CURRICULUM VITAE of Prof. Dr.h.c Prof.h.c Hannu Tenhunen

Personal Facts:

Name: Hannu Tenhunen, Born: in Joroinen, Finland, 16.4.1957
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Summary CV of Prof. Hannu Tenhunen

Prof. Dr.h.c Prof.h.c. Hannu Tenhunen is chair professor of Electronic Systems at Royal Institute of Technology (KTH), Stockholm, Sweden. Prof. Tenhunen has held professor position as full professor, invited professor or visiting honorary professor in Finland (TUT, UTU), Sweden (KTH), USA (Cornel U), France (INPG), China (Fudan and Beijing Jiatong Universities), and Hong Kong (Chinese University of Hong Kong), and has an honorary doctorate from Tallinn Technical University. He has been director of multiple national large scale research programs or being an initiator and director of national or European graduate schools. He has actively contributed on VLSI and SoC design in Finland and Sweden via creating new educational programs and research directions, most lately at European level as being the EU-level Education Director of the new European flagship initiative European Institute of Technology and Innovations (EIT), and its Knowledge and Innovation Community EIT ICT Labs. Prof. Tenhunen has been active in promoting the innovation system and innovation support mechanism in research and education both at national and European level.

Prof. Tenhunen has been a board member in science parks, start-up companies, and has served as advisor or expert for high technology companies and venture capitalists, as well as evaluator for EU and national programs and research institutes. He has supervised over 70 M.Sc. thesis, 39 doctoral thesis, and 8 post-doc. From his doctoral students and post-docs, as of today, 21 are currently professors and associate professors. Prof. Tenhunen has served in Technical Program Committee's of all major conferences in his area, have been general chairman or vice-chairman or member of Steering Committee of multiple conferences in his core competence areas. He has been one of the founding editorial board member of 3 scientific journal, have been quest editor for multiple special issues of scientific journals or books, and have contributed numerous invited papers to journals. He has contributed to over 110 journal papers, over 625 reviewed international conference papers, over 170 non-reviewed papers, local conference papers, or other publications, and 9 international patents granted in multiple countries. Prof. Tenhunen is member of Academy of Engineering Science of Finland.

Current and Previous Positions

Professor (fulmakt professor, chair professor), Kungl Tekniska Högskolan/Royal Institute of Technology, Stockholm, Sweden, 1992 forward.
Director of Education, European Institute of Innovation and Technology, EIT ICTlabs   2010-2012
Director of Turku Centre of Computer Science, Åbo Akademi University, Turku, Finland, 2006-2010.
Adjunct Professor, Chinese University of Hong Kong, China, 2006-
Honorary professor, Fudan University, Shanghai, China
Honorary professor, Beijing Jiatong University, Beijing, China
Invited professor of nanoelectronics, University of Turku, Finland, 2006-2010.
Professor Invite´, Institute National Polytechnique de Grenoble (INPG), 2005-2006
Dean, School of Information Technology, Royal Institute of Technology, 2001-2005

Invited visiting professor, Cornell University, Ithaca, NY, 1998
Head of Laboratory, Digital Signal Processing Laboratory, Tampere University of Technology, 1988-1990
Coordinator of National Microelectronics Program of Finland 1987-1991.
Associate professor and acting professor, Tampere University of Technology, 1985-1991.

Scientific expert positions

Evaluator in multiple EU projects and programs for European Commission 1990-2006
Evaluator of projects and large programs for Belgian research funding agency IWT during 1994-2006
Evaluator of large scale research institute IMEC, Leuven, for Belgian government, 2003, 2007
Evaluator of Norwegian electronics education program, 1992
Evaluator of technical education and graduate education for Åbo Akademi University, 2002
Evaluator of MEDEA+ multi billion Euro Eureka programme for participating EU country governments, 2004
Coordinator of multicore processing SRA update for Artemis technology platform, 2006-2007
Coordinator of nanoelectronics education initiative for ENIAC technology platform, 2007
Organizer over 40 advanced courses and workshops at international level
Multiple invited talks and conference opening or keynote presentations
Co-founder and associate editor of Journal of Analog Circuits and Signal Processing, Journal of Low Power Electronics, and International Journal of Embedded and Real-Time communication Systems
Expert reviewer in most journals and key conferences
Participated to technical program committee work for most key conferences in VLSI and design methodologies, e.g. ISSCC 1988-2005
Chair of multiple full day tutorials and workshops in conjunction with international conferences or industrial continuing education (NorESD)
Technical program chair for multiple conferences
General Chair for European Solid-State Conference, 2000, Stockholm, IEEJ Analog VLSI Conference, 2001, Stockholm and 2006 in Hangzhou, European Workshop of Microelectronics Education, 2006 in Stockholm. IEEE Norchip Conference, 2001, Stockholm, Vice-Chair, International Forum on Application-Specific Multi-Processor SoC (MPSoC), France, USA, Japan 2003-2007, Vice-Chair, IEEE COMPSAC confenrence 2008, General Chair, ESSCIRC/ESSDERC Conference 2011 in Helsinki
Member of Steering Committee for European Solid State Circuits Conference and European Solid State Device Conference (ESSCIRC/ESSDERC) (2006-), International SOC Symposium (2005-), IEEE Norchip conference (1992-2005)
Guest editor of multiple scientific journals

Academic Qualifications:

1982	Master of Science in Electrical Engineering at Helsinki University of Technology, Finland (total over 300 credit units) - Majors in Electron Physics (discrete semiconductor device and IC engineering), and Computer Engineering (digital signal processing) - Minors in Mathematics, Solid-State Physics, and Theoretical Physics
1982	Completed postgraduate course requirements for Licentiate of Technology degree at Helsinki University of Technology - Major in Electron Physics - Minor in Computer Engineering (digital signal processing)

1986	Doctor of Philosophy (Ph.D.) at Cornell University, Ithaca, NY, USA (Starting Jauanry 1983 and finished with thesis defence in September 1985) - Major in Electrical Engineering (Microelectronics) - Minor in Applied Engineering Physics (Microfabrication and characterization)
1989	Found qualified by academic review committee and appointed to Associate Professor of Analog and Digital Circuit Techniques in May 1989 at Tampere University of Technology, Electronics Laboratory
1989	Found qualified by academic review committee and first canditate for Full Professor in Information Technology (Tietotekniikka) at Tampere University of Technology, Pori Educational Unit. Cancelled application due to other duties (ASIC research professorship).
1989	Found qualified by academic review committee for Research Professor in Microelectronics at Technical Research Center of Finland (VTT), Semiconductor Laboratory, Helsinki
1990	Found qualified by academic review committee and appointed for Associate Professor of Digital and Computer Engineering (Tietojenkäsittelytekniikka) at Tampere University of Technology, Signal processing Laboratory
1990	Found qualified by academic review committee for Research Professor in Digital Signal Processing and Industrial Applications at Technical Research Center of Finland (VTT), Computer Systems Laboratory, Oulu.
1991	Found qualified by academic review board for Laboratory Director and Professor of Electronics Laboratory, Technical Research Center of Finland (VTT), Electronics Laboratory, Oulu.
1991	Found qualified by academic review committee and appointed for Full Professor in Electronic System Design, Royal Institute of Technology (KTH), Department of Electronics, Stockholm, Sweden, December 1991.
1992	Found qualified by academic review committee and appointed to Docent (professor competence) positions in Digital Circuits and Systems at Tampere University of Technology.
1998	Nominated to Visiting Professor, Cornell University, School of Electrical Engineering, Ithaca, NY, USA
1999-2002	Nominated to Visiting Professor (part-time), University of Turku, Laboratory of Electronics and Information Technology, Finland
1999	Found qualified and appointed to Docent (professor competence) in VLSI Circuit and System Design at Electronic Circuit Design Laboratory, Helsinki University of Technology, Finland
2003	Appointed to honorary doctor (Dr.h.c.) in microelectronics at Tallinn Technical University, Estonia for contributions in advanced education and research
2003	Appointed to TUCS Fellow at Åbo Akademi University, Turku School of Business and Management, and University of Turku at Turku Center for Computer Science
2003-2005	Granted a NorFA (Nordisk forskarakademien) visiting professor at University of Turku, Deparment of Information Technology
2004	Appointed to honorary professor at Bejing Jiatong University, China
2004	Appointed Professeur Invite´ by the faculty board of Institut National Polytechnique de Grenoble, France
2005	Appointed honorary professor by the University Council of Fudan University, Shanghai, China
2005	Appointed director of TUCS
2006	Appointed Adjunct Professor at Chinese university of Honk Kong.
2006	Appointed fixed term invited professor of nanoelectronics, University of Turku

