

Presentation of Tampere University of Technology

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TUT in a nutshell

Was founded in 1965

- Educates Masters of Science in Technology and Architecture
- Almost all MSc graduates are employed at the time of graduation
- Currently is the second largest technical university in Finland
- 12,400 students
 - 10,500 of whom are taking an undergraduate degree and 1,900 a postgraduate degree
- More than 1,900 faculty members and other personnel
- 260 TUT students studied abroad (in 2006)
- Almost 800 international students studied at TUT
 - 270 non-nationals were employed as researchers
- Over 150 foreign students are currently working on their MSc degree
- Some 140 foreign postgraduates are working towards a doctorate
- At present TUT actively cooperates with over 250 universities



Department of Communications Engineering

Wide scope in communications technologies

Networks and Protocols *prof. Jarmo Harju*

Digital Transmission *prof. Markku Renfors*

Radio Network Planning *prof. (part-time) Jukka Lempiäinen*

RF Communication Circuits *prof. Nikolay Tchamov*



Institute of Communications Engineering (ICE)

Wide scope in communications technologies

Personnel

- 4 professors + 1 part-time professor + 8 Post Doc
- around 75 researchers/research assistants

Teaching/year

- About 8000 ECTS credit, approx. 30 MSc students

PhD studies

- 3 - 4 persons per year graduate with Dr. Tech. degree
- around 25 active PhD students

Research

- 40 - 50 publications /year, including about 20 journal articles
- project financing about 1,7 Million Euros/year



Department of Communications Engineering (DCE)

Co-operating with the following companies

Austria Microsysteme

CSC (Center for Scientific Computing)

Digita Oy

Elektrobit

Elisa

European Communications Engineering

FastraX

Helsinki Media Company

IBM

Instrumentointi Oy

Lucent Technologies/Bell Lab

Nemo Technologies

Nokia

RTT Oy

Satel

SGS Thomson

Space Systems Finland

Staselog

TeliaSonera

Teleste Corporation

Tellabs

Texas Instruments

uNAV



Department of Communications Engineering (DCE)

Networks and Protocols

Prof. Jarmo Harju

Research areas

- Quality of service properties of Internet protocol (IP) networks
- Home networks, IPv6, Mobile IP, service discovery
- Wireless Networking
- Multicast and P2P technologies
- Network security, HIP



Department of Communications Engineering (DCE)

Multimedia Wired and Wireless Networking

Dr. Tech., Docent Yevgeni Koucheryavy

Research areas

- 4th generation networking
- Protocols and systems optimization
- 802.11-based WiFi, mesh and VANET
- QoS in mobile networks



Department of Communications Engineering (DCE)

Digital Transmission *Prof. Markku Renfors*

Research areas

- Multirate DSP algorithms and receiver architectures
- Software Radio, Cognitive Radio
- Multicarrier techniques (DVB-x, 3G Long Term Evolution) [more](#)
- Filter-banks in digital transmission systems



Department of Communications Engineering (DCE)

RF-DSP

Prof. Mikko Valkama

Research areas

- Overall area of interest includes all essential physical layer techniques in future wireless and wireline communications systems
- Communication theoretic area
 - air-interface and waveform level (modulation and coding) studies for future radio systems; e.g. different variants of multicarrier modulation combined with multiple TX and RX antennas
 - radio resource management and system-level performance studies; e.g. channel-aware packet scheduling, adaptive modulation&coding, VoIP, ...
- Radio implementation (TX & RX) area
 - DSP based RF/analog impairment mitigation techniques; Dirty-RF theme (I/Q imbalances, phase noise, TX/RX nonlinearities, ADC nonidealities, etc.)
 - radio architecture studies and advanced sampling techniques, e.g. digital radio processors using non-uniform sampling and/or discrete-time analog signal processing, RF/IF sampling architectures



Department of Communications Engineering (DCE)

Signal Processing for Mobile Positioning
Dr. Tech., Docent Elena-Simona Lohan

Research areas

Satellite (Galileo, GPS) and mobile network based positioning techniques

- o Code & doppler acquisition and tracking algorithms for multipath environments
- o CNR estimation
- o Carrier phase tracking
- o Channel modelling studies based on measurements



Department of Communications Engineering (DCE)

Radio Network Planning *Prof. Jukka Lempiäinen*

Research areas

- 3G (UMTS, HSDPA, HSUPA, WiMAX, LTE) radio network topology (site locations, BS antenna configurations, sectorization)
- Indoor network planning, and repeaters
- Positioning aspects in network planning
- HAPS



Department of Communications Engineering (DCE)

RF Communication Circuits *Prof. Nikolay Tchamov*

Research areas

- High-speed, low power analog and mixed-mode RF-ASIC design (DCO/VCO, LNA, PA, T/H)
- Work in close co-operation with a number of RF ASIC vendors (TI, Infineon, ST Microelectronics)
- Critical components for Digital Radio Processors on (about) 50 nm RF-CMOS process. Focus on direct-sampling receiver architecture.

