

SHORT CURRICULUM VITAE

Name: Tapio Antero SARAMÄKI

Date of birth: June 12, 1953, Orivesi, Finland

Marital status: Married, two daughters

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Education: Matriculation examination, Oriveden yhteiskoulu 31.5.1972
Diploma Engineer in Electrical Engineering (with honors), TUT 8.3.1978
Doctor of Technology in Electrical Engineering (with honors), TUT 27.5.1981

Awards and Honors: The 1987 IEEE Circuits and Systems Society's Guillemin-Cauer Award together with Prof. Markku Renfors
The 1994 Best Paper Award, Signal Processing Laboratory, TUT, together with T. Ritonieni, E. Pajarre, S. Ingalsuo, T. Husu, and V. Eerola
The Best Paper Award among the papers published in the Special Issue on Frequency-Response Masking Technique (together with J. Yli-Kaakinen and H. Johansson), edited by Y. C. Lim, in *Journal of Circuits, Systems, and Computers*, vol. 12, no. 5, October 2003
Fellow of IEEE, 2002, for "contributions to the design and implementation of digital filters and filter banks"
The 80th Honorary Member (Fellow) of the Russian A. S. Popov Society for Radio Engineering, Electronics and Communications since 1945, 2004, for "great contributions to the development of DSP theory and methods and great contributions to the consolidation of relationships between Russian and Finnish organizations"
The 1987 IEEE Circuits and Systems Society's Guillemin-Cauer Award together with Brazilian colleagues M. B. Furtado, Jr., P. S. R. Diniz, and S. L. Netto, University of Rio de Janeiro

Main positions: Various research and teaching positions at the Department of Electrical Engineering, TUT, some of them supported by the Academy of Finland, 1.1.1975 – 1.9.1986
Department of Electrical Engineering, TUT: Part-time Teaching Assistant in Physics and Mathematics, 1975–1976, Research Assistant in Electronics, 1977, Research and Teaching Assistant in Electronics, 1978
The Academy of Finland: Research Assistant in Technology, 1979–1981; Junior Research Fellow in Technology, 1981, Senior Research Fellow in Technology, 1982–1986
Assistant Professor in Signal Processing, Institute of Signal Processing (earlier Signal Processing Laboratory), Department of Information Technology (earlier Department of Electrical Engineering), TUT, 1.9.1986 – 1.4.1995
Acting Associate Professor, Institute of Signal Processing, Department of Information Technology, TUT, 1.8.1988 – 31.7.1989
The Academy of Finland, Fellow Scientist Scholarship (corresponds to the sabbatical for a professor in the United States) four times: 1.7.1989 – 31.12.1989, 1.7.1990 – 31.12.1990, 1.10.1993 – 30.9.1994, and 1.8.1998 – 31.7.1999
Docent at the Institute of Telecommunications, Department of Information Technology, TUT (a docent in Finland is a scientist having valuable knowledge for both the research and education at the corresponding laboratory or institute), 1.9.1992 –
Acting Associate Professor in Signal Processing, Institute of Signal Processing, Department of Information Technology, TUT, 1.10.1994 – 31.3.1995
Associate Professor in Signal Processing, Institute of Signal Processing, Department of Information Technology, TUT, 1.4.1995 – 1.8.1998

Professor in Signal Processing, Institute of Signal Processing, Department of Information Technology, TUT, 1.8.1998–

Head of the Institute of Signal Processing, Department of Information Technology, TUT, 1.1.1996 – 31.7.1997

Other positions:

Visiting Research Fellow (Professor) at the University of California, Santa Barbara, 1982 (6 months), 1985 (2 months), 1986 (2 months), 1990 (5 months), 1998 (one month); at the California Institute of Technology, Pasadena, 1987 (one week); and at the National University of Singapore 2001 (two weeks)

Civil service at the Laboratory of Information and Computer Science, Helsinki University of Technology (speech recognition and digital signal processing), 1.3.1983 – 23.2.1984

Project leader of designing digital filters and filter banks for various applications, Signal Processing Laboratory, TUT, 1990 –

Co-founder, share holder, and system-level designer of VLSI Solution Oy, Tampere, Finland 1991 –

Member and Vice-Member of the Departmental Council, Department of Electrical Engineering, TUT, 1.1.1996–31.12.2001

President of Aragit Oy Ltd., Tampere, Finland, which was founded by four TUT professors, 2001 –

Research interests:

