Curriculum Vitae of Niclas Björsell

University Education

2007	Doctor of Philosophy (Telecommunication), Title: *Modeling Analog to Digital Converters at Radio Frequency* Supervisor: *P. Händel*	Royal Institute of Technology
1998	Licentiate of Science (Automatic Control), Title: *Control of heating systems in buildings* Supervisor: *T. Söderström*	Uppsala University
1994	B.Sc. in Electrical Engineering,	Uppsala University

Present Position

2008 -	Associate professor (Swedish: Universitetslektor) *Absence 10% Jan 10 – Mar 12*	University of Gävle

Previous Employments

2012 - 15	Guest Professor 5% Faculty: IR (ELEC)	Vrije Universiteit Brussel
2010 - 12	Associate professor 10 % (Swedish: Universitetslektor) School of Information and Communication Technology	Royal Institute of Technology (KTH)
1991 - 08	Lecturer (Swedish: Universitetsadjunkt) *Absence Sep 98 – Mar 02*	University of Gävle
1999 - 02	Project Manager	Utilator AB
1998 - 99	Responsible for Sales, Support, and Training of the Simulation Software IDA	Bris Data AB
1990 - 91	Automation Constructor	NLK-CelPap AB
1987 - 90	Teacher in Electronics and Automatic Control	Polhemsskolan
1986 - 87	Programming and Commissioning Control Systems	Billman-Regulator AB

Docent

2012	Docent in Telecommunication	Royal Institute of Technology

SCIENTIFIC ACHIEVEMENTS

Brief Account of Own Research Profile

Niclas Björsell has scientific experience with more than 100 scientific articles (of which at least 75 are registered in Scopus) in measurement technology, wireless communication and automation. Since 1994, when he began his doctoral studies, research and development have always been part of his work. The postgraduate studies resulted in a Lic. Ph. in Control Technology (1998) from Uppsala University and a Ph. D. in Telecommunications (2007) from the Royal Institute of Technology (KTH). From 1998 to 2002, he worked in the industry with development projects. In 2012 he became a docent at KTH and in 2012-2015 he was a guest professor at the Vrije Universiteit Brussel.

Dissertation work

Control Strategies for HVAC Systems

Based on experiences from commissioning control systems for heating, ventilating and air-conditioning (HVAC) systems a joint research project with the company TAC (today Schneider Electric) and funded by NUTEK "Control strategies for heating systems in buildings" were conducted. In summary, auto-tuning for two different control functions were studied, (i) feed forward compensation with correlated disturbances [IC56] and (ii) optimal preheating time [IC55]. This led, together with related results [NC18], [IC57] to a licentiate thesis [TH2] in 1998.

In parallel with the first project, a participation in the project "Demand controlled ventilation" led to two publications [IC58], [RE5]. Moreover, in both projects a simulation program under development, IDA, was used [IC54].

Analog to Digital Converter Modelling and Post-Correction

Modelling analog to digital converters (ADCs) at radio frequency were the topic for the PhD thesis [TH1], where model structures suited to describe a nonlinear dynamic behaviour of an ADC were required and the model had to be valid over a wide frequency range. The challenge was to find a model structure that are fairly easy to characterize, with a minimum number of model parameters, and without any loss of information. Initially, Volterra models were studied [J28], [IC49] and a suitable ADC model for post-correction of ADCs were developed [IC47], [IC48] and evaluated [J30], [IC46]. In addition, the method for parameter estimation should be easy to use and the estimator should be efficient. The most common method using histogram test with different stimulus were studied in [J29], [J31], [IC51], [IC52], [IC53]. Besides that, some summarizing papers have been presented at national conferences [NC17], [NC16] and a Kautz-Volterra model were studied, but not implemented for post-correction [J26], [IC44].

List of publications

Journals

[J1] S. R. Panigrahi, N. Björsell, and M. Bengtsson, "Radio Channel Measurement in Industrial Indoor Environments at the 24 GHz ISM band: Path loss and Channel Fading," in IEEE Transactions on Antennas and Propagation, in revision, May. 2021.

[J2] S. R. Panigrahi, N. Björsell, and M. Bengtsson, "Multipath Radio Propagation in Industrial Indoor Environments at the 24 GHz ISM band," in IEEE Transactions on Antennas and Propagation, in revision, May. 2021.

[J3] S. R. Panigrahi, N. Björsell and M. Bengtsson, "Data Fusion in the Air With Non-Identical Wireless Sensors," in IEEE Transactions on Signal and Information Processing over Networks, vol. 5, no. 4, pp. 646-656, Dec. 2019.

[J4] R. Krishnan, N. Björsell, L. G. Farewik and C. Smith, "A survey of human shoulder functional kinematic representations", Medical and Biological Engineering and Computing, 2018

[J5] N. Björsell and W. Van Moer, "Measuring and characterizing nonlinear RF systems," in IEEE Instrumentation & Measurement Magazine, vol. 20, no. 4, pp. 45-48, August 2017.

[J6] M. Hamid, N. Björsell, and B. Slimane, “Empirical Statistical Model for LTE Downlink Channel Occupancy”, Wireless Personal Communications, pp. 855-866, 2017.

[J7] M. Hamid, N. Björsell, and B. Slimane, “Radio Resource Allocation for Indoor Secondary Access in TV White Space”, International Journal On Advances in Telecommunications, vol 9, no 1&2, pp. 25-34, 2016.

[J8] M. Hamid, N. Björsell, and B. Slimane, “Spectrum Sensing Challenges: Blind Sensing and Sensing Optimization”, IEEE Instrumentation & Measurement Magazine, Vol. 19, 44-52 s. 2016

[J9] M. Hamid, N. Björsell, and B. Slimane, "Energy and Eigenvalue-Based Combined Fully-Blind Self-Adapted Spectrum Sensing Algorithm", IEEE Transactions on Vehicular Technology, vol. PP, pp. 630-642, 2015.

[J10] M. Hamid, N. Björsell, and S. B. Slimane, "Signal Bandwidth Impact on Maximum-Minimum Eigenvalue Detection," Communications Letters, IEEE, vol. 19, pp. 395-398, 2015.

[J11] S. Medawar, P. Händel, B. Murmann, N. Björsell, M. Jansson,” Static Integral Nonlinearity Modeling and Calibration of Measured and Synthetic Pipeline Analog-Digital Converters”, IEEE Transactions on Instrumentation and Measurement, pp 502-511, 2014.

[J12] M. Hamid, N. Björsell, W. Van Moer, K. Barbe, B. Slimane “Blind Spectrum Sensing for Cognitive Radios Using Discriminant Analysis: A Novel Approach”, IEEE Transactions on Instrumentation and Measurement, pp 2912-2921, 2013.

[J13] L. Gonzales, K. Barbe, W. Van Moer, N. Björsell, “Cognitive Radios: Discriminant Analysis for Automatic Signal Detection in Measured Power Spectra”, IEEE Transactions on Instrumentation and Measurement, pp. 3351-3360, 2013.

[J14] C. Nader, W. Van Moer, N. Björsell, P. Händel, "Wideband Radio Frequency Measurements: From Instrumentation to Sampling Theory," Microwave Magazine, IEEE, vol. 14, pp. 85-98, 2013.

[J15] S. Medawar, P. Händel, B. Murmann, N. Björsell, M. Jansson, ”Dynamic Calibration of Undersampled Pipelined ADCs by Frequency Domain Filtering”, IEEE Transactions on Instrumentation and Measurement, pp 1882-1891, 2013.

[J16] C. Nader, P. N. Landin, W. Van Moer, N. Björsell, P. Händel, D. Rönnow, “Peak-power Controlling Techniques for Enhancing Digital Pre-distortion of RF Power Amplifiers” Transactions on Microwave Theory and Techniques, Vol. 60, Issue 11, p 3571-3581, 2012.

[J17] K. Barbe, W. Van Moer, L. Lauwers , N. Björsell, “A simple non-parametric pre-processing technique to correct for non-stationary effects in measured data” Instrumentation and Measurement, IEEE Transactions on, Vol. 61 No. 8, pp. 2085-2094, 2012.

[J18] C. Nader, W. Van Moer, N. Björsell, K. Barbe, and P. Händel, “Reducing the Analog and Digital Bandwidth Requirements of RF Receivers for Measuring Periodic Sparse Waveforms”, Instrumentation and Measurement, IEEE Transactions on, Issue 61, p. 2960-2971, 2012.

