



## **Publications, Patents, Talks**

**2019**

Philips Lehrstuhl für Medizinische Informationstechnik  
Helmholtz-Institut für Biomedizinische Technik  
Rheinisch-Westfälische Technische Hochschule Aachen

*Philips Chair for Medical Information Technology  
Helmholtz-Institute for Biomedical Engineering  
RWTH Aachen University*

**Director:**  
**Univ.-Prof. Dr.-Ing. Dr. med. Dr. h.c. Steffen Leonhardt**

## **Bücher 2019 / Books 2019**

### **Buchbeiträge mit anonymem Gutachterwesen 2019 / Peer-reviewed book chapters 2019**

1. Christoph Hoog Antink, Simon Lyra, Michael Paul, Xinchu Yu, Steffen Leonhardt, «A Broader Look: Camera-Based Vital SignEstimation across the Spectrum», Yearb Med Inform 2019:102-14. <http://dx.doi.org/10.1055/s-0039-1677914>

Submitted:

2. M. Ulbrich, M. Lüken, J. Mühlsteff and S. Leonhardt, "Wearable bioimpedance systems for home-care monitoring using BSNs", Wearable Sensors 2<sup>nd</sup> Edition, ed.: Edward Sazonov, to appear (2020).

### **Patentanträge und erteilte Patente mit Beteiligung des Lehrstuhls 2019 / *Granted Patents and filed Patent Applications 2019***

1. J. Lem, B. Eilebrecht, M. Mathissen, A. Lindner, R. Vogt, M. Walter, S. Leonhardt, „SENSOR FOR CONTACTLESS ELECTROCARDIOGRAPHIC MEASUREMENT“, 10495669, granted 03.12.2019.

**Artikel in Zeitschriften  
mit anonymem Gutachterwesen 2019 /  
Papers in peer-reviewed Journals 2019**

1. H.F.N. Al-Shuka, M. H. Rahman, S. Leonhardt, I. Ciobanu, M. Berteau, "Biomechanics, actuation, and multi-level control strategies of power-augmentation lower extremity exoskeletons: an overview", **International Journal of Dynamics and Control**, Feb. 2019, aop, pp 1-27, <https://doi.org/10.1007/s40435-019-00517-w>.
2. A. Benninghaus, O. Balédent, A. Lokossou, C. Castelar, S. Leonhardt, K. Radermacher, "Enhanced in vitro model of the CSF dynamics", **Fluids and Barriers of the CNS**, April 2019, Vol. 16, pp 1-11, <https://doi.org/10.1186/s12987-019-0131-z>.
3. C. Castelar, F. Flürenbrock, L. Korn, A. Benninghaus, B. Misgeld, S. Shchukin, K. Radermacher, S. Leonhardt, "FEM Simulation of Bioimpedance-Based Monitoring of Ventricular Dilation and Intracranial Pulsation"; **International Journal Bioelectromagnetism**, Vol 21, No. 1, pp 7 - 20, <http://www.ijbem.org/volume21/number1/7-20.pdf>.
4. S. Delbeck, T. Vahlsing, S. Leonhardt, G. Steiner, H.M. Heise, "Non-invasive monitoring of blood glucose using optical methods for skin spectroscopy – opportunities and recent advances", **Analytical and Bioanalytical Chemistry**, 2019 Vol 411, No. 1, pp 63-77, <https://doi.org/10.1007/s00216-018-1395-x>.
5. C. Hoog Antink, S. Lyra, M. Paul, X. Yu, S. Leonhardt, "A Broader Look: Camera-Based Vital Sign Estimation across the Spectrum", **Yearbook of Medical Informatics**, 2019, pp. 102-114, <http://dx.doi.org/10.1055/s-0039-1677914>.
6. C. Hoog Antink, M. Pirhonen, H. Väättäjä, S. Somppi, H. Törnqvist, A. Vallderoriola Cardó, D. Teichmann, O. Vainio, V. Surakka, A. Vehkaoja, "Sensor Fusion for Unobtrusive Respiratory Rate Estimation in Dogs", **IEEE Sensors Journal**, Vol 19, No. 16, pp. 7072 – 7081, <http://dx.doi.org/10.1109/JSEN.2019.2912002>.
7. A.H. Ismail, T. Gross, G. Schlieper, M. Walter, F. Eitner, J. Flöge, S. Leonhardt, „Monitoring transcellular fluid shifts during episodes of intradialytic hypotension using bioimpedance spectroscopy“, **Clinical Kidney Journal**, 2019, pp 1-7, doi: [10.1093/ckj/sfz123](https://doi.org/10.1093/ckj/sfz123).
8. A.H. Ismail, G. Schlieper, M. Walter, J. Flöge, S. Leonhardt, „Knee-to-Knee bioimpedance measurements to monitor changes in extracellular fluid in haemodynamic-unstable patients during dialysis“, **Journal of Electrical Bioimpedance**, 2019, Vol 10, No. 1, pp 55-62, <https://doi.org/10.2478/joeb-2019-0008>.
9. T. Menden, J. Orschulik, S. Dambrun, J. Matuszczyk, S. Aguiar Santos, S. Leonhardt, M. Walter, „Reconstruction algorithm for frequency-differential EIT using absolute values“, **Physiological Measurement**, 2019, Vol 40, pp. 1-14, <https://doi.org/10.1088/1361-6579/ab0b55>.