Research Interests:

- Interconnect centric and robust/interference free design of electronic systems, architectures and methods
- Design of embedded and integrated systems towards signal processing, communication, and internet-of-things applications
- Flexible electronic systems and intelligent integration to paper and pulp based substrates and packages
- 3D integration technologies and modelling & design of 3D circuits and systems using through-silicon-via (TSV)
- VLSI applications in personal communication and fundamental design constraints and future paradigms necessary to harvest the technology potential
- Platform based design methods and architectures based network-on-chip architectures
- Embedded dependable systems based on agent controlled autonomic systemic architectures (HW/SW)
- VLSI Design and Circuits, especially towards DSP
- IC Mixed Signal Circuits and Systems including sigma-delta A/D and D/A
- Integrated Heterogeneous Sensible Systems
- Technology policies and educational strategies in area of rapidly evolving ICT technology.

Positions:

Summer 1978	Research Assistant, Electron Physics Laboratory, Helsinki University of Technology; research in electronic structure of selenium using selfconsistent orthgonalized planewave (OPW) method.
Summer 1979	Research Assistant, Technical Research Center of Finland, Semiconductor Laboratory; research in electronic structure of tellerium and amorphous chalcogenide semiconductors.
Summer 1980	Research Assistant, Electron Physics Laboratory, Helsinki University of Technology; research in electronic structure of amorphous chalcogenide semiconductors.
1980 – 1983	Research and Teaching Assistant, Electron Physics Laboratory, Helsinki University of Technology; research in thermodynamics of glass transition and structure of silicon dioxide and chalcogenide glasses (under Prof. T. Stubb).
1980 - 1981	Teaching Assistant at Digital Systems Laboratory, Helsinki University of Technology. (Computability Theory, Theoretical Computer Science))
1980 - 1982	Teaching Assistant at Physics Department, University of Helsinki (Final year laudatur-course Semiconductor Physics)
1983	Research Scientist, Academy of Finland; Design of VLSI circuits (8 months, CUSRAM chip).

1983 - 1986	Statutory Research and Teaching Assistant, Helsinki University of Technology (on the leave of absence during 1.8.1983 -31.7.1986).
Jan 1983-August 85	Fulbright Visiting Fellow, in National Research and Resource Facility for Submicron Structures (12 months), Cornell University, Ithaca, NY, USA
1983 - 1985	Graduate Research Assistant, School of Electrical Engineering, Cornell University, Ithaca, NY, USA; research in dielectric isolation technology in submicron CMOS process technology group of Cornell for silicon-on-insulator VLSI structures (under Prof. J. P. Krusius). Funded by IBM General Technology Division, Burlington.
Sept. 1985-June 86	Acting Associate Professor of Electronics, Electronics Laboratory, Tampere University of Technology, Finland. Activities include establishing microelectronics curriculum in TUT and laboratory and starting up VLSI research team and getting external funding for it. Research focus is on high performance circuit design and simulation including semiconductor process and device modelling.
June 1986-Feb 87	Statutory Military Service, Finnish Air Force Depot, Research Associate, High performance VLSI signal processing for radar applications (6 months).
Sep. 1986 - Dec. 86	Visiting Lecturer, Tampere University of Technology, Electronics Laboratory, course Design of Analog Integrated Circuits.
Jan 1987-May 87	Visiting Lecturer, Tampere University of Technology, Electronics Laboratory, course Digital and Analog Integrated Circuits.
Feb. 1987	VLSI Research Group Leader (Principal Scientist), Electronics and Computer Systems Laboratories, Tampere University of Technology. Activities include: (i) establishing an active VLSI research group of size 25 research assistants and associates, and acting its research leader and program manager, (ii) active research on VLSI circuit structures, analog/digital interfaces, digital signal processing systems on silicon, fast microarchitectures for DSP, and space electronics.
July -Dec. 1987	Acting Professor of Electronics. Electronics Laboratory, Tampere University of Technology, Activities include: (i) teaching VLSI Design, Analog Circuit Design and CAD/CAE methods in electronics courses, (ii) supervising thesis work for 4 PhD-level students and 12 MSci students (members of VLSI Research Group), (iii) acting as a member of organizing committees for many professional post-graduate continuing education short courses in electronics, (iv) prepared and lectured multiple continuing education and post-graduate courses on ASIC integration.

1987 - 1991	Program Coordinator, National Microelectronics Research and Development Program, funded by Technology Development Centre of Finland and Finnish Industry 100 million FIM for 1987 -1991. Activities include: (1) Developing research program goals for 1987 - 1991, (2) monitoring current research projects, (3) preparing research program and budgets, (4) proposing and organizing following new programs (i) FINSILC, all Finnish universities active in electronics will be equipped with commercial silicon compilers for education and research, (ii) FINCHIP, a commercial multichip project to provide prototype services and small production runs (100 - 10 000 IC year) using Finnish technology in order to enhance ASIC competiviness of Finnish electronics industry, (iii) SMARTPOWER, intelligent power integrated circuits, a project combining National Microelectronics and Mechatronics programs providing system design know-how (DSP, VLSI) and technology know-how (BiMOS, PIC) to power electronics and mechatronics industry. Major contribution in this area was the shift of the research activities from research institutes to universities, integrating universities and industries in close cooperation. This program produced (as seen in retroactive perspective in 1998) the key competence and the key senior personnel which significantly contributed to Finnish industry success in 1990s (e.g. Nokia).
Aug. 1988-Sep. 1989	Head of Laboratory and Acting Professor of Electronics Tampere University of Technology, Signal Processing Laboratory. Teaching duties include Computer Systems, Digital Hardware Techniques and VLSI System Design, responsible on hardware system design (research and teaching). Heading research laboratory of size 55 people.
1989	Nominated as Associate Professor of Electronics in May 1989 at Tampere University of Technology (on leave of absence due to being Head of Laboratory and acting professor at Signal Processing Laboratory).
1990	Nominated as Associate Professor of Computer Engineering at Signal Processing Laboratory of TUT in August 1990. Established Computer Engineering Laboratory and organized external funding of 6.5 MFIM for equipments and software. On leave of absence.
1989-94	Holding a 5-year research grant (research professor) on ASIC Techniques funded by private companies. On leave of absence on teaching duties. Research focus on ASIC system design, design methodologies, and technologies. Active supervision of graduate students.
1989-91	Visiting Lecture, Signal Processing Laboratory, TUT, courses Digital Systems Design, VLSI for Digital Signal Processing (Graduate course), Practical Packaging Technologies for Electronic System Design (Graduate seminar), High Speed Digital System Design, Part I, Interconnections, Packaging and Circuits (Graduate seminar)