[J19] C. Nader, P.N. Landin, W. Van Moer, N. Björsell, P. Händel, "Performance evaluation of peak-to-average power ratio reduction and digital pre-distortion for OFDM based systems," Transactions on Microwave Theory and Techniques, p. 3504-3511, 2011.

[J20] C. Nader, W. Van Moer, K. Barbe, N. Björsell, and P. Händel, “Harmonic Sampling and Reconstruction of Wideband Undersampled Waveforms: Breaking the Code,” IEEE Transactions on Microwave Theory and Techniques, vol. 59, no. 11, pp. 2961-2969, 2011.

[J21] N. Björsell, L. De Vito and S. Rapuano, "A waveform digitizer-based automatic modulation classifier for a flexible spectrum management," Measurement, vol. 44, pp. 1007-1017, 2011.

[J22] C. Nader, N. Björsell, and P. Händel, "Unfolding the frequency spectrum for undersampled wideband data," Signal Processing, vol. 91, pp. 1347-1350, 2011.

[J23] C. Nader, P. Händel, and N. Björsell, "Peak-to-Average Power Reduction of OFDM Signals by Convex Optimization: Experimental Validation and Performance Optimization", IEEE Transactions on Instrumentation and Measurement, vol. 60, pp. 473-479, 2011.

[J24] S. Medawar, P. Händel, N. Björsell, and M. Jansson, "Post-Correction of Pipelined Analog-Digital Converters based on Input Dependent Integral Nonlinearity Modeling," IEEE Transactions on Instrumentation and Measurement, p. 3342-3350, 2011.

[J25] S. Medawar, P. Händel, N. Björsell, and M. Jansson, "Input Dependent Integral Nonlinearity Modeling for Pipelined Analog-Digital Converters," IEEE Transactions Instrumentation Measurement, vol. pp. 2609-2620, 2010.

[J26] N. Björsell, M. Isaksson, P. Händel, and D. Rönnow, "Kautz-Volterra modelling of analogue-to-digital converters," *Computer Standards & Interfaces*, vol. 32, pp. 126-129, 2010.

[J27] C. Luque and N. Björsell, "Improved Dynamic Range for Multi-Tone Signals Using Model-Based Pre-Distortion," Metrology and Measurement Systems, Vol. XVI, No. 1 pp 129-141, 2009.

[J28] N. Björsell, P. Suchánek, P. Händel, and D. Rönnow, "Measuring Volterra kernels of analog to digital converters using a stepped three-tone scan," IEEE Transactions on Instrumentation and Measurement, vol. 57, pp. 666-671, 2008.

[J29] N. Björsell and P. Händel, "Histogram tests for wideband applications," IEEE Transactions on Instrumentation and Measurement, vol. 57, pp. 70-5, 2008.

[J30] N. Björsell and P. Händel, "Achievable ADC performance by post-correction utilizing dynamic modeling of the integral nonlinearity," EURASIP Journal on Advances in Signal Processing, vol. 2008, p. 10 pages, 2008.

[J31] N. Björsell and P. Händel, "Truncated Gaussian noise in ADC histogram tests," Measurement, vol. 40, pp. 36-42, 2007.

Text Books

[TB1] N. Björsell, "AD and DA conversion," in Modern Measurements: Fundamentals and Applications, A. Ferrero, D. Petri, P. Carbone, and M. Catelani, Eds., ed: Wiley-IEEE Press, 2015, pp. 125 - 148.

[TB2] M. Hamid, N. Björsell, A. Mohammed, "Iterative Optimization of Energy Detector Sensing Time and Periodic Sensing Interval in Cognitive Radio Networks," in Self-Organization and Green Applications in Cognitive Radio Networks, ed: IGI Global, 2013, pp. 53-69.

[TB3] B-O Lundinger, "IT för tekniker och ingenjörer", Part of Chapter 3, Utbildningsradion, Stockholm 1997.

International Conferences

[IC1] N. Björsell and A. Dadash, "Finite Horizon Degradation Control of Complex Interconnected Systems" accepted to *17th IFAC Symposium on Information Control Problems in Manufacturing, INCOM*, 2021.

[IC2] A. Bemani and N. Björsell, "Cyber-Physical Control of Indoor Multi-vehicle Testbed for Cooperative Driving," in 2020 *IEEE Conference on Industrial Cyberphysical Systems (ICPS),* 2020, pp. 371–377.

[IC3] S. R. Panigrahi, N. Björsell and M. Bengtsson, "Distributed Detection with Non-Identical Sensors: Fusion in the Air or at the Receiver?," 2020 IEEE Wireless Communications and Networking Conference (WCNC), Seoul, Korea (South), 2020, pp. 1-6

[IC4] S. R. Panigrahi, S. M. Rana, N. Björsell and M. Bengtsson, "A Study of Delay and Doppler Spreads at 24 GHz ISM band," *2020 16th International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob)*, Thessaloniki, Greece, 2020, pp. 1-6.

[IC5] P. Mattsson, D. Zachariah, and N. Björsell, "Flexible Models for Smart Maintenance," in 2019 IEEE International Conference on Industrial Technology (ICIT), 2019, pp. 1772-1777.

[IC6] S. R. Panigrahi, N. Björsell, and M. Bengtsson, "Distributed Detection with Non-identical Wireless Sensors for Industrial Applications," in 2019 IEEE International Conference on Industrial Technology (ICIT), 2019, pp. 1403-1408.

[IC7] R. Krishnan, S. Cruciani, E. Gutierrez-Farewik, N. Björsell, and C. Smith, "Reliably Segmenting Motion Reversals of a Rigid-IMU Cluster Using Screw-Based Invariants," in 2018 IEEE-RAS 18th International Conference on Humanoid Robots (Humanoids), 2018, pp. 88-95.

[IC8] R. Krishnan, N. Björsell and C. Smith, "Segmenting Humeral Submovements using Invariant Geometric Signatures", IROS 2017

[IC9] D. Rönnow, B. Laporte-Faulet, and N. Björsell, "Determination of elongation of electrically small objects in building structures by polarimetric synthetic aperture radar", in IEEE International Instrumentation and Measurement Technology Conference (I2MTC) Proceedings, 2017.

[IC10] R. Krishnan, N. Björsell and C. Smith, "SHAPE Algorithm for Approximate Computation of Angular Velocities in Humeral Motion", in IEEE International Instrumentation and Measurement Technology Conference (I2MTC) Proceedings, 2017.

[IC11] S. R. Panigrahi, N. Bjorsell and M. Bengtsson, "Feasibility of large antenna arrays towards low latency ultra-reliable communication," 2017 IEEE International Conference on Industrial Technology (ICIT), Toronto, ON, Canada, 2017, pp. 1289-1294

[IC12] R. Krishnan, N. Björsell and C. Smith, “Invariant Spatial Parametrization of Human Thoracohumeral Kinematics: A Feasibility Study”, IROS 2016

[IC13] D. Andersson et.al,” Radar Images of Leaks in Building Elements”, 6th International Building Physics Conference, IBPC 2015.Vol 78, pp. 1726-1731.

[IC14] M. Hamid, N. Björsell, and B. Slimane, “Frequency Hopping for Fair Radio Resources Allocation in TVWS”, Proceedings ICWMC 2015, pp71-76, 2015

[IC15] X. Qin and N. Björsell, “Measurement of horses gaits using geo-sensors”, in Instrumentation and Measurement Technology Conference (I2MTC) Proceedings, 2015 IEEE International, 2015, pp. 330-333.

[IC16] Y. Tingxiao, E. Zenteno, and N. Björsell, "Measurement imperfections impact on the performance of digitally predistorted power amplifiers," in Instrumentation and Measurement Technology Conference (I2MTC) Proceedings, 2014 IEEE International, 2014, pp. 230-233.

[IC17] M. Hamid, N. Björsell, and S. Ben Slimane, "Sample covariance matrix eigenvalues based blind SNR estimation," in Instrumentation and Measurement Technology Conference (I2MTC) Proceedings, 2014 IEEE International, 2014, pp. 718-722.

[IC18] M. Hamid, J. Ferrer Coll, N. Björsell, J. Chilo, W. Van Moer, “Multi-Interference Detection Algorithm using Discriminant Analysis in Industrial Environments”, IEEE Industrial Electronics Society (IECON 2013), pp. 5600-5604, 2013

[IC19] N. Björsell, W. Van Moer, “Adding errors to reduce the PAPR and BER of OFDM-based transmissions”, the International Instrumentation and Measurement Conference (I2MTC), pp. 743-746, 2013.