10. T. Muders, B. Hentze, P. Simon, F. Girschbach, M.R.G. Doebler, S. Leonhard, H. Wrigge, C. Putensen, „A Modified Method to Assess Tidal Recruitment by Electrical Impedance Tomography”, **Journal of Clinical Medicine**, 2019, Vol. 8, pp. 1-15, doi: 10.3390/jcm8081161.
11. C. Ngo, S. Dahlmanns, T. Vollmer, B. Misgeld, S. Leonhardt, „Object-oriented modeling of thoracic fluid balance to study cardiogenic pulmonary congestion in humans“, **Computer Methods and Programs in Biomedicine**, 2019, Vol. 180, pp. 1 – 10, <https://doi.org/10.1016/j.cmpb.2019.104998>.
12. M. Paul, A. Filipa Mota, C. Hoog Antink, V. Blazek, S. Leonhardt, “Modeling photoplethysmographic signals in camera-based perfusion measurements: optoelectronic skin phantom”, **Biomedical Optics Express**, 2019, Vol. 10, No. 9, pp 1 – 16, <https://doi.org/10.1364/BOE.10.004353>.
13. B. Penzlin, M. Enes Fincan, Y. Li, L. Ji, S. Leonhardt, C. Ngo, “Design and Analysis of a Clutched Parallel Elastic Actuator”, **Actuators**, Vol. 8, No.3, pp. 1 – 15, <https://doi.org/10.3390/act8030067>.
14. A. Pomprapa, W. Ahmed, A. Stollenwerk, S. Kowalewski, S. Leonhardt, „Deep Learning of Arrhythmia Analysis Based on Convolutional Neural Network”, **International Journal of Bioelectromagnetism**, 2019, Vol. 21, No. 1, pp. 48 – 48.
15. A. Pugovkin, A. G. Markov, S. V. Selishchev, L. Korn, M. Walter, S. Leonhardt, L.A. Bockeria, O.L. Bockeria, D. V. Telyshev, “Advances in Hemodynamic Analysis in Cardiovascular Diseases Investigation of Energetic Characteristics of Adult and Pediatric Sputnik Left Ventricular Assist Devices during Mock Circulation Support”, **Cardiology Research and Practice**, Vol. 2019, pp. 1 – 15, <https://doi.org/10.1155/2019/4593174>.
16. C. Putensen, B. Hentze, S. Muenster, T. Muders, „Electrical Impedance Tomography for Cardio-Pulmonary Monitoring“ **Journal of Clinical Medicine**, 2019, Vol. 8, No. 8, pp. 1-19, <https://doi.org/10.3390/jcm8081176>.
17. X. Yu, W. Neu, P. Vetter, C. Bollheimer, S. Leonhardt, D. Teichmann, C. Hoog AntinA Multi-Modal Sensor for a Bed-Integrated Unobtrusive Vital Signs Sensing Array”, **IEEE Trans Biomed Circuits Syst.**, 2019, Vol. 13, No. 3, pp. 529-539. doi: 10.1109/TBCAS.2019.
18. D. Petukhov, L. Korn, M. Walter, D. Telyshev, “A Novel Control Method for Rotary Blood Pumps as Left Ventricular Assist Device Utilizing Aortic Valve State Detection”, **BioMed Research International**, 2019.
19. C. Chen, C. Sun, S. Leonhardt, P. Andriessen, H. Niemarkt, W. Chen, „Amplitude-Integrated Electroencephalography Applications and Algorithms in Neonates: A Systematic Review”, **IEEE Access**, Vol. 7, 2019, pp. 141767 – 141781, doi: 10.1109/ACCESS.2019.2944531.
20. A.V. Kobelev, S. I. Shchukin, S. Leonhardt, “Application of Tetrapolar Electrode Systems in Electrical Impedance Measurements”, **Biomedical Engineering**, Vol. 52, No. 6, March 2019, pp. 383 – 386, doi: 10.1007/s10527-019-09852-w.