1992-	Professor of Electronics, Institute of Electronic System Design, The Royal Institute of Technology, Stockholm, Sweden. Creating from scratch an active research program in electronic system design directed towards communications and completely renovating electronics and VLSI education at Royal Institute of Technology. Establishment, with external funding, a laboratory of 25 persons. Initiated and founding member of 4 graduate schools (with 5-10 year financing each): 2 already decided (Personal Communication and Computing, and Microelectronics and Fotonics design activities), 2 currently under final review stage. Duties include defining the laboratory research profile, education and curriculum profile, and recruit the staff and graduate students (3 assocaite professors, 3 staff members, and 15 graduate students are currently associated to Electronic System Design Laboratory).
1994	Docent at Tampere University of Technology in Digital Systems. Activities include courses in VLSI, Physical Architecture of VLSI/ULSI Systems, and short continuing education courses to industry and graduate students in modern design methodologies and mixed signal designs.
1998	Visiting professor, Cornell University, School of Electrical Engineering, Ithaca, NY, USA (fall semester). Research on global interconnects for ULSI.
1999	Docent at Electronic Circuit Design Laboratory, Helsinki University of Technology. Duties include building a new circuit oriented digital circuit design curriculum and providing undergraduate and graduate courses
2000-2003	Visiting part-time professor, University of Turku, Laboratory of Electronics and Information Technology, Turku, Finland
2001- 2005	Appointed to Dean of School of Information Technology, Royal Institute of Technology (IT-Universitet, KTH). Responsible of development KTH profile in Kista with 60 professors and associate professors, 3500 full-time equivalent students, and 520 MSEK education and research activity volume, and large scale international educational programs. -see www.it.kth.se
2006-2010	Director, Turku Centre for Computer Science, TTurku, Finland
2006	Invited Professor of nanoelectronics, University of Turku
2010-2012	Director of Education, EIT ICT Labs, European Institute of Innovation and Technology.

Other activities:

Participated in professional and post-graduate training

1980	Summer Institute in Quantum Chemistry, Solid State Physics, and Quantum Biology, Uppsala, Sweden
1981	NATO Advanced Study Institute: Science and Technology of Large Scale Integrated Circuits: Present Situation and Future Prospects, Erice, Sicily, Italy

1982	Helsinki International Summer School on Semiconductors, Helsinki, Finland
1982	Technology Forecasting in Practice, Helsinki, Finland
1983	Lithography and Dry Etch Process Short Course, National Submicron Facility, Ithaca, NY, USA
1986	Design of Analog/Digital Application Specific Intergrated Circuits, Helsinki, Finland
1986	Modern Digital Signal Processing Techniques, Tampere, Finland
1986	GaAs Integrated Circuits, Tampere, Finland
1987	Space Technology and Instrumentation: International Workshop, Tampere, Finland
1987	DSP Specialist Workshop, Finland/Sweden
1987	NATO Advanced Study Institute: Logic Synthesis and Silicon Compilation for VLSI Design, L'Aquila, Italy
1986-91	Multiple continuing education courses (over 20) as a course director and/or lecturer (organised by INSKO or Coninuing education center EDUTECH at Tampere University of Technology)
1996	NATO Advanced Study Institute of Low Power Design for Deep Submicron Technologies, Italy
1997-98	Multiple one to 5 day graduate level courses to Ericsson Radio Systems, Ericsson Components, Nokia Mobile Phones, and Nokia Research Center on A/D converters, mixed signal designs, and on physical architectures of VLSI/ULSI systems.
1995	Organised and lectured 3 day continuing education course on Sigma-Delta Converters for Ericsson Components AB staff.
1995	Organised and lectured a graduate course on Physical Architecture of ULSI/VLSI Systems at Helsinki University of technology (won the best course price for academic year 1994/95)
1996	Organised and lectured 8 day continuing education course on Physical Architecture of ULSI/VLSI Systems for Ericsson Radio AB staff
1997	Organised and lectured 8 day continuing education/graduate course on Physical Architecture of ULSI/VLSI Systems for Ericsson Radio Systems AB staff
1998	Organised and lectured 8 day continuing education/graduate course on Mixed Signal System Design for Ericsson Radio Systems AB staff
1996	Organised and lectured 5 day continuing education course for Nokia Corporation staff on Physical Architecture of ULSI/VLSI Systems in Tampere
1997	Organised and lectured 3 day continuing education/graduate course for Nokia Mobile Phones staff on Physical Archiecture of ULSI/VLSI Systems in Tampere
1997	Organised and lectured 3 day continuing education course for Nokia Mobile Phones staff on Mixed Signal System Design in Oulu
1998	Organised and lectured 14 hour continuing education course/graduate on Sigma-Delta Noise Shaper Design for Ericsson Radio Systems AB staff
1996-98	Co-organised and lectured 30% of 32 hour continuing/graduate course on A/D Conversions for Ericsson Radio Systems AB and KTH staff.
1998	Organised and lectured graduate course on Low Power IC Design at Helsinki University of Technology, Finland
1998	Co-lectured with Prof. Kari Halonen) continuing education course IC Design to Nokia Mobile Phone staff in Oulu
1997	Organised and lectured 1 day continuing education course on Low Power Electronic System Design at Nokia Mobile Phones, Oulu
1999	Organised and lectured graduate course in VLSI Design at Turku University, Turku, Finland

1999	Organised and lectured undergraduate course in LSI Design at Helsinki University of Technology
2000	Organised and lectured a 3-day graduate course on IC circuit and layout design to Nokia Telecommuncation Oy and Fincitec Oy staff
2000-3	Organsied and lectured a 3 day intensive final-year undergraduate and graduate course on deep submicron VLSI electrical design at Helsinki University of Technology
2001	Organised a workshop on Network-on-Chip at ESSCIRC Conference, Villach, Austria
2002	Organised a tutorial day on interconnect centric design at ESSCIRC2002, Florenze, Italy
2003	Organised a tutorial day on interconnect centric design at ESSCIRC2003, Lissabon, Portugal

Research policy and program formation activities

1986-1990	Program coordinator (director), National Microelectronics Program of Finland (100 MFIM R&D program for creating the enabling infrastructure in microelectronics systems in Finland).
1988-1990	Director and organiser of the Finnish multichip service FINCHIP to academic users.
1987-1991	Co-proposer and initial organiser for International University Program on Digital Signal Processing (with prof. Yrjö Neuvo)
1990-1994	Initiative taker and propose organiser for EUREKA-JESSI subproject NorASIC-SMI for organisation of technology dissemination and SME support in ASIC area for Nordic Small and medium sized enterprices.
1993-1997	Initiative taker and organiser of NorESD (Nordic Program of Modern Electronic System Design) Continuing Education Program on modern electronic system design consisting over 20 different courses (each with 2-3 day program) both in Sweden (Stockholm) and Finland (Tampere). Total over 400 participants making this, sofar, the largest directed continuing education activity towards industries in these countries.
1995-1999	Inititative taker and proposal writer and project director for ESPRIT long term research proposal MEDIA
1996-97	Co-proposer and co-planner for SSF graduate school proposal Computing&Communication (C&C), which was then realised as Personal Computing&Communication (PCC) program.
1997-1998	Initiative taker and co-proposer for a new SSF graduate school in advanced electronics technology and production, EPROPER. National program started late fall 1999.
1996-1999	Co-proposer for an industrial graduate school Electronic Design funded by SSF. First students started in Spring 2000.
1994-1996	Initiative taker and first start-up workshop organiser for a joint Finnish-Swedish research program INWITE 1997-2000, funded by NUTEK and TEKES and Finnish and Swedish industries. This program will be followed by EXCITE program for 2001-2003 with additional funding partnership with Academy of Finland and Tekniksforksningsråd (TFR).
1997-1998	Inititative taker and co-proposer for a High Speed Electronics program within Microelectronics and Photonics Graduate School financed by SSF. Member and KTH representative in the management board.
1994-98	Co-proposer and member of the managemnt board for Mobile Radio consortia (funded by NUTEK and SSF).
1994-1996	Co-proposer and member of the management board for Advanced ASIC Design consortia (funded by NUTEK and SSF).