[IC20] W. Van Moer, K. Barbe, N. Björsell, “A novel spectral subtraction technique for cognitive radios”, the International Instrumentation and Measurement Conference (I2MTC), pp. 118-121, 2013..

[IC21] W. Van Moer, N. Björsell, M. Hamid, K. Barbe, C. Nader, “Saving lives by integrating cognitive radios into ambulances”, the International Symposium on Medical Measurements and Applications (MeMEA), pp. 1-4, 2012.

[IC22] M. Hamid, K. Barbe, W. Van Moer, N. Björsell, “Spectrum Sensing through Spectrum Discriminator and Maximum Minimum Eigenvalue Detector: A Comparative Study”, the International Instrumentation and Measurement Conference (I2MTC), pp. 2252-2256, 2012.

[IC23] L. Gonzales, K. Barbe, W. Van Moer, N. Björsell, “Cognitive Radios: Discriminant Analysis Finds the Free Space”, the International Instrumentation and Measurement Conference (I2MTC), pp. 2242-2247, 2012.

[IC24] M. Hamid, N. Björsell, “Maximum Minimum Eigenvalues Based Spectrum Scanner for Cognitive Radios”, the International Instrumentation and Measurement Conference (I2MTC), pp. 2248-2251 2012.

[IC25] M. Hamid and N. Björsell, "A Novel Approach for Energy Detector Sensing Time and Periodic Sensing Interval Optimization in Cognitive Radios," invited paper at the CogART, Barcelona, 2011.

[IC26] M. Hamid and N. Björsell, "Geo-location Spectrum Opportunities Database in Downlink Radar Bands for OFDM Based Cognitive Radios," presented at the CCSIE, London, 2011.

[IC27] C. Nader, P. N. Landin, W. Van Moer, N. Björsell, M. Isaksson and P. Händel, “Peak-to-average power ratio reduction versus digital pre-distortion in OFDM based systems” in IEEE MTT-S Int. Microwave Symp. Dig., Baltimore, USA, 2011, pp. 1 - 4.

[IC28] N. Björsell, L. De Vito and S. Rapuano, "A GNU radio-based signal detector for cognitive radio systems," in Instrumentation and Measurement Technology Conference (I2MTC), 2011 IEEE, 2011, pp. 1-5.

[IC29] F. Fraile, C. Nader, J. C. Guerri and N. Björsell, "On the reuse of DVB-T transmitter infrastructure for DVB-T2," in Broadband Multimedia Systems and Broadcasting (BMSB), 2011 IEEE International Symposium on, 2011, pp. 1-6.

[IC30] C. Nader, W. Van Moer, K. Barbe, N. Björsell and P. Händel, "Characterizing the out-of-band nonlinear behaviour of RF devices: The key to success," in Instrumentation and Measurement Technology Conference (I2MTC), 2011 IEEE, 2011, pp. 1-5.

[IC31] K. Voet, P. Händel, N. Björsell and W Van Moer, "Mirrored parallel Hammerstein predistortion for multitone generation," in Instrumentation and Measurement Technology Conference (I2MTC), 2011 IEEE, 2011, pp. 1-4.

[IC32] N. Björsell, P. Händel, M. Jansson, and S. Medawar, "Improved Estimate of Parametric Models for Analogue to Digital Converters by Using Weighted Integral Nonlinearity Data," in IMEKO 15th International workshop on ADC Kosice, 2010, pp. 62-.

[IC33] S. Medawar, P. Händel, N. Björsell, and M. Jansson, "Pipelined Analog-Digital Converters Integral Nonlinearity Modeling for Post-Correction," in IMEKO 15 international workshop on ADC Kosice, 2010, pp. 54-.

[IC34] C. Nader, P. Händel, and N. Björsell, "OFDM PAPR reduction by convex optimization: A power amplifier point-of-view," in RF Front-ends for Software Defined and Cognitive Radio Solutions (IMWS), 2010 IEEE International Microwave Workshop Series on, 2010, pp. 1-4.

[IC35] S. Medawar, P. Händel, N. Björsell, and M. Jansson, "Model order determination and segmentation of analog-digital converters integral non linearity," in Instrumentation and Measurement Technology Conference (I2MTC), 2010 IEEE, 2010, pp. 36-41.

[IC36] N. Björsell, C. Nader, and P. Händel, "Multi-tone design for out-of-band characterization of nonlinear RF modules using harmonic sampling," in Instrumentation and Measurement Technology Conference (I2MTC), 2010 IEEE, 2010, pp. 620-623.

[IC37] H. Fraz, N. Björsell, J. S. Kenney, and R. Sperlich, "Prediction of Harmonic Distortion in ADCs using dynamic Integral Non-Linearity model," in Behavioral Modeling and Simulation Workshop, 2009. BMAS 2009. IEEE, 2009, pp. 102-107.

[IC38] N. Björsell, P. Daponte, L. De Vito, and S. Rapuano, "Automatic signal recognition for a flexible spectrum management," in IMEKO world congress Lisboa, 2009, pp. 568-573.

[IC39] P. N. Landin, C. Nader, N. Björsell, M. Isaksson, D. Wisell, P. Händel, O. Andersen, and N. Keskitalo, "Wideband Characterization of Power Amplifiers Using Undersampling," in IEEE MTT-S Int. Microwave Symp. Dig., Boston, MA, USA, 2009, pp. 1365-1368.

[IC40] C. Nader, H. Altahir, O. Andersen, N. Björsell, E. Condo, N. Keskitalo, and H. d. l. Rosa, ”Automated Multidimensional Characterization of Power Amplifier for Design and Production,” in I2MTC 09, Singapore, 2009, pp. 144 – 147.

[IC41] O. Andersen, N. Björsell, and N. Keskitalo, ” A Test-Bed Designed to Utilize Zhu’s General Sampling Theorem to Characterize Power Amplifiers,” in I2MTC 09, Singapore, 2009, pp. 201 – 204.

[IC42] S. Medawar, P. Händel, N. Björsell, and M. Jansson, "ADC Characterization By Dynamic Integral Nonlinearity," in Proceedings of the 13th Workshop on ADC Modelling and Testing, Florence, Italy, 2008, pp. 1037-1042.

[IC43] C. Luque and N. Björsell, "Improved dynamic range for multi-tone signal using model-based pre-distortion," in Proceedings of the 13th Workshop on ADC Modelling and Testing, Florence, Italy, 2008, pp. 1003-1007.

[IC44] N. Björsell, M. Isaksson, P. Händel, and D. Rönnow, "Kautz-Volterra modelling of an analogue-to-digital converter using a stepped three tone excitation," in 12th Workshop on ADC Modeling and Testing Iasi, Romania, 2007.

[IC45] S. Medawar, N. Björsell, P. Händel, and M. Jansson, "Dynamic Characterization of Analog-Digital-Converters," in Mosharaka International Conference on Wireless Communications and Mobile Computing, 2007.

[IC46] N. Björsell and P. Händel, "Post-Correction of Under-Sampled Analog to Digital Converters," in IMTC 2007 – Instrumentation and Measurement Technology Conference Warsaw, Poland, 2007.

[IC47] P. Händel, N. Björsell, and M. Jansson, "Model Based Dynamic Characterization of Analog-Digital-Converters At Radio Frequency — Invited paper," in ISSPA Sharjah, 2007.

[IC48] N. Björsell and P. Händel, “Dynamic behavior models of analog to digital converters aimed for post-correction in wideband applications”, IMEKO Workshop on ADC and DAC Modelling and Testing, Rio de Janeiro 2006.

[IC49] N. Björsell, D. Rönnow, P. Händel, "Measuring Volterra kernels of analog to digital converters using a stepped three-tone scan," proc. IMTC 2006 pp 1047-1050, Sorrento, Italy, 2006.

[IC50] N. Björsell, O. Andersen, P. Händel, “High Dynamic Range Test-Bed for Characterization of Analog-To-Digital Converters Up To 500 MSPS” Proceedings of IMEKO 2005, Vol 2. pp 601-604, Gdynia/Jurata, Poland 2005.

[IC51] N. Björsell and P. Händel, “A Statistical Evaluation of ADC Histogram Tests with Arbitrary Stimuli Signal” Proceedings of ADDA 2005 pp 259-264. Limerick 2005.