21. A.N. Tikhomirov, S. I. Shchukin, S. Leonhardt, A.K. Volkov, M.A. Murashko, "Multichannel Electrical Impedance Methods for Monitoring Cardiac Activity Indicators", **Biomedical Engineering**, Vol. 52, No. 6, March 2019, pp. 365 – 370, doi: 10.1007/s10527-019-09849-5.
22. T. Saritas, R. Greber, B. Venema, V. G. Puelles, S. Ernst, V. Blazek, J. Floege, S. Leonhardt, G. Schlieper, "Non-invasive evaluation of coronary heart disease in patients with chronic kidney disease using photoplethysmography" **Clinical Kidney Journal**, 2019, Vol. 12, No. 4, pp 538- 545, doi: <https://doi.org/10.1093/ckj/sfy135>.
23. N. Hochhausen, J. Orschulik, A. Follmann, S. Aguiar Santos, H. Dohmeier, S. Leonhardt, R. Roissant, M. Czaplak, „Comparison of two experimental ARDS models in pigs using electrical impedance tomography”, **PLOS ONE**, November 13, 2019, <https://doi.org/10.1371/journal.pone.0225218> .
24. A. Pomprapa, W. Ahmed, A. Stollenwerk, S. Kowalewski, S. Leonhardt. „Deep Learning of Arrhythmia Analysis based on Convolutional Neural Networks“, **International Journal of Bioelectromagnetism**, Vol 21, No. 1, pp.48 -58, 2019.

Early Access:

25. L. Liu, S. Leonhardt, C. Ngo, B.J.E. Misgeld, "Impedance-Controlled Variable Stiffness Actuator for Lower-Limb Robot Applications", **IEEE Transactions on Automation and Engineering**, 2019, pp. 1-14, doi: [10.1109/TASE.2019.2954769](https://doi.org/10.1109/TASE.2019.2954769), early access.

Submitted:

26. D. U. Uguz, T. B. Tufan, A. Uzun, S. Leonhardt, and C. H. Antink, "Physiological motion artifacts in capacitive ECG: Ballistocardiographic impedance distortions," *IEEE Transactions on Instrumentation and Measurement*, 2020.
27. L. Korn, S. Lyra, D. Rüschen, D. Telyshev, S. Leonhardt, and M. Walter, „Electrical in silico and in vitro models of the left heart ventricle“, *Physiological Measurement*, 2020.
28. M. Paul, S. Karthik, J. Joseph, M. Sivaprakasam, J. Kumutha, S. Leonhardt, C. Hoog Antink, "Non-contact sensing of neonatal pulse rate using camera-based imaging: A clinical feasibility study", *Physiological Measurement*, 2020.
29. M. Lueken, W. ten Kate, G. Valenti, J. P. Batista, C. Bollheimer, S. Leonhardt and C. Ngo, "Estimation of Stride Time Variability in Unobtrusive Long-Term Monitoring Using Inertial Measurement Sensors", *IEEE Journal of Biomedical Health Informatics*, 2020.

## **Konferenzbeiträge mit Beteiligung des Lehrstuhls 2019 / Conference Proceedings 2019**

### **125. Kongress der Deutschen Gesellschaft für Innere Medizin e.V., May 4 – 7, 2019, Wiesbaden, Germany**

1. X. Yu, C. Hoog Antink, J. Batista, S. Leonhardt, C. Bollheimer, T. Laurentius, "Kontaktlose Messung der Herzratenvariabilität und ihre Bedeutung als potentieller geriatrischer Biomarker", *Der Internist* 2019, Supl. 1, p. 19, 125. Kongress der Deutschen Gesellschaft für Innere Medizin, May 4 -7, 2019, Wiesbaden, Germany

### **Deutscher Anästhesiekongress (DAC), May 9 – 11, 2019, Leipzig, Germany**

2. T. Muders, B. Hentze, H. Wrigge, C. Putensen, "Methodologische Aspekte EIT-basierter Detektion tidaler Rekrutierung", *Deutscher Anästhesiekongress (DAC) 2019*, May 9 - 11, 2019, Leipzig, Germany.

### **IEEE EMBS International Conference on Biomedical & Health Informatics (BHI) and 16th IEEE-EMBS International Conference on Wearable and Implantable Body Sensor Networks (BSN), Chicago, USA, May 19<sup>th</sup> – May 22<sup>nd</sup> 2019**

3. M. Lueken, W. ten Kate, J. P. Batista, C. Ngo, C. Bollheimer and S. Leonhardt, "Peak Detection Algorithm for Gait Segmentation in Long-Term Monitoring for Stride Time Estimation using Inertial Measurement Sensors," *IEEE EMBS International Conference on Biomedical & Health Informatics (BHI)*, Chicago, IL, USA, 2019, pp. 1-4.
4. M. Lueken, B. Martin, B.J.E. Misgeld and S. Leonhardt, "Monitoring of Posture and Activity Using Smart Wearable Concepts", *16<sup>th</sup> IEEE-EMBS International Conference on Wearable and Implantable Body Sensor Networks (BSN)*, Chicago, IL, USA, 2019.