1996-2001	Initiative taker and director of Swedish Institute (SI) Visby program project on Electronics for Information Technology education and research co-operation with Tallinn Technical University, Estonia (will be expanded towards Kaunus Technical University during 2000).
1998-99	Initiative taker and one of the planners for new educational profile Competence Area Electronics (KELE) in KTH E-sektion study program
1997	Initiative taker for national program on System-on-Chip in Sweden. This resulted to establishment of the national Socware program with total budget volume of 400 MSEK during time period 2000-2005
1998-2000	Initiative taker (together with Prof. Landgren) and planner for the new electronics program which transformed later to the new IT-university study program and "pusher" and curriculum planner for System-on-Chip related track KK in the new IT educational program. Currently this program represents the largest and most aggressive educational initiative in Sweden with first 165 students starting in Fall 2000.
1998-2002	Co-proposer and responsible researcher for SIDA sandwitch program in electronics education and competence development with University of Peradeniya, Sri Lanka.
1998-2000	Initiative taker and planner for the International Master Program on System-on-Chip Design at KTH with the first 30 students starting the program in Fall 2000. This is one of the first interdisciplinary SoC educational initiatives in the world.
1999-2000	Initiative taker for profiling faculty development and new requirement of professors towards future Ubiquitous Communication Electronics at University of Turku. Four new professor chairs ahs and will be announced from devices to systems with this common focus. Co-propose for a regional R&D program in Turku area with 200 MFIM volume.
2000	Initiative taker and co-proposer (with profs. J. Nurmi and J.. Isoaho) to a new national System-on-Chip related research program ESCO (Enhancing System-on-Chip Competence and Opportunities) in Finland with 200 MFIM targeted research volume and 1250 new specialist trained over the next 5 year period.
2000	Initiative taker and co-proposer for a European Union ITS project in education to address the Microelectronics Skill Shortage area IV 8.9 in September 2000 call.
2000	Ititiative taker and strategic planner for globalisation/internationalisation strategy for the IT-University in Kista
2001-2004	Strategic planning responsibility for the academic faculty expansion and education program expansion for the IT-University in Kista.
2000-2004	Project contractor, SoC-Mobinet EU IST program project of volume 4 MEuro
2002	Proposer and coordinator for EoI for networks of Excellence in Network-on-Chip. Co-proposer and founding partner for 3 other networks and 2 Integrated Project proposal.
2003	Key proposer, thematic area leader, and contractor for EU 6th framework Network-of-Excellence proposal EuroSOC
2003	Initiator for Nordic/Baltic NorFA network for in Network-on-Chip and Nanosystems
2002-2004	Holder of NorFA (Nordisk Forskarakademi) part-time visiting professor position at University of Turku.
2003	Initiator of KTH System-on-Chip joint education and research center in China in cooperation with Chinese national research program 863 and Zhejiang University and Fudan University
2005	Established Euro-Sino Centers for research and education in SOC
2005	Initiator behind Campus Sweden, a joint operation of KTH, Chalmers, and Karolinska Institutut in Bejing University and in fudan University.

2006	Initiator of close academic integration between universities in Turku and Stockholm region.
2007	Initaitor of Turku Innovation Platform, a regional governance structure for knowledge and innovation community operation.
2007	Initiator a large scale Nordic Master School on Innovative ICT between Turku, Stockholm, Copenhagen and Tallinn.

Professional Activities:

1986-1987	President of Tampere section of Electronics Engineers in Finland Society
1986	Member of organizing committee for a professional postgraduate course: Design of Analog/Digital Application Specific Integrated Circuits
1986	Member of organizing committee for a professional postgraduate course: GaAs Integrated Circuits
1987	Member of organizing committee for a professional postgraduate course: Micropower Electronics
1987-1989	Organized "National IC Design Workshop" for research institutes and industry. May 1987, March 1988, April 1989, and April 1991
1987	Organized "Sigma/Delta Analog-to-Digital Converter Techniques" workshop. August 1987, August 1988
1987	Organized and designed a post-graduate full-term course "VLSI for Digital Signal Processing"
1987-1988	Course director for international "Advanced Course on MOS VLSI Design for Telecommunication (10 day course), June 1988 (together with Prof. Y. Tsividis, Columbia University, USA)
1987	Member of a selection committee and a reviewer for IEEE International Circuits and Systems Conference (ISCAS -88)
1987-1891	Member of a steering committee for National Microelectronics Research and Development Program
1988	Course director and organizer for "Practical Silicon Compilation in Electronic System Design", 5 day course (in English) in February 1988, Finland
1988	Course director and organizer for "Module Generator Based VLSI System Design", 5 day course (in English) in March 1988, Finland
1988	Course director and organizer for "ASIC Design Workshop", 8 day workshop (in English) in October 1988, Finland
1988-1990	Member of a organizing committee and course designer for "International University Program in Digital Signal Processing"
1988-1989	Member of a Department Board, Tampere University of Technology, Department of Electrical Engineering
1989	Organized (with Dr. Vainio) 2 day industrial seminar "DSP-ASIC Workshop", February 1989
1989	Member of a organizing committee for industrial course "Custom Silicon Now!", March 1989
1988-1989	Member of Technical Program Committee, IEEE European 1989 Solid State Circuits Conference (ESSIRC), Austria
1989-1992	Member of Technical Program Committee, IEEE ASIC Seminar & Exhibit, USA
1990-95	Member of Technical Program Committee, International Solid-State Circuits Conference, USA
1990	Conference Chairman, Scandinavian NORCHIP Seminar, Lund, Sweden, October 1990
1990	Member of the Steering Committee, Nordic NORSILC/NORCHIP Project funded by NIF