[IC52] N. Björsell and P. Händel, “On Gaussian and Sine Wave Histogram Tests for Wideband Applications” Proceedings of IMTC 2005. Vol 1. pp 677-682. Ottawa 2005.

[IC53] N. Björsell and P. Händel, “Benefits with Truncated Gaussian Noise in ADC Histogram Tests” Proceedings of IMEKO 04. Vol 2. pp. 787-792. Athens 2004.

[IC54] N. Björsell, et.al, "IDA Indoor Climat and Energy" Proceedings of Building Simulation ’99. Vol. 2, pp. 1035-1042. Kyoto 1999.

[IC55] N. Björsell, "On control strategies for heating systems: A model based estimate of optimal preheat time" Proceedings of EPIC ’98. vol. 2, pp. 618-623. Lyon 1998.

[IC56] N. Björsell, "An automatically tuned feedforward compensation for heating systems with correlated disturbances" Proceedings of IASTED Control and Applications’98. pp. 204-208. Honolulu 1998.

[IC57] N. Björsell, "Control strategies for heating systems" Proceedings of Building Simulation ’97. vol. 1, pp. 295-300. Prague 1997.

[IC58] N. Björsell, "Control strategies for demand controlled ventilating systems" Proceedings of Roomvent ‘96. vol. 1, pp. 273-278. Yokohama 1996.

National Conferences

[NC1] N. Björsell, S. Kolluri, P. Mattsson, “Flexible Models for Smart Maintenance”, Reglermöte ’18, Stockholm, 2018

[NC2] S. R. Panigrahi, N. Björsell, and M. Bengtsson, ”Large Antenna Array for Low Latency and Ultra Reliable Communication" in Swe-CTW 2017, Göteborg, 2017.

[NC3] R. Krishnan, N. Björsell and C. Smith, "How do we plan movements?:A geometric answer", DEMOVE symposium, Baiona, Spain, 2016

[NC4] R. Krishnan, N. Björsell and C. Smith, "Human shoulder functional kinematics: Are we ready for the high-reliability computational challenge?", Workshop on Human Movement Understanding and Robotics, IEEE/ RSJ IROS 2016, Daejeon, Korea.

[NC5] R. Krishnan, N. Björsell and C. Smith, "Moving towards cognitive understanding of human shoulder kinematics", International Symposium on the Neuromechanics of Human Movement, Heidelberg, Germany. 2016

[NC6] D. Rönnow et.al. “Radio Measurement Technology for Characterization of Nonlinear Devices and Industrial Radio Environments”, in Proceedings GigaHertz 2014, 2014

[NC7] M. Hamid, N. Björsell, W. Van Moer, K. Barbé and B. Slimane, " Blind Spectrum Sensing for Cognitive Radios Using Discriminant Analysis: A Novel Approach," in Swe-CTW 2013, Göteborg, 2013.

[NC8] M. Hamid and N. Björsell, "Power Assignment for Secondary Users Operating in TVWS Geo-locations Database Based Cognitive Radios," in Swe-CTW 2012, Lund, 2012.

[NC9] M. Hamid and N. Björsell, "Maximum Minimum Eigen Values Based Spectrum Scanner in GNU Radio," in RF Measurement Technology Conference Gävle, 2011.

[NC10] C. Nader, W. Van Moer, K. Barbé, N. Björsell and P. Händel, " Evolved Harmonic Sampling: a Tool to Reduce the Digital Bandwidth Requirement of RF Receivers," in RF Measurement Technology Conference Gävle, 2011.

[NC11] P. Landin et. al., “Overview of Synergetic OFDM Crest Factor Reduction and DigitalPre-Distortion for RF Pas” in RF Measurement Technology Conference Gävle, 2011.

[NC12] K. Voet, W. Van Moer, N. Björsell, and P. Händel, "Nonlinear Measurement Instruments – A Comparative Study" in RF Measurement Technology Conference Gävle, 2011.

[NC13] C. Nader, P. N. Landin, N. Björsell, M. Isaksson, D. Wisell, P. Händel, O. Andersen, and N. Keskitalo, "Wideband Power Amplifiers Characterization by Undersampling: Zhu-Frank Sampling Theorem," in RF Measurement Technology Conference Gävle, 2009.

[NC14] M. Siddiq and N. Björsell, "Synthetic Instruments – an overview," in Nordic Test Forum 2008 Tallin, Estonia, 2008.

[NC15] C. Luque and N. Björsell, "Model-based Pre-distortion for Signal Generators," in Proceedings GigaHertz 2008, Göteborg, Sweden, 2008, pp. 88.

[NC16] P. Händel, N. Björsell, M. Jansson, and S. Medawar, "Modeling of the Dynamics of Analog-Digital-Converters at Radio Frequency," in RF Measurement Technology Conference Gävle, 2007.

[NC17] N. Björsell and P. Händel. ”Analog-to-Digital Converters for High-Speed Applications” Proceedings of. GigaHz 2005, pp. 151-154. Uppsala 2005.

[NC18] N. Björsell, "Reglerstrategier för uppvärmning av bostäder" Proceedings of Reglermöte ‘96, pp. 174-175. Luleå 1996.

[NC19] N. Björsell, "Matlab in cooperation with data acquisition software" Proceedings of Nordic Matlab Conference, pp. II-29 - II-31. Stockholm 1995.

Thesis

[TH1] N. Björsell, "Modeling Analog to Digital Converters at Radio Frequency" Doctoral thesis, Stockholm 2007.

[TH2] N. Björsell, "Control of heating systems in buildings" Licentiat thesis. UPTEC 98 002R, Uppsala 1998.

Standards

[ST1] "IEEE Standard for Jitter and Phase Noise," in IEEE Std 2414-2020, vol., no., pp.1-42, 26 Feb. 2021.

[ST2] "IEEE Standard for Digitizing Waveform Recorders," in IEEE Std 1057-2017 (Revision of IEEE Std 1057-2007), vol., no., pp.1-313, 26 Jan. 2018.

[ST3] "IEEE Standard for Terminology and Test Methods of Digital-to-Analog Converter Devices," in IEEE Std 1658-2011, vol., no., pp.1-126, 10 Feb. 2012.

[ST4] "IEEE Standard for Terminology and Test Methods for Analog-to-Digital Converters," in IEEE Std 1241-2010 (Revision of IEEE Std 1241-2000), vol., no., pp.1-139, 14 Jan. 2011.

Reports

[RE1] M. Petrova et.al, "Final Report on Models with Validation Results” EU FP7 project INFSO-ICT-248303 QUASAR, 2012.

[RE2] J. Kerttula et.al, "Laboratory Test Report” EU FP7 project INFSO-ICT-248303 QUASAR, 2012.

[RE3] N. Björsell, H. Mohamed, J. O. Kerttula, E., and M. I. Rahman, "Initial Report on the tolerance of legacy systems to transmissions of secondary users based on legacy specifications" EU FP7 project INFSO-ICT-248303 QUASAR, 2010.

[RE4] U. Norlen, and N. Björsell, "Electronic energy services to the home: A demonstration of the Energy Barometer system". The KEES Project - Energy Efficiency in a Deregulated Market, Chap. 6. Enersearch, Malmö 1999.

[RE5] N. Björsell N and C. Blomqvist, "Utveckling av nya system som ger möjlighet till flexibel behovsstyrning av luftflöden". University of Gävle FoU-rapport Nr 40, Gävle 1998.

