

## CURRICULUM VITAE

(A short version; for more details, see <http://www.cs.tut.fi/~ts>)

**Tapio Saramäki** (Born 1953, Orivesi, Finland)

**Professor of Signal processing**, Tampere University of Technology (TUT), Dept. of Signal Processing

### Education

1978 Diploma Engineer (with honors) in Electrical Engineering, TUT.

1981 Doctor of Technology (with honors) in Electrical Engineering, TUT.

### Most Important Academic Positions

1975–1986 Various research and teaching positions at the Department of Electrical Engineering, TUT, some of which supported by the Academy of Finland

1986–1995 Assistant Professor in Signal Processing, TUT; 1988–1989, Acting Associate Professor: 1.8.1988–31.7.1989; Fellow Scientist Scholarship of the Academy of Finland (corresponds to the sabbatical for a professor in the United States) three times: 1.7.1989–31.12.1989, 1.7.1990–31.12.1990, and 1.10.1993–30.9.1994.

1986–1995 Associate Professor in Signal Processing, TUT.

1998– Full Professor in Signal Processing, TUT; Fellow Scientist Scholarship of the Academy of Finland: 1.8.1998–31.7.1999.

1992– Docent (Adjunct Professor) in Communication Engineering, TUT.

### Professional Activities

- The Digital Signal Processing Technical Committee of the IEEE Circuit and Systems Society: Member 1998–, Secretary 2000–2001, Chairman 2002–2003; Distinguished Lecturer 2002–2003; ISCAS (International Symposium on Circuits and System): Track Chair (DSP) 2003 and 2004; Track Co-Chair (DSP) 2005, 2011, 2013, 2014 and 2015.
- Secretary of the IEEE Finland Section 2002–2003.
- 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.
- A Member of the ISPA (International Symposium on Image and Signal Processing) International Steering Committee organizing the future ISPA conferences since 2005.
- Co-Chairman together with Profs. Jaakko Astola and Karen Egiazarian in the annual workshop on Spectral Methods and Multirate Signal Processing (SMMPSP), 2001–2008
- Among others, Co-Chairman of Special Sessions of EUSIPCO 2000 (Tampere, Finland), Tutorial Chair of NORSIG 2004 (Espoo, Finland) and NORSIG 2006 (Reykjavik, Iceland), Tutorial Co-Chair of APCCAS 2006 (Singapore), Technical Program Co-Chair of ISPA 2007 (Istanbul, Turkey), Publicity Chair of ICGCS 2010 (Shanghai, China), International Coordinator of ISCAS 2011, Technical Program Co-Chair of ECCTD 2011 (Linköping, Sweden), and Constantinides Track Chair of DSP 2015 (Singapore).
- The organizer of almost twenty special sessions at international conferences; A member of the Technical Program Committee at more than twenty international conferences; and served as a session chairman at more than twenty international conferences.
- Various organization duties especially for DSPA, EUSIPCO, ECCTD, IASTED, ISCAS, ICECS, ISPA, and NORSIG.
- A Guest Editor together with Prof. Yong Lian for the Special Issue on Frequency Response Masking Technique and Its Applications in *Circuits, Systems, and Signal Processing*, vol. 22, no. 2, March/April 2003, 238 pages and 10 editorial pages.
- Among others, for example, an external assessor for an Associate Professor who was considered for tenure to age 65 years old, Nanyang Technological University, 2007.
- Evaluated dozens of candidates in both Finland and world-wide for various grants and awards.
- Reviewer, among others, for *IEEE Transactions on Circuits and Systems*; *IEEE Transactions on Signal Processing*; *IEEE Transactions on Instrumentation and Measurements*, *IEEE Journal of Solid-State Circuits*; *Circuits, Systems, and Signal Processing*; *IEE Proceedings* (many pro-

ceedings); *Signal, Image and Video Processing; and Circuits, Systems, and Signal Processing*.

