

Erik Leitinger

Curriculum Vitae

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Education

- 2012–2016 **Dr.techn. (Ph.D.)**, TU, Graz, *Passed with Highest Honors.*
PhD Programme - Information and Computer Engineering
- 2009–2012 **Dipl.-Ing.**, TU, Graz, *Passed with Highest Honors.*
Master Programme - Electrical Engineering with a focus on Wireless Communications
- 2005–2009 **BSc**, TU, Graz, *Passed with Highest Honors.*
Bachelor Programme - Electrical Engineering
- 1999–2004 **Matura**, HTLuVA, Graz, *Passed with Highest Honors.*
Branch Electrical Engineering

PhD thesis

- title *Cognitive Indoor Positioning and Tracking using Multipath Channel Information*
- supervisor Klaus Witrisal, Graz University of Technology
- second examiner Fredrik Tufvesson, Lund University

Master thesis

- title *Capacity and Capacity-Achieving Input-Distribution of an Energy Detector*
- supervisor Klaus Witrisal, Graz University of Technology

Experience

Vocational

- 2017 May – present **Postdoctoral Schrödinger Fellow**, Department of Electrical and Information Technology, Lund University.
- 2017 Jan – 2017 April **Postdoctoral Fellow**, Signal Processing and Speech Communication Laboratory, Graz University of Technology.
- 2016 Oct – 2016 Jan **Postdoctoral Fellow**, Department of Electrical and Information Technology, Lund University.
- 2016 Feb – 2016 Sept **Postdoctoral Fellow**, Signal Processing and Speech Communication Laboratory, Graz University of Technology.
- 2012–2016 **Research Associate**, Signal Processing and Speech Communication Laboratory, Graz University of Technology.

- 2009–2012 **Study Assistant**, *Graz University of Technology*.
Courses: Fundamentals of Communications, Signal-Transformations, Communication Systems Laboratory, Advanced Telecommunications Laboratory and High-Frequency Laboratory
- 2008 **Programmer**, *Graz University of Technology, Department of Broadband Communications*.
Programming for the software WIIS (Weather Image Information System)
- 2007 **Internships**, *Siemens Austria AG, Graz*.
Programmer for automation of test-protocols
- Miscellaneous**
- 2004–2005 **Civil Service**, *Seniorenheim, Graz*.
Civil service at Haus der Barmherzigkeit Graz

Awards

- 2017 **Erwin Schrödinger Fellowship**, *Fonds zur Förderung der wissenschaftlichen Forschung (FWF)*.
- 2016 **Award of Excellence for PhD Thesis**, *Federal Ministry of Science, Research and Economy (BMWFV)*.
- 2015 **Award for Patent**, *Graz University of Technology*.
Method, device and system for indoor localization and tracking using ultrawideband radio signals
- 2014 **Best student paper competition finalist**, *IEEE Radar Conference 2014*.
- 2010 **Excellence Scholarship**, *Styrian Government*.
- 2005 **Excellence Scholarship**, *Graz University of Technology, Faculty of Electrical Engineering*.

Languages

- German Native Speaker
English Professional

Computer skills

- programming Matlab, Octave, C++
Office MS Office, Latex
Operating Systems Windows, Linux

Interests

- Sports inline skating, table tennis
Reading fiction and professional literature
Music playing the guitar

Publications

Patents

- [1] P. Meissner, E. Leitinger, M. Lafer, and K. Witrival, "Method, device and system for indoor localization and tracking using ultrawideband radio signals," Patent 14 171 612.6, Jun. 6., 2014, patent filed.

Incollections

- [1] K. Witrival, P. Meissner, E. Leitinger, and P. Kulakowski, "Techniques and models for localization," in *Cooperative Radio Communications for Smart Green Environments (COST Action IC1004)*, 2015, section 3.3.