Approximation and optimization theories

Design of digital filters requiring a small number of arithmetic operations, development of efficient algorithms for digital filter design, computationally-efficient and low-sensitivity structures for both finite-impulse response (FIR) and infinite-impulse response (IIR) filters

Optimization of efficiently-implementable digital filters and filter banks for practical applications, thereby implying that the constraints stated by both the implementation in use and the application at hand are taken into account

Optimization of multiplication-free digital filters and filter banks for various applications, thereby leading to highly customized very-large-scale integration (VLSI) implementations (no cost multiplier element is needed)

Communications applications: filter banks, transmultiplexers, modems, Nyquist filters of various kinds, optimization of DSP algorithms for all-digital receivers

Single-rate filter banks including digital crossover filters, filter banks with an efficiently adjustable crossover frequency, special filter banks for de-noising, feature extraction, signal analysis, etc.

Multirate filter banks including, among others, uniform and non-uniform banks, perfect-reconstruction (PR) and nearly PR critically sampled cosine-modulated and modified DFT filter banks as well as oversampled generalized DFT filter banks, low-delay filter banks, and wavelet banks

Efficient techniques, based on the use of a proper polynomial-based interpolation, for generating samples at arbitrary points between the existing discrete-time samples with applications to up-sampling and down-sampling between arbitrary input and output sampling rates, symbol time adjustment in all-digital receivers, and special continuous-time signal processing alternatives

Image processing, multirate filtering, biomedical engineering, and instrumentation

Optimization of modified B-spline functions in the frequency domain for many image processing applications, such as zooming (up- and down-scaling), affine transforms (translation, rotation, re-scaling), and image warping

Optimized VLSI implementations of A/D and D/A converters, sigma-delta modulators, and DSP algorithms

Optimization of DSP algorithms for spread spectrum applications and global positioning systems

Teaching experience:

Elementary mathematics, physics, and electronics as well as pattern recognition

Digital signal processing (DSP): Dozens of courses have been given for both graduate and undergraduate students and for people working in the industry. Especially, seven courses

with own lecture notes written in English have been generated.

- Industrial activities: The above-mentioned VLSI Solution Oy specializes in efficient VLSI implementations of both analog and digital signal processing algorithms for various applications. The projects include, among others, DSP algorithms for communications applications, several small silicon area decimator and interpolator VLSI designs and overall A/D and D/A converter designs as well as chips for spread spectrum applications and global positioning systems. The above-mentioned Aragit Oy Ltd. concentrates on spreading know-how of the four founding members on information technology to the industry.
- Industrial projects: Participated in several research projects financed by Finnish industry together with TEKES, the Finnish Funding Agency for Technology and Innovation
Nokia Research Center (NRC), Tampere, 1995– , The TUT leader for many projects between NRC and TUT: Optimization of a filter in a feedback loop, three projects on the use of multirate filter banks and adaptive filtering for echo cancellation, tailored designs of sampling rate converters between arbitrary sampling rates, and optimization of special low-delay non-uniform multirate filter banks for speech enhancement
- Main academic projects: Leader of the team entitled “Digital Filters and Filter Banks” of a Centre of Excellence of the Academy of Finland, called as Signal Processing Algorithm Group (SPAG), Institute of Signal Processing, TUT, 2000-2011, the first and second periods for 2000 to 2005 and 2006 to 2011, respectively.
In the past, a collaborator in the project entitled “All-digital receivers”, led by Prof. Markku Renfors and supported by the Academy of Finland, started in 1994.
- Consultation: Burr-Brown Corporation, Component Design Engineering, Tucson, Arizona, invited to consultation on designing multiplier-free decimators and interpolators for A/D and D/A converters based on the use of sigma-delta modulators, April 1991
Tritech Microelectronics International, Singapore, invited to consultation on designing efficient sigma-delta A/D and A/D converters and VLSI-implementable DSP algorithms, April 1993. This was the start for the cooperation with VLSI Solution Oy.
- Patents: Three international patents on efficient VLSI implementations of finite-impulse response digital filters. These patents have been used world-wide in several VLSI circuits to significantly reduce the silicon area as well as the power consumption compared to other existing designs.
- Supervision of students: Ten doctoral students: Practical supervisor (not a professor at that time): Kari-Pekka Estola, 1986, TUT; main supervisor: Jussi Vesma, 1999, TUT, Juha Yli-Kaakinen (degree with honors), 2002, TUT, Robert Bregovic’ (degree with honors), 2003, TUT, Peyman Arian, 2007, TUT, Pilar Martin-Martin, 2007, Universidad de Alcala, Madrid, Spain (together with Dr. Fernando Cruz-Roldan); co-supervisor: Keping Chen, Linköping University, Sweden, Harri Raittinen, 1996, TUT, Atanas Gotchev, 2003, TUT, Djordje Babic’, 2004, TUT; under supervision right now: Raija Lehto (the doctoral thesis is practically ready), Baharak Soltanian and very soon: Mohammed Ahsan, Omer Anjum, and Asadul Haque
Five Licentiate students (a degree between the Diploma Engineer (Master of Science) and Doctor of Technology degrees)
More than sixty Diploma Engineer students
Review of eight doctoral theses
Opponent (Examiner) in nine doctoral dissertations (Finland, Sweden (twice), Norway (twice), Denmark, Armenia (only an examiner), Singapore (only an examiner), Mexico)
- International cooperation: Prof. Sanjit K. Mitra, University of California, Santa Barbara, USA
Prof. P. P. Vaidyanathan, California Institute of Technology, Pasadena, USA
Prof. Lars Wanhammar and Håkan Johansson, Linköping University, Linköping, Sweden
Prof. Svante Signell and Hannu Tenhunen, Royal Institute of Technology, Stockholm, Sweden