Approved Grants

Funding from EU, Trusts or other Sources

2010 - 12 EU FP7 project “**QUASAR**”
Role: Task leader

Main project leader: KTH (SE)
Other co-leaders: Ericsson AB (SE), RWTH Aachen University (DE), Aalto University (FI), Yonsei University (Rep. of Korea), BT PLC (UK), BNetzA (DE), Ss Cyril & Methodius University (Macedonia), PTS (SE), Ofcom (UK), FICORA (FI)

ID: INFSO-ICT-248303

Funding from Trade and Industry and Public Authorities

2021 - 24 KKS project “**Predictive Maintenance from a System Perspective**”
Role: Principal Investigator
Approved: April 2021

2020 - 22 ERUF project “**Intelligent Digitaliserat Underhåll**”
Role: Principal Investigator
ID: 20203291, TVV supported the project with 3212 kSEK
20202943, Region Gävleborg supported the project with 1606 kSEK

2019 - 21 SSF project "**Instrument for High-Speed Electron Tunnelling Measurements**"
Role: Co-Applicant
ID: ITM17-0049, SSF supported the project with 7999 kSEK

2018 - 21 ERUF project "**Automation och mm-vågor**"
Role: Co-Applicant
ID: 20201448, TVV supported the project with 3934 kSEK
00201020, Region Gävleborg supported the project with 1967 kSEK

2017 - 18 Vinnova project "**Flexibla modeler för smart underhåll**"
Role: Principal Investigator
ID: 2017-04807, VINNOVA supported the project with 493 kSEK

2007 - 09 KKS project "**Radio Frequency Measurement Technology for Future Power Amplifiers and Transmitters**"
Role: Co-applicant
Main project leader: Niclas Keskitalo, HiG/Ericsson AB
ID: 2006/0231, KKS supported the project with 4943 kSEK

2004 - 06 KKS project "**Novel Measurement and Modelling Techniques for RF Power Amplifiers**"
Role: Co-applicant
ID: 2006/0231, KKS supported the project with 3607 kSEK
Main project leader: Niclas Keskitalo, HiG/Ericsson AB
ID: 2003/0218, KKS supported the project with 3607 kSEK

1994-1998 NUTEK project "**Reglerstrategier för värme och ventilationssystem**"
Role: Principal Investigator
ID: NUTEK, P4818

Doctoral Students

2015 - 21 Smruti Ranjan Panigrahi PhD: Feb 26, 2021
Title: *Unraveling the potential of Wireless Sensors in the age of Industry 4.0*
Main supervisor: Mats Bengtsson, EES, KTH
My role: De facto supervisor[1]
The daily work has taken place at the University of Gävle and regular supervision has been carried out as well as planning and follow-up of the work.

2010 - 15 Mohamed Hamid Lic: Feb 7, 2013 PhD: Feb 13, 2015
Title: *On Spectrum Sensing for Secondary Operation in Licensed Spectrum: Blind Sensing, Sensing Optimization and Traffic Modeling*
Main supervisor: Ben Slimane, ICT, KTH
My role: De facto supervisor[1]
The daily work has taken place at the University of Gävle and regular supervision has been carried out as well as planning and follow-up of the work.

2008 - 12 Charles Nader Lic: Aug 20, 2010 PhD: Aug 17, 2012
Title: *Signal Shaping and Sampling-based Measurement Techniques for Improved Radio Frequency Systems*
Main supervisor: Peter Händel, EES, KTH
My role: De facto supervisor[1]
The daily work has taken place at the University of Gävle and regular supervision has been carried out as well as planning and follow-up of the work.

[1] Until 2019, doctoral students in electrical engineering at the University of Gävle have been enrolled at Royal Institute of Technology (KTH)

2007 - 12 Samer Medawar Lic: Feb 5, 2010 PhD: June 8, 2012

Title: *Pipeline Analog-Digital Converters Dynamic Error Modeling for Calibration: Integral Nonlinearity Modeling, Pipeline ADC Calibration, Wireless Channel K-Factor Estimation*
Main supervisor: Peter Händel, EES, KTH
My role: Co-supervisor
This work is a continuation of my doctoral thesis where I contributed with knowledge and I was introduced to the role of supervisor.

Doctoral Students at Present Being Supervised

2020 - Amirhossein Hosseinzadeh Dadash PhD: ~2025

Preliminary title: *Innovative digital maintenance*
My role: Main supervisor
Authored the research plan, regular supervision, planning and follow-up.

2019 - Ali Bemani PhD: ~2024

Preliminary title: *Design of Digital Twins used in a Wireless Network Controlled System in an Industrial Environment*
My role: Main supervisor
Authored the research plan, regular supervision, planning and follow-up.

2018 - Vipin Choudhary Lic: Mar 23, 2021 PhD: ~2024

Title: *Nondestructive testing and antenna Measurements using UWB radar in industrial applications*
Main supervisors:
Magnus Jansson, EES, KTH (until Mar 23, 2021)[1]
Daniel Rönnow, HiG (after Mar 23, 2021)
My role: Co-supervisor
My contribution is the knowledge of the university's radar test bed, which I have been involved in designing.

2019 - Oscar Bautista Gonzalez PhD: ~2024

Preliminary title: *Modelling and prediction of industrial maintenance by machine learning*
Main supervisor: Daniel Rönnow, HiG
My role: Co-supervisor
The project is carried out within my research project and I participate in the regular supervision.

2019 - Rabé Andersson PhD: ~2024

Preliminary title: *Design & Development of an Affordable Assistive Exoskeleton for Ageing People*
Main supervisor: Magnus Isaksson, HiG
My role: Co-supervisor
My contribution is the knowledge robotics and control theory and I participate in the regular supervision.

PEDAGOGICAL ACHIEVEMENTS

Account of own Pedagogical Experience

An overview of the courses that have been developed and taught since 2005 is given in Table 1. These are described in more detail in the following text.

Table 1 Courses given since 2005

Cycle	Course	ECTS	Developed			Course		
			Entirely	Partly	Material	Co-ord.	Lecture	Ass.
3	Measurement and Signal Processing	10.0		x		x	x	
3	Research Methods in Science and Technology	10.0		x			x	
3	Measuring and Characterizing Nonlinear RF Systems	4.0		x		x	x	
2	Digital twins	5.0	x		x	x	x	x
2	Modulation and Coding	7.5			x	x	x	x
2	Multivariable and nonlinear control	7.5	x		x	x	x	
2	Predictive maintenance	5.0	x		x	x	x	x
2	Statistical signal processing	7.5	x		x	x	x	x
2	Virtual commissioning	5.0	x		x	x	x	x
1	Automation systems	7.5	x		x	x	x	x
1	Control theory	7.5			x	x	x	x
1	Electricity Engineering	7.5		x			x	
1	Introduction to Automation	7.5	x		x	x	x	x
1	Measurement systems	7.5	x		x	x	x	x
1	Robotics	7.5	x		x	x	x	x

In addition to Table 1 the following courses are either given before 2005, have overlapping content with the above, or the scope has been limited. They are all 1st cycle courses and the course names are only listed by the Swedish title: Samplade Reglersystem, Industriell Styrteknik, Processreglering, Styr- och Reglerteknik, Digitalteknik, Elteknik, Ingenjörsdatorverktyg, Matematikkurser på ingenjörsprogram, Datakurser på ingenjörsprogram, Installationsteknik, Energy Systems, Signaler och System

Own Teaching Effort at Undergraduate and Postgraduate Level

University of Gävle - Postgraduate level

2021 - **Research Methods in Science and Technology**
Forskningsmetodologi inom teknik-, natur- och samhällsvetenskap

Development: Developed one (of seven) module “Quantitative methods” (2021)
Teaching: Lectured (2021)

2019 - **Measurement and Signal Processing**
Mätteknikens signalbehandling

Development: Developed the course in collaboration with colleagues (2019)
Teaching: Coordinator and lectured (2019)

2012 **Measuring and Characterizing Nonlinear RF Systems**
Measuring and Characterizing Nonlinear RF Systems

Development: Developed the course in collaboration with Wendy Van Moer (VUB)
Teaching: Lectured (2012)

2020 - **Digital twins**
Digitala tvilingar
Development: Developed the entire course (2020)
Teaching: Coordinator and lectured (2020)

2020 - **Virtual Commissioning**
Virtuell driftsättning
Development: Developed the entire course (2020)
Teaching: Coordinator and lectured (2020-21)

2019 - **Predictive maintenance**
Prediktivt underhåll
Development: Developed the entire course (2019)
Teaching: Coordinator and lectured (2019-20)

2015 - 19 **Multivariable and Nonlinear Control Systems**
Flervariabel och olinjär reglerteknik
Development: Developed the entire course (2015)
Teaching: Coordinator and lectured (2015 - 19)

2005 - 16 **Statistical signal processing**
Statistisk signalbehandling
Development: Developed the entire course (2005)
Teaching: Coordinator (2005-16), lectured (2005-16).