Peer-Reviewed Journal Papers

- [1] E. Leitinger, F. Meyer, F. Hlawatsch, K. Witrival, and M. Z. Win, "Radio signal-based factor graph slam," *IEEE Transactions on Wireless Communications*, 2017, submitted.
- [2] S. Grebien, J. Kulmer, F. Galler, M. Goller, E. Leitinger, H. Arthaber, and K. Witrival, "Range estimation and performance limits for uhf-rfid backscatter channels," *IEEE Journal of Radio Frequency Identification*, 2017, accepted.
- [3] J. Kulmer, E. Leitinger, H. Hinteregger, and K. Witrival, "Anchorless cooperative tracking using multipath channel information," *IEEE Transactions on Wireless Communications*, 2017, submitted.
- [4] E. Leitinger, P. Meissner, C. Rudisser, G. Dumphart, and K. Witrival, "Evaluation of position-related information in multipath components for indoor positioning," *IEEE J. Sel. Areas Commun.*, vol. 33, no. 11, pp. 2313–2328, Nov. 2015.
- [5] K. Witrival, P. Meissner, E. Leitinger, Y. Shen, C. Gustafson, F. Tufvesson, K. Haneda, D. Dardari, A. F. Molisch, A. Conti, and M. Z. Win, "High-accuracy localization for assisted living: 5G systems will turn multipath channels from foe to friend," *IEEE Signal Process. Mag.*, vol. 33, no. 2, pp. 59–70, Mar. 2016.
- [6] K. Witrival, E. Leitinger, S. Hinteregger, and P. Meissner, "Bandwidth scaling and diversity gain for ranging and positioning in dense multipath channels," *IEEE Wireless Commun. Lett.*, 2016.
- [7] G. SteinbÄck, M. Gan, P. Meissner, E. Leitinger, K. Witrival, T. Zemen, and T. Pedersen, "Hybrid model for reverberant indoor radio channels using rays and graphs," *IEEE Transactions on Antennas and Propagation*, vol. 64, no. 9, pp. 4036–4048, Sept 2016.
- [8] P. Meissner, E. Leitinger, and K. Witrival, "UWB for robust indoor tracking: Weighting of multipath components for efficient estimation," *IEEE Wireless Comm. Lett.*, vol. 3, no. 5, pp. 501–504, Oct. 2014.

Peer-Reviewed Conference Papers

- [1] E. Leitinger, F. Meyer, F. Tufvesson, and K. Witrival, "Factor graph based simultaneous localization and mapping using multipath channel information," in *Proc. IEEE ICC Workshops 2017*, 2017.

- [2] J. Vieira, E. Leitinger, M. Sarajlic, X. Li, and F. Tufvesson, "Deep convolutional neural network for massive mimo fingerprint-based positioning," in *Personal, Indoor, and Mobile Radio Communication (PIMRC), 2017 IEEE 28th Annual International Symposium on*, 2017.
- [3] J. Kulmer, S. Hinteregger, B. Großwindhager, M. Rath, M. S. Bakr, E. Leitinger, and K. Witrisal, "Using decawave uwb transceivers for high-accuracy multipath-assisted indoor positioning," in *Proc. IEEE ICC Workshops 2017*, May 2017, pp. 1239–1245.
- [4] E. Leitinger, F. Meyer, P. Meissner, K. Witrisal, and F. Hlawatsch, "Belief propagation based joint probabilistic data association for multipath-assisted indoor navigation and tracking," in *Proc. ICL-GNSS-16*, Barcelona, Spain, Jun. 2016.
- [5] J. Kulmer, E. Leitinger, P. Meissner, S. Hinteregger, and K. Witrisal, "Cooperative localization and tracking using multipath channel information," in *Proc. ICL-GNSS-16*, Barcelona, Spain, Jun. 2016.
- [6] S. Hinteregger, E. Leitinger, P. Meissner, and K. Witrisal, "MIMO Gain and Bandwidth Scaling for RFID Positioning in Dense Multipath Channels," in *2016 IEEE International Conference on RFID*, Orlando, USA, May 2016.
- [7] S. Hinteregger, E. Leitinger, P. Meissner, J. Kulmer, and K. Witrisal, "Bandwidth dependence of the ranging error variance in dense multipath," in *2016 24th European Signal Processing Conference (EUSIPCO) (EUSIPCO 2016)*, Budapest, Hungary, August 2016.
- [8] S. Witrisal, K. Hinteregger, J. Kulmer, E. Leitinger, and M. P., "High-accuracy Positioning for Indoor Applications: RFID, UWB, 5G, and beyond," in *2016 IEEE International Conference on RFID (RFID) (IEEE RFID 2016)*, May. 2016.
- [9] A. Nguyen Hong, M. Rath, E. Leitinger, S. Hinteregger, and K. Klaus, "Channel capacity analysis of indoor environments for location-aware communications," in *2016 IEEE Global Communications Conference: Second IEEE International Workshop on Localization and Tracking: Indoors, Outdoors, and Emerging Networks (GC16 Workshops LION)*, Washington, USA, Dec. 2016, accepted.
- [10] E. Leitinger, P. Meissner, M. Lafer, and K. Witrisal, "Simultaneous localization and mapping using multipath channel information," in *Proc. IEEE ICC-15*, London, UK, Jun. 2015, pp. 754–760.
- [11] G. Dumphart, E. Leitinger, P. Meissner, and K. Witrisal, "Monostatic Indoor Localization: Bounds and Limits," in *Communications Workshops (ICC), 2015 IEEE International Conference on*, June 2015.
- [12] P. Meissner, E. Leitinger, M. Lafer, and K. Witrisal, "Real-Time Demonstration of Multipath-Assisted Indoor Navigation and Tracking (MINT)," in *Communications Workshops (ICC), 2014 IEEE International Conference on*, June 2014, pp. 144–149.