1990	Member of the Organizing Committee, INSKO courses "New Electronics Design Techniques" and "VHDL Course"
1989-91	Company Board Member, Kemi Technology Park Ltd.
1991-94	Member of the Steering Committee, Nordic NorASIC-SME project (a subproject in EUREKA JESSI (Joint European Submicron Silicon Initiative) project) funded by Nordisk Industrifond and Nordic goverments
1990-91	Reviewer, International Journal of Computer Aided VLSI Design, and Analog Integrated Circuits and Signal Processing
1991	Conference Co-Chairman (with Prof. Olesen), Nordic NORCHIP Seminar, Copenhagen, Denmark, October 1991.
1991	Member of the Steering Committee for ASIC Design Methodologies and Tools (ASPI) Program (a part of Finnish National Electonic Design and Manufacturing Programme 1991-95)
1991	Member of the Steering Committee for Circuit Board Design and Testing Methods and Tools Program (a part of Finnish National Electronic Design and Manufacturing Programme 1991-95)
1991-92	Member of the Technical Program Committee, IEEE European Solid State Circuits Conference (ESSCIRC)
1992-	Chairman, Nordic NORCHIP project with over 15 Scandinavian participating institutions. Duties to develop Scandinavian consortia and network for Centers-of-Excellence in microelectronics
1994-	General chairman, IEEE NORCHIP conference (a Nordic/Baltic conference specializing to IC design and design methodologies. Best papers are published as a special issue of Journal of Analog Circuits and Signal Processing and Journal of VLSI Signal Processing).
1993-94	Member of the company board, Synthesia AB
1996, 1998	Member of Technical program Committee, IEEE European Solid State Circuits Conference (ESSCIRC)
1992-2001 Circuits	Member of Technical Program Committee, IEEE International Solid-State Conference (ISSCC)
1994	Guest co-editor for special issue in Journal of Analog Circuits and Signal Processing
1997-1998	Executive Board Member, national graduate school Personal Computing and Communication (PCC).
1997-	Member of Editorial Board, Journal of Analog Integrated Circuits and Signal Processing
1998	Technical program committee member, Design, Automation and Test in Europe Conference (DATE99)
1997	Guest co-editor for special issue in Journal of Analog Circuits and Signal Processing
1997-1998	Member of the company board, KTH Holding AB
1997-1998	Executive Board Member, national graduate school in Microelectronics and Photonics, high speed electronics.
1999-2000	Technical program committee member, Microelectronics System Education Conference (EWME2000), France, 2000
1998-2000	General Chairman, IEEE European Solid-State Conference in Stockholm in year 2000 in Stockholm
1999	Expert reviewer, EU ESPRIT PREST research project
1999	Expert reviewer, EU ITS programme proposal for the first call.
2000	Expert reviewer, EU ESPRIT PATMOS project
1999	Expert reviewer, Belgian Flamish National Research Program 1999-2001 on information technology

1999	Expert reviewer, Belgian evaluation of the Flemish participations in the European EUREKA-program MEDEA
1999	Technical program committee member, IFIP International Conference on Very Large Scale Integration
1999-2000	Vice chairman and Local organizing committee chairman, IEEJ Analog VLSI conference, Stockholm,
2000-2001	Technical Program Committee member for European Solid State Circuits conference (ESSCIRC) 2001
2000-2001	Technical Program Committee member for European Conference on Circuit Theory and Design (ECCTD) 2001
2000-2001	Technical Program Committee Member, IEEE International Conference on Electronics, Circuits and Systems
1999-2000	Technical Program Committee Member of Baltic Electronics Conference (BEC) 2000
1999-2000	Member of the management board for Industrial Graduate School in Electronic Design, funded by KK-foundation.
2000-	Member of the management board for national System-on-Chip program Socware
2000-	Director of KTH SoC research and education activities. Responsible director of International Master Program on System-on-Chip at KTH
1998-2003	Area manager in System-on-Chip area in national SSF funded INTELECT research program
2000	Guest co-editor for special issue in Journal of Analog Circuits and Signal Processing
2001	Guest co-editor for special issue in Journal of Analog Circuits and Signal Processing
2002	Guest co-editor for special issue in Journal of Analog Circuits and Signal Processing
2000-	Member of the Academic Advisory board, Turku Center for Computer Science (TUCS).
2000-	Member of the Advisory Board, Imsys AB (a Swedish high technology company with focus on innovative microprocessor ICs)
2000-	Advisor, Spirea AB (a Swedish high technology company with focus on Bluetooth products).
1980 - 2004	Participated over 100 international conferences
1999	Expert reviewer for Belgian Government on IMEC, Leuven, activities and future directions and organisational structure
2000	Technical program committee member of the European Solid State Circuit Conference
2001	Conference Chair and orgainiser, 19th IEEE Norchip Conference, Kista Sweden
1991-	Chairman of the Executive Board of IEEE Norchip series of Nordic/Baltic conferences
2001	Conference organising committee member, DATE Conference 2002
2001	Technical program committee member, 4th European Workshop on Microelectronics Education (EWME02), 2002
2002	Technical program committee member of the Baltic Electronic Conference, 2002
2002	Technical program committee member, European Solid State Circuits Conference 2002 & 2003 & 2004 (Florence, Lissabon, Leuven)
2002	Guest editor Journal of Analog Circuits and Signal Processing
2003	Technical program committee member for ESSCIRC and special workshop organiser

2003	Expert reviewer for multi billion Euro Medea+ Eureka programme.
2003	Guest co-editor for special issue in IEEE Journal of Solid State Circuits
2003	Guest co-editor for special issue for Journal of System Architectures
2004	Technical program committee member, EWME 2004 (European Microelectornics Education Conference)
2004-2008	Vice-Chairm of Multiprocessor SoC workshop (MPSOC2004)
2005	Technical program committee member, European Solid State Circuit Conference
2007	General Chairman, EWME 2006 in Stockholm, European Microelectronics Conference
2005	Steering Group member for ESSCIRC/ESSDERC conferences
2007	Steering Group member, IEEE Int Workshop for System-on-Chip
2008	Vice.Chiar, IEEE COMPSAC Conference
2011	General Chair, ESSCIRC/ESSDERC 2011 conference

Membership in Professional Organizations:

IEEE, Electron Device, and Circuits and Systems, and Solid-State Circuits Societes
Electrochemical Society
Electronics Engineers in Finland Society
Finnish Technical Society
Finnish Physical Society

Fellowships and Grants:

Asla-Fulbright Fellowship 1983 - 84
Finnish Cultural Foundation Grant 1983 - 85
Wihuri Foundation Grant 1984
Foundation for Advancement of Technology Grant 1984

Teaching Experience:

Lecturing and designing undergraduate and graduate courses (1980 - 2000) in the following topics (responsibility include course planning, material selection, additional course material development, lecturing and grading):

- Semiconductor Physics (for EE students)
- Quantum Physics (for EE students)
- Computability Theory (teaching assistant)
- Theoretical Computer Science (teaching assistant)
- Discrete Components and Semiconductor Devices
- VLSI Design
- Integrated Circuits
- CAD/CAE Methods in Analog Electronics
- Commercial Electronic Components and Circuits
- Analog and Digital Electronic Circuit Structures and Design
- Analog Circuit Design on Silicon
- Electronics Laboratory Works and Special Projects
- Computer and Processor Architecture
- Digital Equipment Design
- Structured VLSI System Design
- VLSI Processor Architecture and Design
- VLSI for Digital Signal Processing
- High Speed Digital System Design
- Practical Packaging Technologies for Electronic System Design

- Low Power Electronic System Design
- Low Power IC Design
- Sigma-Delta A/D converters
- A/D and D/A conversion techniques
- Physical Architecture of VLSI/ULSI Systems
- Mixed Signal System Design
- VLSI Design
- LSI Design
- Digital System Engineering
- High Speed CMOS design
- Embedded Systems in SoC
- Digital Hardware organisation
- Digital Circuit Techniques for deep submicron CMOS
- Electrical Design of Digital Systems
- Nanoelectronic systems

Many (over 60) professional post-graduate and continuing education short courses and seminars (lectured/designed) including a Nordic co-operative program NorESD for continuing education.

New curriculum structure and course integration approach in electronics education at Royal Institute of Technology.

New specialised curriculum towards System-on-Chip integration from physical integration to functional integration.