#### Academic Activities Abroad

- Visiting Research Fellow (Professor) at the University of California, Santa Barbara, USA, 1982 (6 months), 1985 (2 months), 1986 (2 months), 1990 (5 months), 1998 (one month); at the California Institute of Technology, Pasadena, USA, 1987 (one week); at the National University of Singapore 2001 (two weeks); Graduate Center, University of Oslo, Norway, 2007 (one month); at Nanyang Technological University, Singapore, 2009 (two weeks); and at Linköping University, Sweden, 2013 (one week).
- Participated with Prof. Olli Vainio in an ASEAN-EU University Network Programme (AUNP) together with Nanyang Technological University, Singapore, and Linköping University, Sweden, 2004–2006.
- Since 2000, at least eight plenary talks, eight invited talks, three tutorial talks, and one banquet talk at various conferences and seminars.
- Presented more than 50 papers (not exactly counted; this estimate is based on 250 conference articles and that on average there have been between two to three articles in each conference) in international conferences and seminars
- Delivered lectures at different universities (e.g., University of California, Santa Barbara, USA; California Institute of Technology, Pasadena, USA; University of Victoria, Victoria, Canada; University of Rio de Janeiro, Brazil; INAOE, Puebla, Mexico; Beijing University of Post and Telecommunication, China; National University of Singapore, Singapore; Nanyang Technological University, Singapore; University of Nis, Serbia; University of Zagreb, Croatia; University of Sofia, Bulgaria; Universidad de Alcalá, Madrid, Spain; Norwegian University of Science and Technology, Norway; Graduate Center, University of Oslo, Norway; Linköping University, Sweden; Helsinki University of Technology)

#### Honors

- The 1987 IEEE Circuits and Systems Society's Guillemin-Cauer Award together with Prof. Markku Renfors.
- Fellow of IEEE, 2002, for “contributions to the design and implementation of digital filters and filter banks”.
- 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.
- 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 2006 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.

#### Doctoral Students Supervised

Kari-Pekka Estola (1986, a practical supervisor); Jussi Vesma (1999); Juha Yli-Kaakinen (degree with honors) (2002); Robert Bregović (degree with honors) (2003); Peyman Arian (2007); Pilar Martin-Martin (2007; Universidad de Alcalá, Madrid, Spain, together with Prof. Fernando Cruz-Roldan); Raija Lehto (2009); Co-Supervisor: Keping Chen (1987; Linköping University, Sweden, Supervisor: Prof. Lars Wanhammar); Harri Raittinen (1996, Supervisor: Prof. Kimmo Kaski); Atanas Gotchev (2003, Supervisor: Prof. Karen Egiazarian); Đorđe Babić (2004, Supervisor: Prof. Markku Renfors); Omer Anjum (2013, Supervisor: Prof. Jari Nurmi); Baharak Soltanian (2015, Supervisor: Prof. Markku Renfors).

#### Active Doctoral Students under my Personal Supervision

Muhammad Ahsan is going to finalize his doctoral studies in one year.

#### Opponent (Examiner) of doctoral dissertations

Altogether twelve times: Finland (twice), Sweden (four times), Norway (twice), Denmark, Armenia (an examiner), Singapore (an examiner), and Mexico.

### Publications

- 50 refereed journal articles; 250 papers in conference proceedings, three world-wide used patents, co-editor of one journal special issue, seven book chapters. Among these book chapters, T. Saramäki, "Finite impulse response filter design," in Handbook for Digital Signal Processing, S. K. Mitra and J. F. Kaiser, Eds. New York: John Wiley and Sons, 1993, Chapter 4, pp. 155–277, has gained a great international interest as a key reference in many courses held world-widely at many international universities and as start up ideas for at least four programs provided by the MathWorks, Inc.
- According to Google Scholar, there are more than **4100** citations including self-citations. The h-index and i10-index are **32** and **102**, respectively.
- For the list of publications and invited talks, see [http://www.cs.tut.fi/~ts/Tapio\\_Saramaki\\_Publications\\_January\\_2015.pdf](http://www.cs.tut.fi/~ts/Tapio_Saramaki_Publications_January_2015.pdf)