- [13] E. Leitinger, M. Fröhle, P. Meissner, and K. Witrival, "Multipath-Assisted Maximum-Likelihood Indoor Positioning using UWB Signals," in *2014 IEEE International Conference on Communications Workshops (ICC)*, June 2014, pp. 170–175.
- [14] E. Leitinger, P. Meissner, M. Froehle, and K. Witrival, "Performance Bounds for Multipath-assisted Indoor Localization on Backscatter Channels," in *2014 IEEE International Conference on Radar (RadarCon)*, 2014.
- [15] K. Witrival, E. Leitinger, P. Meissner, and D. Arnitz, "Cognitive Radar for the Localization of RFID Transponders in Dense Multipath Environments," in *2013 IEEE International Conference on Radar (RadarCon)*, April 2013.
- [16] P. Meissner, E. Leitinger, M. Froehle, and K. Witrival, "Accurate and Robust Indoor Localization Systems Using Ultra-wideband Signals," in *European Navigation Conference (ENC)*, Vienna, Austria, 2013. [Online]. Available: <http://arxiv.org/abs/1304.7928>
- [17] P. Meissner, M. Gan, F. Mani, E. Leitinger, M. Froehle, C. Oestges, T. Zemen, and K. Witrival, "On the use of ray tracing for performance prediction of UWB indoor localization systems," in *IEEE ICC 2013 Workshop on Advances in Network Localization and Navigation (ANLN)*, IEEE, 2013.
- [18] M. Froehle, E. Leitinger, P. Meissner, and K. Witrival, "Cooperative Multipath-Assisted Indoor Navigation and Tracking (Co-MINT) using UWB Signals," in *IEEE ICC 2013 Workshop on Advances in Network Localization and Navigation (ANLN)*, 2013.
- [19] E. Leitinger, B. Geiger, and K. Witrival, "Capacity and Capacity-Achieving Input Distribution of the Energy Detector," in *2012 IEEE International Conference on Ultra-Wideband (ICUWB)*, sept. 2012, pp. 57 –61.
- [20] M. Gan, P. Meissner, F. Mani, E. Leitinger, M. Froehle, C. Oestges, K. Witrival, and T. Zemen, "Low-Complexity Sub-band Divided Ray Tracing for UWB Indoor Channels," in *IEEE WCNC*, Sydney, 2014.
- [21] —, "Calibration of Indoor UWB Sub-band Divided Ray Tracing Using Multiobjective Simulated Annealing," in *IEEE ICC*, Sydney, 2014.