Prof. Are Hjørungnes, UniK - University Graduate Center at University of Oslo, Kjeller, Norway

Prof. Tor A. Ramstad, Norwegian University of Science and Technology, Trondheim, Norway

Profs. Yong Ching Lim and Ya Jun Yu, Nanyang Technological University, Singapore

Prof. Yong Lian, National University of Singapore, Singapore

Profs. Paulo Diniz, Sergio Netto, and Antonio Petraglia, University of Rio de Janeiro, Brazil

Profs. Andreas Antoniou and Wu-Sheng Lu, University of Victoria, Canada

Prof. Ljiljana Milic', University of Belgrade, Serbia

Drs. Pilar Martin-Martin and Fernando Cruz-Roldan, Alcala Univesity, Madrid, Spain

National
cooperation:

Prof. Markku Renfors, Institute of Communications Engineering, TUT

Profs. Jaakko Astola and Karen Egiazarian as well as Drs. Robert Bregovic', Atanas Gotchev, and Bogdan Dumitrescu (our visitor from Politehnica University of Bucharest, Romania), Institute of Signal Processing, TUT

Prof. Olli Vainio, Institute of Digital and Computer Systems, TUT

Other
activities:

Long-standing association with IEEE Transactions (Circuits and Systems; Acoustics, Speech, and Signal processing; and Signal Processing) and with IEE journals (U.K.) as a reviewer (more than 200 papers).

Associate Editor, IEEE Transactions on Circuits and Systems – II: Analog and Digital Signal Processing, 2000–2001

Associate Editor, Circuits, Systems, and Signal Processing, 2003–2008

Distinguished Lecturer of the IEEE Circuits and Systems Society, 2002–2003

Member of the DSP Technical Committee of the IEEE Circuit and Systems Society: Secretary 2000–2001 and Chairman 2002–2004

Secretary of the IEEE Finland Section 2002–2003

Track Chair (Digital Signal Processing) of the 2003, 2004, and 2005 International Symposiums on Circuits and Systems

Co-Chairman together with Profs. Jaakko Astola and Karen Egiazarian in the annual workshop on Spectral Methods and Multirate Signal Processing (SMMPSP), started in 2001

Co-Chairman of Special Sessions of EUSIPCO 2000, Tampere, Finland, September 2000

Tutorial Chair of NORSIG 2004 (Espoo, Finland) and NORSIG 2006 (Reykjavik, Iceland) and Tutorial Co-Chair of APCCAS 2006 (Singapore)

Technical Program Co-Chair of ISPA 2007 (Istanbul, Turkey)

A member of ISPA Steering Committee

The organizer of almost twenty special sessions at international conferences

A member of the Technical Program Committee at more than twenty international conferences

Seven plenary talks, eight invited talks, three tutorial talks, and one banquet talk at international conferences

Served as a session chairman at more than twenty international conferences

Member of the Board of the Institute of Technical Computation, TUT

Main lecturer and organizer of four intensive DSP courses to the industrial people through EDUTECH, the institute of TUT taking care of educating people outside the university

A founding member of the Median-Free Group International