New international M.Sc. educational program, SOC Masters, at KTH

New national and international B.Sc., M.Sc (Teknologie magister), Civ.ing. programs for IT-University in Kista. 750 students will enter on yearly basis to these programs, of which over 300 are international students.

Organization development experiences 1986-2003

Organised a new electronics educational program at Tampere University of Technology 1985-86

Created a current Microelectronics lab with focus on circuit design issues at Tampere University of Technology

Organised national circuit related research activities as the coordinator of the national Microelectronics Program of Finland 1987-90

Started and organised Digital hardware Laboratory (during that time part of Signal Processing Lab) 1989-1992. Currently a laboratory of 130 persons

Worked as Head of Laboratory (prefekt) of Signal processing Laboratory being responsible on overall education and administrative issues. (1988-89)

Contributed significantly to the creation of International Program of Signal Processing at Tampere University Technology (jointly with Prof. Yrjö Neuvo), 1988-89

Created from scratch electronics design activities at Royal Institute of Technology (KTH) and Electronic System Design Laboratory, and establishing that as the recognised leading European research and education unit in this area comparable to the best US units.

Organised multiple large-scale donations for creating competitive educational environment both at TUT and at KTH.

Creation and support for activities towards technology dissemination and enhanced usage in SME sector in Nordic area, 1990-1994

Contributed as initiator or co-propose to formation of multiple graduate schools and national research programs in Sweden, 1995-1998

Initiated the process to create a national program and policy of System-on-Chip design issues (including education, research, and industrial activities), 1997-1999

Contributed to the restructuring of education in electronics area at KTH and one of the early propagators and architects for the IT-university program at KTH, 1998-2000

Leadership as dean for IT-University development with currently over 3500 full time students, 60 professors and associate professors and 520 MSEK yearly total budget.

Definition of new professor areas and ling-term educational strategies.

Initiator and organiser for International Master Program on System-on-Chip Design (SoC Masters) at KTH, 1999-2003. Currently the most successful international master program at KTH with over 500 applicants each year.

Member of KTH Executive Management Board (Ledningsgrup)

Member of KTH Faculty Dean Council

Member of KTH Faculty Promotion Council

Member of KTH International Programs Council

Chairman of Recruitment Board for IT-University

Chairman of Educational Board for IT-University

Director, Turku Centre of Computer Science

Research activities and program development experience 1987-2000

Research Projects in 1987:

Digital Signal Processing and Application Specific Integrated Circuits (DSP-ASIC, system and circuit designs and design methodologies) co-principal investigator, funded by Technology Development Centre.

Hierarchical and Deterministic Modelling of IC structures and Fabrication Processes, Principal Investigator, Academy of Finland.

Advanced Microarchitectures for High Performance Digital Signal Processing, Matine, Principal Investigator.

Electronic Integration of High Energy Particle Detector for SOHO Satellite (by ESA), Principal Investigator.

Advanced Analog to Digital Conversion Techniques, Industry funded, Principal Investigator.

Program Coordination, National Microelectronics R&D Program

Research Projects in 1988:

High Performance Microarchitectures for Adaptive Signal Processing, Principal Investigator

SMARTPOWER-Integrated Circuits for Power Electronics and Mechatronics, Co-investigator (circuit techniques)

A/D and D/A Conversion Techniques, Principal Investigator

Electronic Integration of High Energy Particle Detector for SOHO Satellite, Principal Investigator and co-investigator in international ERNE-project for ESA

Design of Testable and Verifiable Integrated Circuits and Electronic System for Avionics, Principal Investigator

DSP-ASIC, 2nd year, Co-investigator and project manager

Research co-operation with Integraph Corp. (Huntsville, USA) on advanced circuit design techniques and related tools. Integraph provides workstation and programs worth of over 1 million FIM to VLSI Research Group

Research co-operation with Silicon Compiler Systems (SCS) (San Jose, USA) on VLSI system design. SCS provides Generator Development Tools and module compiler software worth over 5 million FIM to VLSI Research Group in order enhance VLSI system design know-how in Finland

Program Coordination, National Microelectronic R&D program
- FINSILC-project: silicon compiler systems for Finnish universities
- FINCHIP - a commercial multichip project for industrial R&D, small scale production, and academic research and education
- monitoring and developing national research program on ASIC design

Training program on gate array and standard cell dig-ital system design for over 250 industrial designers, Principal Investigator

Research Projects in 1989:

DSP-ASIC, 3rd year, co-investigator and project amanger

SMARTPOWER, 2nd year, co-investigator

DSP-CORE, 1st year, research on high resolution analog interfaces and core microprocessor and signal processor architectures and implementations for embedded system ASIC implementations in instrumentation and telecommunication. Principal investigator.

Digital Power Control. Research on digital ASIC based intelligent thermal overload relays and contactors for electric machines. Principal investigator.

Constant False Alarm Rate (CFAR) radar digital signal processing. Principal investigator.

Oversampled sigma/delta converters for telecommunication applications. Principal investigator.

ESPIRIT project Promotion of VLSI Design Skills. Co-investigator.

Research co-operation with Silicon Compiler Systems on VLSI tools for DSP-ASIC.

Program Coordination, National Microelectronics Program
-FINSILC; extending silicon compilation tools to technical colleges in Finland in order to initiate ASIC training in technical colleges and institutes.
-FINCHIP; integrating FINCHIP services with ESPIRIT project "Promotion of VLSI Design Skills" and provide high performance digital CMOS processing capabilities to Finnish research establishments.
-VLSINET; computer network for design information exchange and email between research organizations, industry and FINCHIP.
-Developing new research areas for the 2nd phase of National Microelectronics Program in 1990s.

Research Projects 1990:

DSP-ASIC, 4th year, co-investigator
DSP-CORE, 2nd year, principal investigator
Digital Power Control, 2nd year, principal investigator
CFAR Radar signal processing andhardware implementations, 2nd year
Oversampled sigma/delta converters, industrial applications in process automation (sensors) and mobile communication (intermediate frequency signal processing), principal investigator
Digital Audio. Established and arranged funding for industrial consortia for pre-competitive R&D in digital audio and DSP based loudspeakers, principal investigator
Organized funding and coordinating for Technical Colleges in developing microelectronis and system design courses.
Established Digital and Computer System Design Laboratory in Signal processing Laboratory, TUT with help of 6.5 million FIM grant as hardware and software from industry.
Coordinator, National Microelectronics R&D Program of Finland , 4th year
     -planning futher activities after the end of Finnish NMP

Research Projects 1991

Developing new application specific signal processor architectures with a European company (Austrian Microelectronics Systems, AMS), 3 researchers
Research in ASIC based smartpower applications (Smart Motor Controller), 4 researchers
Research in PCB/hybrid/MCM electrical and system level simulation techniques and tools to distribute simulations on computer network, 4 researhers (part of KOSTI Program in new National Electronics Programme)
Digital audio for loudspeakers, 2 researchers
ESPRIT EUROCHIP VLSI Design Skill Training Action
Sigma/delta data conversion research, 4 researchers
EUREKA JESSI Application Project #42 and Nordisk Industrifond funded
NorASIC-SMI project (part of ASPI program in Finland), 5 researchers
     -synthesis for DSP-ASIC
     -DSP cell libraries
     -simulation acceleration tools
     -innovative DSP integration applications
Evaluation of Finnish Industry Needs and Requirements for Standardized Design Tool and Database Integration (ESKART, Part of new National Electronics Programme, cooperation with Research Institute for Information Technology, TUT), 1 researcher

Research projects in 1992

Reusable macro library based design methodology at Tampere University of Technology. Close contact/supervising to earlier research projects at TUT.
Research cooperation with CERN on data collection system in Large hadron Collider based on ATM switching technologies (KTH)
Asynchronous design methodologies (KTH)
NorASIC, a ASIC technology dissemination project as well as evaluation of ASIC technology adoption in industries. Initiaiting the activites at Institute of Microelectronics in Sweden.