### Selected Publications: *The six most cited papers in the Rank Order of Citations all time*

1. T. Saramäki, "Finite impulse response filter design", Chapter 4 in Handbook for Digital Signal Processing, edited by S. K. Mitra and J. F. Kaiser, John Wiley and Sons, New York, 1993, pp. 155–277. **205 citations**
2. T. Kohonen, K. Mäkisara, and T. Saramäki, "Phonotopic maps—insightful representation of phonological features for speech recognition," in *Proc. IEEE Seventh International Conference on Pattern Recognition*, Montreal, Canada, July 30–August 2, 1984, pp. 182–185, **189 citation**.
3. T. Saramäki, Y. Neuvo, and S. K. Mitra, "Design of computationally efficient interpolated FIR filters", *IEEE Trans. Circuits Syst.*, vol. CAS-35, no. 1, pp. 70–88, Jan.1988; **170 citations**
4. P. P. Vaidyanathan, T. Q. Nguyen, Z. Doganata, and T. Saramäki, "Improved technique for design of perfect reconstruction FIR QMF banks with lossless polyphase matrices," *IEEE Trans. Acoust., Speech, Signal Process.*, vol. ASSP-27, no. 7, pp. 1042–1056, July 1989; **163 citations**
5. J. Vesma and T. Saramäki, "Interpolation filters with arbitrary frequency response for all-digital receivers," in *Proc. 1996 IEEE International Symposium on Circuits and Systems*, Atlanta, Georgia, May 12–15, 1996, vol. 2, pp. 586–571. **121 citations**
6. M. Renfors and T. Saramäki, "Recursive Mth-band digital filters—Part I: Design and properties," *IEEE Trans. Circuits Syst.*, vol. CAS-34, no. 1, pp. 24–39, Jan.1987 (This paper received the 1987 IEEE Circuits and Systems Society's Guillemin-Cauer Award.); **110 citations**

### Teaching Experience:

- Long-term experience in educating students in elementary mathematics, physics, electronics, pattern recognition and especially digital signal processing.
- Dozens of courses have been given for both graduate and undergraduate students as well as for people working in the industry.
- Seven courses with their own lecture notes in English have been generated:
  1. T. Saramäki, P. Jarske, and M. Renfors, "Exercises in digital filtering," 1991 (in Finnish). See <http://www.cs.tut.fi/~ts/>
  2. T. Saramäki, "Basic Digital Signal Processing," 1991 (in English).
  3. T. Saramäki, "Advanced Digital Filtering," 1991 (in English).
  4. T. Saramäki, "System Level DSP Algorithms," 1997 (in English). See <http://www.cs.tut.fi/~ts/>
  5. T. Saramäki, "Discrete-Time Wavelets," 1997 (in English).
  6. T. Saramäki, "Digital Linear Filtering I," 1999 (in English). See <http://www.cs.tut.fi/~ts/>
  7. T. Saramäki, "Digital Linear Filtering II," 1999 (in English). See <http://www.cs.tut.fi/~ts/>
  8. T. Saramäki, "Multirate Digital Signal Processing," 1999 (in English). See <http://www.cs.tut.fi/~ts/>

### Non-Academic Activities / Expert tasks in society and business

- Co-Founder, Share Holder, and System-Level Designer of VLSI Solution Oy Ltd., Tampere, Finland, 1991–
- Co-founder and COE of Aragit Oy Ltd., Tampere, Finland, which was founded by four TUT professors, 2001–2009.

- Consulting for 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; and for 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.

#### Industrial activities:

- The above-mentioned VLSI Solution Oy Ltd. specializes in efficient VLSI implementations of both analog and digital signal processing algorithms for various applications.
- The projects have included, 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.
- Furthermore, Aragit Oy Ltd. concentrated on spreading the know-how of its founding members on information technology to other industrial companies.

#### Industrial projects:

- Participation in several research projects financed by Finnish industry together with TEKES, the Finnish Funding Agency for Technology and Innovation.
- The TUT leader of tens of projects between Nokia Research Center and TUT such as the optimization of a filter in a feedback loop, the use of multirate filter banks and adaptive filtering for echo cancellation, the tailored designs of sampling rate converters between arbitrary sampling rates, and the optimization of special low-delay non-uniform multirate filter banks for speech enhancement.

#### Main recent 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.
- Due to the dramatic change in the Finnish university system, basic research is no more directly supported. Therefore, our team is planning to use its thorough knowledge on filters and filter banks to reply to an increasing demand for agile digital signal processing which can efficiently adapt to varying application requirements in order to avoid wasting energy. A driving force behind this is found in the communications area where there is an increasing interest to develop multi-standard communications systems for seamless support of services across several different standards. Typical examples are self-defined and cognitive radios, where the intelligent modifications of the existing filter and filter bank designs play a crucial role. Recently, an intensive collaboration has been started with Prof. Vesa Välimäki and his group, Department of Signal Processing and Acoustics, Aalto University, because a thorough knowledge on analog and digital filters plays a crucial role in their research.