE32ab and supervised EE112ab; Spring: EE128 (mutitrate DSP and wavelets).

- 7) 1993-1994 and 1994-1995: EE112 (DSP basics), EE128 (multirate DSP and wavelets), and EE166 (Data compression).
- 8) 1995-1996: EE32a, EE32b and EE166 (Fall, Winter and Spring).
- 9) 1996-1997: EE112, EE128, EE166 (Fall, Winter and Spring).
- 10) 1997-1998: EE112, EE128 (Fall and Winter).
- 11) 1999: EE32, EE112b , EE 112c (Fall, Winter, Spring).
- 12) 2000-2001: EE112abc (Fall, Winter, Spring).
- 13) 2002-: EE111, EE112ab (Fall, Winter, Spring).
- 14) 2003-: EE112ab (Winter, Spring).

Vaidyanathan's students who received Ph.D from Caltech

- 1) Dr. T. Q. Nguyen (Ph.D, June 1989). Professor, Dept. Electrical Engineering, Boston University.
- 2) V. C. Liu (Ph.D, June 1990). Presently with General Instrument, San Diego, CA.
- 3) Dr. (Ms.) Z. Doganata (Ph.D, June 1990). Presently with the IBM T. J. Watson Research Center, Yorktown Heights, N.Y.
- 4) Dr. R. D. Koilpillai (Ph.D June 1991). Presently with the Ericsson, Inc., Research Triangle Park, NC.
- 5) Dr. V. Sathe (Ph.D June 1991). Presently with General Instrument, San Diego, CA.
- 6) Dr. Anand Soman (Ph.D 1993), Signal Labs, Bombay, India.
- 7) Dr. Tsuhan Chen (Ph.D 1993), Department head and Professor of Electrical Engineering, Cornell University.
- 8) Dr. Igor Djokovic (Ph.D 1995), Member of Technical staff, PairGain Technologies, Inc., Tustin, CA.
- 9) Dr. See-May Phoong (Ph.D 1996), Faculty at National Taiwan University, Taipei, Taiwan.
- 10) Dr. Yuan-Pei Lin (Ph.D 1997), Faculty at Chiao-Tong University, Hsinchu, Taiwan.
- 11) Dr. Jamal Tuqan (Ph.D 1998), Post Doctoral Researcher, IBM T. J. Watson Research Center, Yorktown heights, New York.
- 12) Dr. Ahmet Kirac (Ph.D 1998), Member of Technical Staff, Lucent Technologies, Huntington Beach, CA.
- 13) Dr. Murat Mese (Ph. D 2001), Member of Technical Staff, Sequoia Communications, Los Angeles, CA.
- 14) Dr. Sony Akkarakaran (Ph. D 2001), Member of Technical Staff, Sequoia Communications, Los

Angeles, CA.

- 15) Dr. Bojan Vrcelj (Ph. D 2003), now at Qualcomm, San Diego, CA.
- 16) Dr. Andre Tkacenko (Ph. D 2005), now at JPL, La Canada, CA.
- 17) Dr. Byung-Jun Yoon (Ph. D 2007), now a faculty member at Texas A&M University.
- 18) Dr. Borching Su, (Ph. D 2008), now a faculty at the National Taiwan University, Taipei, Taiwan.
- 19) Dr. Chun-Yang Chen, (Ph. D 2009), now with Facebook.
- 20) Dr. Ching-Chih Weng, (Ph. D 2011), now with Facebook.
- 21) Dr. Chih-Hao Liu, (Ph. D 2013), now with Qualcomm, San Diego.
- 22) Dr. Piya Pal (Ph. D 2013), now assistant professor at University of Maryland, College Park.

Vaidyanathan's students who have received the Wilts prize for best doctoral dissertation in the EE Dept., Caltech

- 1) Tsuhan Chen, 1993.
- 2) See-May Phoong, 1997.
- 3) Andre Tkacenko, 2004.
- 4) Borching Su, 2008.
- 5) Ching-Chih Weng, 2012.
- 6) Piya Pal, 2014.

Vaidyanathan's students who are Fellows of the IEEE

- 1) Dr. T. Q. Nguyen (Ph.D, June 1989). Professor, Dept. Electrical Engineering, Boston University.
- 2) Dr. Tsuhan Chen (Ph.D 1993), Department head and Professor of Electrical Engineering, Cornell University.

Current Doctoral Students: Srikanth Tenneti, Chun-Lin Liu, and Oguzhan Teke.