Research projects 1993-94

Walkstation, an interdiciplinary research project on future multimedia personal communication
ATM switch fabrics for very high throughput and 10 Gbit/s building blocks.
Self-timed asynchronous architectures and their applications to spread spectrum radio receivers.
High level synthesis technologies for memory intensive telecommunication applications
System level design toolbox, a collection of tools for early exploration and estimation of communication systems

Research program 1994-1997

The main objectives of the research program at ESDlab is to: (i) conduct conceptual design and feasibility of new circuit architectures and design methods and concepts on selected area of telecommunication applications, (ii) explorre long range technology and circuit options for VLSI/ULSI systems, and (iii) identifying critical design concepts which may provide paradigm shift in design methodology. This is achieved at ESDlab via a research program with 3 focus 3 areas:
i) **VLSI/ULSI System Applications and Strategic Implementation Techniques**
Focus on new concepts and architectures in personal communication (CDMA) and high speed switching. On implementation side high speed sigma-delta methodology and asynchronous design techniques for low power and high performance are under study
(ii) **Design Methodology and Tools**
Research focus on HW/SW codesign and co-verification issues and performance estimation, and on high level synthesis for telecommunication oriented applications.
(iii) **High Speed/High Performance Complex Circuits**
Research focus on design and technology issues (on both Si- and III-V-semiconductor based substrates) for high speed (0.5-40 GHz) mixed-mode circuits for optical and wireless communication and ATM.
This program is realised via multiple smaller nationally and internationally funded research projects. Key aspects has been in establishing and starting up advanced and long term (5-10 years) graduate schools in the area as Personal Computing and Communication (PCC) and Microelectronics and Photonics (High Speed Electronics Track).

Research program 1998-2001

The objective of the ESDlab is to do research and education in the design of complex electronic systems. The ESDlab mission is to
1. develop a new knowledge base and to do industrially relevant research in innovative design on VLSI/ULSI systems and technologies,
2. couple research to educational activities, and
3. provide state-of-the-art facilities for own work and to our industrial affiliates

The key research issues to improve design efficiency and design quality are:
Functional design and validation: Functional design for heterogeneous

ASICs consisting of multiple DSP and RISC core processors, with embedded software integrated on chip memories resulting to much higher design abstraction and specification levels in the design process requiring new description languages and synthesis techniques.

IP based design: Significant improvement of reusability and enhanced reusable macro generation in all phases of the design, resulting to more efficient IP (intellectual property) encapsulation.

Interconnection based design: Design optimization strategies in an environment where the cost of an interconnection is much higher (for area, power consumption, speed and cost) than a cost of logic cells or transistors resulting in new design paradigms. Most of the current design paradigms and algorithms are based on research in early 1980s, where the situation was completely reversed. Chip and system level synchronization strategies for complex circuits consisting of complex
building blocks resulting in high system performance and standardized way to integrate complex IP to designs.

Physical system integration: Low power design strategies for deep sub-micron design for orders of magnitude reduced power consumption resulting in efficient power management techniques as well as emphasis of codesign of system and implementations aspects. Mixed signal design strategies for integrating the analog interfaces to system circuits. The key issues is digital noise rejection techniques as well a s robust analog circuit techniques for low voltage operation constraint resulting to high yield and robustness of the mixed signal system chips.

In **education** ESDlab covers the same areas of functional system design and physical system integration. A new type of competence and breed of system engineers and engineering scientists need to be created in order to help our industries to meet the challenges of the near future. The system integration aspect must include both the traditional "oriented" system view as well as better understanding of the physical constraints and design issues at all levels from transistors to different substrate technologies and interconnection strategies. In several courses ESDlab addresses these concerns from different perspectives, ranging from mixed signal design and packaging technologies to requirements definition, system specification and concurrent engineering. In order to make this feasible all these topics are presented at proper abstraction levels to allow the students to comprehend the topics and make the connections between them.

These generic goals are pursued in multiple nationally and internationally funded research projects, where the long term strategic aspects are ensured via the national graduate school programs. The application domain for most projects is in area of 4th generation multimedia mobile systems, which will emerge as industrial products within next 10 years. As an example of such research project is European union financed ESPRIT Long Term Research project MEDIA with research focus on 4t[h] generation mobile communication infrastructure, basestations. This project was initiated by us and we serve as the main contractor for the consortia.

These programs are carried out within the framework of the following graduate schools, which I am one of the founding members and proposal initiators. Other topics above are carried out by 3 associate professors at Electronic System Design Laboratory:

Personal Communication and Computing. In this program my research focus is on low power techniques and DSP integration for high data rate (10-100 Mbit/s) 4th generation mobile systems

Microlectonics and Photonics. In this program my research focus is in high speed electronics and new radio architectures suitable for deep submicron CMOS implementations. In the initial phase major effort is in area of wideband A/D interfaces.

EPROPER is a new program with focus on integration technologies and production techniques for future electronics systems. My own research focus is on Coin Radio, fundamental aspects on packaging technologies and design issues towards order of magnitude reduction of current radio terminals. Aim is to provide on 10 year perspective wearable personal electronics with wideband connectivity.

Electronic Design is also a new graduate school program with industries and focus on interdisciplinary design issues of complex electronic systems. My own research focus is on design methodologies and robustness aspects.

In addition of these above mentioned larger research programs, I contribute also on national microelectronics program with the following projects (as technical project leader and Ph.D. student supervisor):

-Wideband CDMA architectures and implementations for 3rd generation mobile systems. Research focus is on low power DSP implementations

-Substrate and signal couplings for mixed signal RF/analog/digital integration with research focus on noise margins studies, simulation and modelling techniques for mixers, oscillators, and sigma-delta noise shapers under substrate and interconnect mediated disturbances.

-Single level integration/packaging technologies and optimal interconnect strategies or deep submicron digital and mixed signal systems

In addition, I am currently preparing a new research program on circuit analysis and design approaches towards multiple giga transistor circuits based on completely different circuit level abstraction as used today.

Research program 2001-2005

Currently multiple new projects have been defined and new applications have been submitted to the funding agencies for projects to be started sometime 2001. The key focus in ESDlab research programs will be in three areas

- Platform based gigascale integration. Focus is on refonfigurable and programmable large scale chip architectures and their supporting design methodologies
- Communication architectures and circuit techniques for low energy and robust/error free on chip communication. Earlier integration work is integrated to high level design methodology
- Mixed signal issues towards gigascale integration including signal integrity, power distribution and analog/RF integration aspets in very compact systems
- Fundamental research in new logic design paradigms and circuit technologies beyond the current industrial roadmaps

Research program 2007-2012

Currently multiple new projects initiated, under progress or in application phase for autonomous operation of complex systems including autonomic monitoring, helaing and dynamic reconfiguration. The key driving issues is both software and hardware itnegration for efficiency and design and performance constraints. The key technological challenge is exploring the limits of nanoscale CMOS.