2010 - 14 **Modulation and Coding**
Modulation och kodning
Development: Assignments (2010)
Teaching: Coordinator and lectured (2010 - 14)

University of Gävle - Basic level

2015 - **Automation systems**
Automationssystem
Development: Developed the entire course (2015)
Teaching: Coordinator (2015-20) and lectured (2015-21)

2015 - 20 **Robotics**
Robotteknik
Development: Developed the entire course (2015)
Teaching: Coordinator (2015-18) and lectured (2015-21)

2009 - **Measurement systems**
Mätsystem
Development: Developed the entire course (2009)
Teaching: Coordinator (2009-19) and lectured (2009-21)

2005 - 19 **Control Theory**
Reglerteknik
Development: Laboratory exercises and assignments are continuously updated
Teaching: Lectured almost every year even before 2005

2012 - 18 **Introduction to Automation**
Introduktion till automation
Development: Developed the entire course (2012)
Teaching: Coordinator (2012-18) and lectured (2012-18)

2009 **Electricity Engineering**
Electricity Engineering
Development: Developed half of the course (2009)
Teaching: Lectured (2009)

International Universities

2012	Fifth workshop on metrology Lectured 4 h in RF measurement technology	University of Split, Croatia
2011	Second workshop on metrology, Lectured 4 h in RF measurement technology	Cyril and Methodius University, Macedonia
2009	Procedamiento Digitale de Señales Lectured a 3 week course in Digital signal processing	Universidad Nacional de San Augustin, Peru
2009	IEEE 2nd Annual International Measurement University Summer school Lectured 1 day in A/D and D/A conversion	Universita' degli Studi di Trento, Italy
2007	ADC & DAC Metrology Summer school Lectured 1 day in sampling techniques	University of Sannio, Italy

Pedagogical Development Effort

2018 - **KUL 4.0 - Kursutveckling för livslångt lärande inom basindustrin**
Concept developer and lecturer in a pilot project for flexible short courses for professional specialists.

2011 - 19 **Automation Engineering Program**
Responsible for the development and implementation of the study program. The program is a three-year program. The education can be coordinated with work periods in industry (co-op) and is then studied in four years.

2004 - 05 **Gävle modellen**
University of Gävle developed 2004 a project based study program for engineers. I was the manager of the electrical engineering program during this time and participated in the group that implemented the new philosophy.

2004 - 06 **Bologna process**
During the implementation of the Bologna process in Sweden the University of Gävle decided to also replace the grading system. This led to extensive work to redesign courses and write new curricula. During this time, I was head of the electronics group.

Assignments as Outside Expert

2010 - 13 External expert in the Tempus project "**Creation of the Third Cycle Studies-Doctoral Studies in Metrology**"
ID: 58599-tempus-mk-tempus-jpcr

Approved Grants

2020 - 22 **Kompetensutveckling och livslångt lärande inom intelligent industri**
Role: Principal Investigator
ID: 20200083, KKS supported the project with 2 360 kSEK

2018 - **KUL 4.0 - Kursutveckling för livslångt lärande inom basindustrin**
Role: Co-applicant
Principal Investigator: Viktoria Mattsson, Luleå tekniska universitet
ID: 2018-03819, Vinnova supported the project with 4547 kSEK

2012 **Exchange program Linnaeus-Palme**
Role: Principal Investigator

Other co-leaders: University of Zagreb.

ID: IPK/2012:3949, Financial support: 244 000 SEK
ID: IPK/2011:3738, Financial support: 40 000 SEK

2010 - 13 **Tempus project "Creation of the Third Cycle Studies-Doctoral Studies in Metrology"**
Role: External Expert and Local Organizer

Main project leader: Ss. Cyril & Methodius University-Skopje
Other co-leaders: South-Eastern European University, University of Zagreb, University of Split and the University of Prishtina, University of Pavia, University of Zaragoza, Czech Technical University in Prague, Technical University Carolo Wilhemina of Braunschweig, Graz University of Technology, Bureau of Metrology of R. Macedonia.

ID: 58599-tempus-mk-tempus-jpcr

2010 **European summer school "Distributed measurement system"**
Role: Principal Investigator

Other co-leaders: The Royal Institute of Technology, Instituto Superior Tecnico,University of Sannio, Czech Technical University in Prague, Techinal University of Kosice, University of Calabria, Budapest University of Technology and Economics, Graduate School of Engineering in Electronics, Computer Science and Telecommunication of Bordeaux, Gdynia Maritime University.

ID: 2009:1230, Financial support: 44 140 Euro

2009 **European summer school "Distributed measurement system"**
Role: Principal Investigator

Other co-leaders: The Royal Institute of Technology, Instituto Superior Tecnico,University of Sannio, Czech Technical University in Prague, Techinal University of Kosice, University of Calabria, Budapest University of Technology and Economics, Graduate School of Engineering in Electronics, Computer Science and Telecommunication of Bordeaux, Gdynia Maritime University.

ID: 2008:1160, Financial support: 38 290 Euro

2008 **European summer school "Distributed measurement system"**
Role: Principal Investigator

Other co-leaders: The Royal Institute of Technology, Instituto Superior Tecnico,University of Sannio, Czech Technical University in Prague, Techinal University of Kosice, University of Calabria, Budapest University of Technology and Economics, Graduate School of Engineering in Electronics, Computer Science and Telecommunication of Bordeaux.

ID: 2007:1716, Financial support: 26 869 Euro

Academic Supervising Experience

Master students

2020 A. Hosseinzadeh Dadash, "A Cyber-Physical Testbed for Wireless Networked Control Systems", 30 hp

2020 M. Hassan, "Production 4.0 of Ring Mill 4 Ovako AB", 30 hp

2020 S. M. Rana, "A Study of Multipath Propagation and Doppler Effect at 24GHz ISM band", 30 hp

2020 G. B. Anbessa, "Implementation of Spectrum Analysis Functionality for IQ-Signal.", 30 hp

2020	S. Polat, “Selective Non-Catalytic Reduction System”, 30 hp
2019	A. Azadehnia, “What benefits will 5G be for small and mid-sized companies?”, 30 hp
2018	A. Haider, “Design of a metal detector”, 30 hp
2017	S. Kolluri “Automation of depowdering step in binder-jet additive manufacturing - Commissioning of KUKA robot”, 30 hp
2016	M. J. Abou Raas, “Wall Compensation Algorithms for M-sequence UWB Radar”, 30 hp
2016	S. Mulumbwa, “Humanoid Arm Geometric Model”, 30 hp
2016	A. Ndolla, “Target Orientation Detection Using UWB SAR by Implementing Polarimetry Technique”, 30 hp
2014	Q. Zhang, “Signal Classification Implemented by Wavelet Analysis and Support Vector Machine”, 30 hp
2014	X. Qin, “Measurement of horses gaits using geo-sensors”, 30 hp
2013	A. Sanz, “Control algorithms for energy savings in irregularly occupied buildings”, 15 hp
2013	T. Yang, “ Sensitivity Analysis of Digital Pre-Distortion Algorithms for Amplifier Linearization - The Impacts of Jitter and Quantization”, 30 hp
2012	T. Feng, “Noise contributions in Nonlinear Vector Network Analyzer (NVNA) measurements”, 30 hp
2012	B. Kazemi, “Developing a Low-Cost Directional Coupler”, 30 hp
2011	L. Gonzales, “Helping cognitive radios in their search for free space”, 30 hp
2010	A. Buccardo, “A Signal Detector for Cognitive Radio System”, 30 hp
2010	T. Teshome, “FPGA based Eigen value Detection Algorithm for Cognitive Radio”, 30 hp
2010	X. Wu, “Design of Passive UHF RFID Tag Antennas and Industry Application”, 30 hp
2009	S. Jawdat, “Dynamic Nonlinear Pre-Distortion of Signal Generators for Improved Dynamic Range”, 30 hp
2009	X. Wu, “The Survey of Detection Methods and Testbeds For Cognitive Radio Application”, 30 hp
2008	H. Al-Tahir, “Multidimensional Measurements: on RF Power Amplifiers”, 30 hp
2008	E. G. Condo Neira, “Multidimensional Measurements on RF Power Amplifiers”, 30 hp
2008	M. Siddiq, “Synthetic Instruments an overview” , 30 hp
2008	P. Gong, H. Guo,“Post-Correction of Analog to Digital Converters”, 30 hp
2007	C. Lugue, "Model-based pre-distortion for signal generators", 30 hp
2006	M. Mansour, *“* Spectrally Pure Signal Generation Based on Spectrum Analyser Measurements Using Pre-distortion*”,* 30 hp
2004 - 05	Kaveh Danandeh Dodaran, “DC Specification for ADC’s with Varying Sampling Frequency”
	A. Stephan. “Modelling Analog-to-Digital Converters Using Volterra Filtering”
	E. Wali, "Truncated Gaussian Noise in ADC Histogram Tests"