Non Peer-Reviewed Papers

- [1] E. Leitinger, P. Meissner, M. Lafer, and K. Witrival, "Multipath-Assisted Indoor Simultaneous Localization and Mapping," in *COST Action IC1004 Scientific Meeting*, Dublin, Ireland, 2015.
- [2] J. Kulmer, E. Leitinger, P. Meissner, and K. Witrival, "Cooperative Multipath-Assisted Navigation and Tracking: A Low-Complexity Approach," in *1st EAI International Conference on Future access enablers of ubiquitous and intelligent infrastructures, 2015*. EAI, 2015.
- [3] J. Kmiecik, P. Meissner, E. Leitinger, K. Witrival, and P. Kulakowski, "Experimental validation of passive indoor localization and tracking using UWB systems," in *COST Action IC1004 Scientific Meeting*, Dublin, Ireland, 2015.

- [4] P. Meissner, E. Leitinger, and K. Witrival, "Robust and Accurate Indoor Localization using Channel Information," in *COST Action IC1004 Scientific Meeting*, Dublin, Ireland, 2015, tD(15)12067.
- [5] E. Leitinger, M. Froehle, P. Meissner, and K. Witrival, "Multipath-Assisted Maximum-Likelihood Indoor Positioning using UWB Signals," in *COST Action IC1004 Scientific Meeting*, Ferrara, Italy, Feb. 2014, tD(14)09054.
- [6] P. Meissner, E. Leitinger, M. Lafer, and K. Witrival, "Real-time demonstration of multipath-assisted indoor navigation and tracking (MINT)," in *COST Action IC1004 Scientific Meeting*, Aalborg, Denmark, May 2014, tD(14)10003.
- [7] K. Witrival, P. Meissner, E. Leitinger, T. Zemen, M. Gan, C. Oestges, B. Fleury, G. Steinboeck, T. Pedersen, and M. Jakobsen, "UWB channel modeling for indoor localization," in *COST Action IC1004 Scientific Meeting*, Ferrara, Italy, Feb 2014, tD(14)09053.
- [8] G. Steinboeck, T. Pedersen, M. Gan, T. Zemen, P. Meissner, E. Leitinger, and K. Witrival, "Preliminary hybrid model for reverberant indoor radio channels," in *COST Action IC1004 Scientific Meeting*, Aalborg, Denmark, May 2014, tD(14)10056.
- [9] P. Meissner, E. Leitinger, M. Froehle, and K. Witrival, "Accurate and robust indoor localization systems using ultra-wideband signals," in *COST Action IC1004 Scientific Meeting*, Ilmenau, Germany, 2013, tD(13)0711.
- [10] P. Meissner, M. Gan, F. Mani, E. Leitinger, M. Froehle, C. Oestges, T. Zemen, and K. Witrival, "On the use of ray tracing for performance prediction of UWB indoor localization systems," in *COST Action IC1004 Scientific Meeting*, Ilmenau, Germany, 2013, tD(13)07010.
- [11] E. Leitinger, P. Meissner, M. Froehle, and K. Witrival, "Performance Bounds for Multipath-assisted Indoor Localization on Backscatter Channels," in *COST Action IC1004 Scientific Meeting*, Ilmenau, Germany, 2013, tD(13)07012.
- [12] K. Witrival, E. Leitinger, M. P., and D. Arnitz, "Cognitive Radar for the Localization of RFID Transponders in Dense Multipath Environments," in *COST Action IC1004 Scientific Meeting*, Ghent, Belgium, Oct. 2013, tD(11)02001.

Supervised Masters' Thesis

- [1] M. Lafer, "Real-Time Multipath-Assisted Indoor-Localization using a Channel Sounder," Master's thesis, Graz University of Technology, 2014.
- [2] C. Rüdiger, "Synchronisation for Multipath-assisted Indoor Localization and Tracking," Master's thesis, Graz University of Technology, 2014.
- [3] G. Dumphart, "Performance Bounds for Anchorless Cooperative Indoor Localization exploiting Multipath," Master's thesis, Graz University of Technology, 2014.
- [4] R. Liepins, "Acoustic Source Localization using Reflected Signals," Master's thesis, Graz University of Technology, 2014.