New technology directions has been initiated with very large scale Excellence centre for Intelligent Paper and Packaging. The forest, electronics, and biomedical industries are three of the most important industries in Nordic area. In a global perspective, Norden has a leading position in these areas. Today there is an untapped opportunity for sustainable growth in the realm of ubiquitous intelligence, which aims to embed tiny and intelligent systems in almost everything including artifacts, the human body, paper and packaging. Due to resident competences, it is likely that Norden will have a high chance to succeed in some areas such as intelligent pharmaceutical packaging, smart foods packaging, hospital logistics and patient care.

However, due to the pressure of global competition, our industries have focused their internal R&D on existing core products. In order to capture this opportunity, the forest industry, electronics industry and the bio-medical industry must work together, jointly developing the necessary technologies such as integrating biomedical sensors, energy and battery cells, and wireless links on paper and packaging. This proposed center is therefore a hub and a research platform required for such a multi-disciplinary collaboration Here electronics, nanotechnologies, and traditional processing technologies will meat and melted with new system concepts and application domains.

Supervised and defended Ph.D Theses.

- Jouni Isoaho, "DSP System Development and Optimization with FPGAs", 1994, Professor, University of Turku
- Jari Nurmi, "Application Specific Digital Signal Processors: Architecture and Transferable Layout Design", 1994, Professor, Tampere University of Technology
- Teppo Karema, "Oversampling A/D and D/A Converters Using One-Bit Sigma-Delta Modulation Techniques", 1994, Director of Technology (CTO), VLSI Solutions Inc
- Tawfiq Lazraq, "Design Techniques and Structures for ATM Switches", 1995, senior expert, Ericsson AB
- Bengt Jonsson, "Switched-Current Circuits: From Building Blocks to Mixed Analog-Digital Systems", 1999, senior expert, Ericsson AB
- Bengt Oelmann, "Asynchronous and Mixed Synchronous/Asynchronous Design Techniques for Low Power", 2000, Professor, Mitthögskolan, Sundsvall, Sweden
- Henrik Olson, "Algorithm-to-Architecture Refinement for Digital baseband Radio Receiver" 2000, technical expert, Ericsson AB
- Peeter Ellervee, "High-Level Synthesis of Control and Memory Intensive Applications", 2000, professor, Tallinn Technical University
- Matias O'Nils, "Soecification, synthesis and validation of HW/SW interfaces", 1999, Professor, Mitthögskolan(Sunsvall).

- Kalle Tammemäe, 1999 (joint student with TTU, defence in TTU), rector (president) IT-College, and adjuct professor at Tallinn Technical University, Tallinn, Estonia. Currently vice-president of Tallinn Technical University.
- Yonghong Gao, "Architecture and Implementation of Comb Filters and Digital Modulators for Oversampling A/D and D/A Converters", 2001, managing director, ZTE Communication,Kista
- Li-Rong Zheng, "Design and Analysis and Integration of Mixed-Signal Systems for Signal and Power Integrity" 2001, professor, KTH, Dean at fudan University, Shanghai
- Imed ben Dahou, "Low Power Design Techniques for Deep Submicron technology with Application to Wireless Transceiver Design", 2002, Associate Professor in Saudi-Arabia,
- Andreas Gothenberg, "Analysis and Design of Low Oversampling Sigma-Delta Modulators for RF Front-Ends", 2002. Managing director of STINT, Swedish foundation for International Cooperation in Research and Higher Education.
- Li Li, "Noise analysis for RF mixers", 2004. Associate professor, Harbin University, China, currently senior engineer Catena Wireless AB
- Li Bingxin, "Design of sigma-delta modulators for wireless receivers", 2003, post-doctoral fellow, Tokyo University, Japan. Currently at Hi Silicon (Huawei) AB, Kista, Sweden
- Dinesh Pamunuwa, "Modelling and Analysis of Interconnects for Deep Submicron System-on-Chip", 2003, Senior Lecture (associate professor), University of Peradeniya, Sri Lanka. senior reader at University of Lancester, UK and currently Senior Reader at University of Bristol, 2013
- Steffen Albrecht, "Sigma-Delta Techniques for Multi-Band Multi-Standard Radio", 2005. Strategy Director, Philips Lightning, Shanghai
- Xinzhong Duo, "System-on-Package Solutions for Multi-Band Multi-Standrd Radio", 2005. Technical manager, Semiconductor Manufacture Internation Corp (SMIC), Shanghai
- Meigen Shen, "Concurrent Chip-Package Design for Radio and Mixed-Signal Systems", 2005. Xanadu Wireless Corp, Netherlands. Currently director of Fudan Innovation Center at Wuxi, China
- Maxim Teslenko, "All around Logic Synthesis", 2008, senior expert Ericsson AB
- Adam Strak, "Timing Uncertainty in Sigma-Delta Analog-to-Digital Converters", 2006, Infineon Semiconductors
- Roshan Weerasekera, "System Interconnection design trade-offs in 3-D integrated circuits", 2008, Senior Scientist at A-STAR, Singapore, 2013
- Majid Baghaei-Nejad, Impulse radio ultrawideband for wireless sensing and identification, 2008, Associate Professor, Dean, Sabzevar University, Iran
- Ethiopia Nigussie, "Exploration and Design of High-Performance Variation Tolerant On-Chip Interconnects", 2010, University teacher, University of Turku
- Sampo Tuuna, "Modeling and Analysis of Noise and Interconnects for On-Chip Communication Link Design", 2011
- Masoud Daneshtab, "Exploring Adaptive Implementations of On-Chip Networks", 2011. Post-doc at University of Turku
- Zou Zhuo, "Impulse Radio UWB for the Internet-of-Things – A Study on UHF/UWB Hybrid Solution", 2012. Senior researcher at KTH
- Thomas Canhao Xu. "Hardware/Software Co-Design for Multicore Architectures", September 2012. Post-doc at UTU
- Amir Rahmani, "Exploration and Design of Power-Efficient Networked Many-Core Systems", 2012.

- Liang Guang, "Hierarchical Agent-based Adaptation for Self-Aware Embedded Computing Systems", 2012.
- Alexander Wei Yin, "On Energy Efficient Computing Platforms", 2012.
- Geng Yang, Biomedical Electronics for Wearable Healthcare Devices", 2013
- Waqar Ahmad, Core Switching Noise for On-Chip 3D Power Distribution Networks", 2013
- Yasar Amar, "Printed Antennas for Ubiquitous Sensors", 2013
- Liang Rong, "All Digital Polar Transmitter Design for Software Defined Radio Architecture and Low Power Circuit Implementations", 2013
- Moazzam Fareed Niazi, "Modeling and Verification for Platform-Based Design", 2013
- Khalid Latif, "Design Methodology for Scalable and Application independent MPSoC platforms", 2013
- Masoumeh Ebrahimi, "Adaptive Routing Approaches for Networked Many-Core Systems", 2013

Post-docs starting in my laboratory after their PhD and who have reached docent or professor level positions:
- Prof. Doc. Ahmed Hemani (KTH),
- Prof. Doc. Elena Dubrova (KTH),
- Prof. Doc. Axel Jantsch (KTH),
- Prof.Doc. Ana Rusu (KTH),
- Prof. Doc. Li-Rong Zheng (Dean at Fudan University),
- Prof. Adam Postula (Univ. of Brisbane),
- Doc. Assoc.Prof. Juha Plosila (UTU),
- Doc. Adj.Prof Tiberiu Seceleanu (Principal Scientist, ABB Corporate Research and Mälärdalen Högskolan).
- Doc. Ass.Prof. Pasi Liljeberg (UTU),
- Prof. Sashi Kumar (Jonköping University)