Own Pedagogical Education

2009	Forskarhandledning 3.0 hp	Royal Institute of Technology (KTH)
2008	Interkulturella undervisningssituationer med fokus på Kina, 7.5 hp (HEI00A)	University of Gävle
2007	Betyg och bedömning, 7.5 Hp (3IH03A)	University of Gävle
1995	Pedagogisk kurs för högskolelärare	University of Gävle

Pedagogical Award

2013 IEEE 2013 Instrumentation and Measurement Society Faculty Course Development Award "Measuring and Characterizing Nonlinear RF Systems "

Personal Pedagogical Ideas about Undergraduate and Postgraduate Teaching

Pedagogical Perspective

The holistic perspective is a key issue trough out my teaching approach. As the head of the electrical engineering group and as the former manager for a study program I arrange regular meetings to discuss the overall structure of study programs to ensure progression and interaction between courses in order to avoid unnecessary overlap while preventing gaps and take advantage of synergy effects. As course responsible lecturer my first lecture is an overview of the course and my last is a summary; each new topic in a course is introduced in its context. Moreover, I strive to have assignments or laboratory work in the end of the course, where the students apply the theoretical topics, preferable in a holistic approach. Study visits are appreciated elements in my teaching that also provides overall knowledge.

It is my belief that students have different ways to learn and I therefore try to show different methods to learn different topics. Some prefers to read text while others prefer mathematical solutions and graphs. It is my intention to use a wide variety of teaching methods to give students the same opportunities to benefit from the teaching.

My intention is to ensure that the students have easy access to all course material and tools. At the University of Gävle we use a web-based platform for that called Canvas. Moreover, most of the computer based tools (e.g. simulation software) are available on-line, accessible also from outside the university. Assignments and laboratory work is handed in via Canvas and automatically plagiarism will be checked. In addition, the assignments are typically design so that each student has their own data-file in order to stress individual work. The use of Canvas also ensures that assignments and laboratory reports are handled in a legally secure manner. It is particularly important when the courses may have multiple teachers involved. The student must feel confident that his/her work remains even if the lecturer and/or assistant leave the university.

A reflection of a more general nature is racism, sexism and nepotism. We would like to believe that there is no, but there is. There are remarkable papers published in well-reputable journals about unfair approval of research funds. There have also been racist elements among students. I try to be aware of this, take action and report.

I have experience from 9 PhD students, 32 Master students and several Bachelor students. What they have in common is that the supervisor ought to guide them in their planning, define the project so that they can complete it successfully, hint and give suggestions on where to find relevant literature, assist with resolving practical issues (e.g. access to computers and laboratory facilities) and assist with layout and review of reports/papers. How efforts shall be distributed depends on the individual and the level of education.

Doctoral students should early be involved in the process of writing articles. In addition, the PhD candidate might be successively involved in the process of paper reviews. Initially the student reads a paper that I will review and we discuss my comments. After a while the student and I will make separate reviews and we compare our comments. By that he/she will be aware of what is expected of a good article and, in addition, the student will be trained in critical reading.

It is clear that the role of a supervisor will depend on how far the student has come in his/her education. At the beginning of the training you have to give more support, clarify what is expected of the student and early start the process of writing scientific reports/papers. Later in the training, a supervisor should focus on that the student takes initiative on analysis and problem formulation. Finally, it is important to get the student to come to an end and assist him/her with the formalities surrounding the defence of the thesis.

All PhD students are individually different. Thus, the supervision should to be individualized by mutual agreement between the student and the supervisor. This agreement shall be settled early in the doctoral education and it must be preceded by a meeting where the parties discuss their expectations of each other's roles and discussing alternative leadership.

I believe that there is a need for regular meetings where student and supervisor jointly determine structure and periodicity. The student will take notes during the meeting and send it by e-mail to me. If I agree we have a written mutual understanding of the results from the meeting. Moreover, it can be distributed to the other supervisor in order to keep him updated since he does not typically attend to all meetings.

In addition to the regular meetings, it is appreciated by many, both mentors and graduate students to spend some time together and discuss research undisturbed. This can be done by jointly carry out measurements in the lab, sit together and write articles, or in connection with conferences taking time for discussions.

New technology and teaching methods based on it affect my educational perspective. It is not only an asset for distance learning; it will also bring new opportunities for campus studies as well as contract education. A prerequisite for lifelong learning is to have the ability to choose the time, place and level of ones studies.

Students' Learning and Development

It is my belief that students have different ways to learn and I therefore try to show different methods to illustrate a topic or solve a problem. A mathematical derivation can sometimes also be illustrated by a graphical solution, for example. In addition, I try to provide various tools to either solve a problem of to clarify/illustrate a theoretical topic. A typical course may consist of; (i) theoretical problems to solve analytically, (ii) simulations assignments and (iii) laboratory work. Problem solving and assignments are typically individual work, while laboratory work is in groups of 2-4 persons.

Around 2004 HiG strived to introduce project-based education in the study programs for engineers (so-called Gävle modellen). I participated in the working group and among other things; we visited Aalborg University which counts as a pioneer in problem-based learning. Meanwhile the education framework CDIO (Conceiving — Designing — Implementing — Operating) was undergoing emergence, especially within my subjects. In summary, this has resulted in that several of my courses contains project.

I have experience from teaching in other countries, teaching foreign students in Sweden and taken a pedagogic course in intercultural education situations. What I have learned is that the basic conditions are different. E.g., some have good theoretical knowledge, but lack practical skill. In these cases, I start the courses with a review of basic concepts and methods and make a reconciliation to ensure that everyone starts at the same level.

The introduction of the Bologna process resulted in the course's grades being based on both theoretical knowledge and practical skills. This has resulted in more developed assignments and laboratory instructions, where reports require students to make independent and critical assessments. Moreover, it gives the opportunity to examine whether the student can identify his/her knowledge gaps and need for further studies.

New technology and teaching methods based on it affect my educational perspective. It is with curiosity that I follow new trends and partly implement them in my teaching. One example is to provide feedback on student projects via video before face-to-face meeting. Thus, the students are prepared for the meeting and they have constant access to the feedback. The origin of this method comes from an internal pedagogical project and students evaluated the method; the students were very satisfied.

My Learning and Development

Through active research, I continuously follow the latest research and developments by continuously reading scientific papers in my field. In addition, I am often engaged in technical committees for conferences and I have been associate editor of an international journal, which means that I also get in touch with papers that I might not otherwise been searching after. As I supervise doctoral students, it is also a source of new knowledge. It satisfies most of my need for theoretical training, but in connection with the purchase of advanced equipment, I have also attended courses that give me practical knowledge.

In addition, at the technical conferences there are sessions about education. New courses and teaching methods are presented at sessions at the conference and/or as workshops in connection with the conference. In 2013 I was awarded "IEEE Instrumentation and Measurement Society Faculty Course Development Award" and held a presentation at one of the workshops. One of the most important sources of my educational development is the biannual national conference *Reglermöte*. It is one day for professors teaching Automatic control related courses at a majority of Sweden's universities, where we share our educational work experiences. It has been the most important source of information regarding concepts and concrete applications in my subject such as CDIO, flipped classroom, MOOC and SPOC.

One outcome is that I have developed a system for remote control of our industrial robots. It allows students to first simulate the movements of the robots, they can control the robots on-line and they can download programs developed in simulation environments and run the program. Other internal projects are the on-line feedback to students' thesis and I have been test pilot for the e-assessment software Edword at HiG.

In 2018, the government has identified a need for industrial skills boost and invited the universities, via Vinnova, to apply for founding in order to supplying skills to meet the industrial sector's needs and promote its long-term development. HiG together with Luleå University of Technology were granted founding. The task was to develop advanced level courses for professional (engineers). It is to some extent a heterogeneous group with varying prior knowledge and experience. My contribution consisted of developing a modular course structure that can be read according to the individual's conditions and needs. The courses can be read flexibly in time and regardless of geographical location. The concept was later expanded to include a total of nine courses.

Finally, several international contacts have gained the teaching skills via experience exchange. One example is the annual summer school taking place in different European countries. I was responsible for the summer school at HiG 2008 – 2010, where around ten different universities participated. Every university gave a half-day lecture. All teaching material was distributed to all lecturers for free to use in their home universities. In addition, I have been to several international teacher exchanges, been a visiting guest professor in Brussels where we developed an award winning Master's course in Brussels and an in-depth variant in Sweden at the doctoral level. Moreover, I have been an external expert in doctoral education in countries from former Yugoslavia when they harmonized their third-cycle education into the European system. I made me aware of the different countries' higher educational systems; not only benedictory countries but also from other European external experts.

Administration, Collaboration and other Qualifications

Administration of Education

2011 - 19	Manager of the Automation Engineering Program (Swedish: Programansvarig)	University of Gävle
2002 - 05	Manager of the Electrical Engineering Program (Swedish: Programansvarig)	University of Gävle

Administrative Assignments

2010 - 12	Head of Center for RF Measurement Technology	University of Gävle
2003 - 04	Member of the board for Research and Education for Technical and Science subjects (TN-nämnden)	University of Gävle
1995 - 98,	Member of the board for Research and Development	University of Gävle
1994 - 98	Member of the board of the Library	University of Gävle

Experience from Unit Leadership

2020 -	Research Director for “Intelligent Industry”, a strategic research area at University of Gävle	University of Gävle
2017 - 2010 - 11	Head of division Electrical Eng. (Ämnesföreträdare) The assignment entailed no economical or personnel responsibilities.	University of Gävle
2006 - 09	Head of Electronics division (Avdelningsföreträdare) Number of employees: 15-20 Annual turnover for education: ≈ 9 MSEK. The research turnover increased from 3.1 MSEK in 2005 to 9.9 MSEK in 2009.	University of Gävle

Membership of University Boards or Councils

2012 -	Member of the Board in Higher Vocational Education (Swedish: Yrkeshögskolan)	CVL, Sandviken
2010 - 13	Member of the University Board	University of Gävle

Member of an International Committees or Advisory Groups

2005 – 20	Member of IEEE standardization groups 2414 - Standard for Jitter and Phase Noise (2014 – 20) 1658 - Standard for Digital to Analog Converters 1241 - Standard for Analog to Digital Converters 1057 - Standard for Digitizing Waveform Recorders (2010 – 17)
2012 - 14	Secretary of IEEE standardization group 2414 - Standard for Jitter and Phase Noise

Approved Grants

2006	Vinnova project “Samverkansutvärdering HiG” Role: Principle Investigator ID: 2006-00702, Vinnova supported the project with 200 kSEK

Assignments within Collaboration

2007 – 11 General chair at the conference Radio Frequency Measurement Technology Conference (RFMTC) 2007 and 2011

2004 - 05 Organizer of the national research conference “Swedish ADDA 05”, Advanced A/D and D/A conversion

2004 Styr framåt

The upper secondary school, Polhemsskolan in Gävle, purchased comprehensive multi-station equipment for education within automation. I participated in the evaluation group as a representative from the university of Gävle.

Own Essays of a Popular Science Nature

2013 “Measuring and characterizing nonlinear RF systems”, tutorial at the ”International Instrumentation and Measurement Conference (I^2MTC)”, Minneapolis.

2012 “Software defined radio - Design and performance measure”, NI-days, Stockholm.

2009 ”Effektivare mätmetoder för radiosystem - att sopa rent bland radiovågor, ljud och signaler”, University of Gävle.

Other Scientific Achievements

Active Participation in National and International Conferences

2016 - 19 GlobeCom 20[13 - 14, 16 - 19]
Member of the technical program committee

2018 2018 IEEE International Symposium on Circuits and Systems
Member of the technical program committee

2016 IEEE CMI 2016
Member of the technical program committee

2012 - 15 CrownCom 20[12, 15]
Member of the technical program committee

2011 - 15 IEEE I^2MTC 20[11 – 15]
Member of the technical program committee and:
- Associate technical program committee chair (2015)
- Organized a special session on Cognitive Radio (2012)
- Session chairman (2011)

2013 - 14 IMEKO TC4 20[13 – 14]
Member of the technical program committee

2011 - 12 Swedish CTW 20[11-12]
Member of the technical program committee

2011 IMEKO IWADC & IEEE 2011 ADC Forum
Member of the technical program committee

2010 IMEKO IWADC 2010
Member of the technical program committee and session chairman

2009 IMEKO World Congress
Member of the technical program committee

2007 IEEE I^2MTC 2007
Session chairman

2007 - 11 RFMTC [07, 09, 11]
General chair (2007, 2011)

2005 Swedish ADDA 05
General chair

National and International Awards

2017 IEEE The instrumentation and Measurement society "Outstanding reviewers of 2017"
IEEE transaction on instrumentation and Measurement

2011 IEEE The instrumentation and Measurement society "Outstanding reviewers of 2011"
IEEE transaction on instrumentation and Measurement

2009 IEEE The instrumentation and Measurement society "Outstanding reviewers of 2009"
IEEE transaction on instrumentation and Measurement

Editorial or Advisory Assignments in International Periodicals

2012 - 20 IEEE Transactions on Instrumentation & Measurement
Associate Editor

Faculty opponent

2015 Faculty opponent for C. Kabiri, "On the Performance of Underlay Cognitive Radio Networks with Interference Constraints and Relaying" Dept. of Communication systems, Blekinge Institute of Technology

Grading committee

2020 PhD Grading committee for S. Grimaldi, "Towards Radio-Environment Aware IoT Networks: Wireless Coexistence Methods for Low-complexity Devices" Dept. of Computer and System Science, Mid-Sweden University.

2019 PhD Grading committee for Y. Jung, "Inverse system identification with applications in predistortion" Dept. of Electrical Engineering, Linköping University.

2019 PhD Grading committee for G. Iadarola, "Characterization of Analog-to-Information Converters". University of Sannio, Italy.

2016 PhD Grading committee for Mh. N. U. Islam, "Method of Torque Measurement based on volumetric strain" Dept. of Electronics Design, Mid-Sweden University..

2015 PhD Grading committee for A. K. M. Pillai, "Signal Reconstruction Algorithms for Time-Interleaved ADCs" Dept. of Electrical engineering, Linköping University.

2012 PhD Grading committee for A. S. Tehrani, "Behaviour modeling of wireless transmitters for distortion mitigation" Dept. of Signals and Systems, Chalmers

Review Assignments

2005 - IEEE Transactions on Instrumentation & Measurement
2005: 3, 2006: 1, 2007: 3, 2008: 4, 2009: 5, 2010: 2, 2011: 5, 2012: 2, 2013:1, 2014: 1, 2015: 4, 2016: 4, 2017: 3, 2018: 1, 2020: 5.

2014 - IEEE Instrumentation and Measurement Magazine
2014: 3, 2015: 1, 2016: 1, 2017: 1, 2020: 2

2018 - IET Radar, Sonar & Navigation
2018: 1, 2019: 1.

2006 - Measurement
2006: 1, 2009: 1, 2011: 1, 2013: 1, 2018: 2

2009 - 15 Electronics letter
2009: 1, 2010: 2, 2011: 2, 2012: 4, 2013: 1, 2014: 3, 2015: 1

2015 Signal processing
2015: 1

2013 - 14 Transactions on Microwave Theory and Techniques
2013: 1, 2014: 1

2010 Circuits, Systems & Signal Processing
2010: 1

Scientific Qualifications of a Non-academic Nature

1999 - 02 **IT-baserade omvårdnadstjänster i hemmet**
Role: Project Manager and R&D coordinator

The objective was to find an appropriate IT-standard for ordinary apartments so that they easily can be adapted to home care services and thereby make it possible for people with these needs to stay at the apartments. The project was managed by JM AB in collaboration with Utilator AB and Interactive Institute and in cooperation with Danderyd Hospital, The Knowledge Foundation (KK-stiftelsen) and The Vårdal Foundation. Founded by KKS 1999/0421, 700.000 SEK

2001 - 02 **Fotosvararen**
Role: Deputy Project Manager

This was a product developing project in cooperation with the research institute Interactive Institute, Frontyard AB and, The Knowledge Foundation (KK-stiftelsen). "Fotosvararen" (eng. The Photo messenger), which was the working title, facilitates the handling of incoming telephone massages using photos. It helps people with concentration and memory problems. This is now commercialized by Polycom AB. The project was founded by KKS 2001/0118, 300.000 SEK

1999 **KEES**
Role: Project Manager
This was a sub-project in a larger research project managed by EnerSearch AB. The objective was to study in which way the fast growing information technology would make energy distribution more efficient and at the same time create synergism with the growing information society by offering the electrical grid as a communication channel.