### **23<sup>rd</sup> International Student Conference on Electrical Engineering (POSTER 2019), May 23, 2019, Prague, Czech Republic**

5. S. Dahlmanns, L. Geller-Hartung, "3D simulation to analyse the effect of thrombosis on bioimpedance spectroscopy", *23<sup>rd</sup> International Student Conference on Electrical Engineering (POSTER 2019)*, Prague, Czech Republic, May 23, 2019.
6. L. Korn, M. Rumpf, "Testbench to model cardiac volume changes", *23<sup>rd</sup> International Student Conference on Electrical Engineering (POSTER 2019)*, Prague, Czech Republic, May 23, 2019.

7. S. Lyra, M. Paul, "Organic LED panels for pulse rate measurement using photoplethysmography imaging", 23<sup>rd</sup> International Student Conference on Electrical Engineering (POSTER 2019), Prague, Czech Republic, May 23, 2019.
8. C. Weiss, A. Kirmas, "Remote breathing signal extraction using infrared thermography in a climatic chamber", 23<sup>rd</sup> International Student Conference on Electrical Engineering (POSTER 2019), Prague, Czech Republic, May 23, 2019.
9. C.-F. Benner, "Glycemic Control in the Intensive Care Unit to Prevent Hyperglycemia in Critically Ill Patients", 23<sup>rd</sup> International Student Conference on Electrical Engineering (POSTER 2019), Prague, Czech Republic, May 23, 2019.
10. B. Romanski, C.-F. Benner, "Feedforward Compensation of Physical Activity in Insulin Therapy for Type 1 Diabetes using Oxygen Uptake", 23<sup>rd</sup> International Student Conference on Electrical Engineering (POSTER 2019), Prague, Czech Republic, May 23, 2019.
11. S. Eisenbrand, T. Menden, "Medical Applications of System Identification with Pseudo Random Binary Sequences", 23<sup>rd</sup> International Student Conference on Electrical Engineering (POSTER 2019), Prague, Czech Republic, May 23, 2019.
12. Isshu Araki, B. Hentze, "A Simulink-Blockset to Control Lego Mindstorms using Raspberry Pi", 23<sup>rd</sup> International Student Conference on Electrical Engineering (POSTER 2019), Prague, Czech Republic, May 23, 2019.

**17<sup>th</sup> International Conference on Electrical Bioimpedance, ICEBI 2019, Joinville, Santa Catarina, Brazil, 9-14 June 2019**

13. T. Menden, T. Textor, S. Schadwinkel, S. Leonhardt, M. Walter, „Influence of Measurement Pattern on RAW-data in Electrical Impedance Tomography”, In P. Bertemes-Filho (Ed.), 17<sup>th</sup> International Conference on Electrical Bioimpedance, International Federation for Medical and Biological Engineering (IFMBE). <https://doi.org/10.1007/978-981-13-3498-6>.
14. S. Dahlmanns, A. Wenzel, S. Leonhardt, D. Teichmann, „Hardware Setup for Tetrapolar Bioimpedance Spectroscopy in Bandages“, 17<sup>th</sup> International Conference on Electrical Bioimpedance (ICEBI), Joinville, Brazil, 2019.
15. L. Korn, S. Lyra, S. Leonhardt, M. Walter "Analysis of silicone additives to model the dielectric properties of heart tissue", 17<sup>th</sup> International Conference on Electrical Bioimpedance (ICEBI), Joinville, Brazil, 2019.

**14<sup>th</sup> IEEE International Symposium on Medical Measurements and Applications (MeMeMa), Istanbul, Turkey, June 26 – 28, 2019**

16. D. U. Uguz, P. Weidener, C. D. Bezek, T. Wang, S. Leonhardt, and C. H. Antink, "Ballistocardiographic coupling of triboelectric charges into capacitive ECG," in 2019 IEEE International Symposium on Medical Measurements and Applications (MeMeA). IEEE, 2019, pp. 1–5.

**Proceedings of the XIV Russian-German Conference on Biomedical Engineering, July 3<sup>rd</sup> – 6<sup>th</sup>, 2019, St. Petersburg, Russia, ISBN 978-5-7629-2492-4**

17. M. Walter, S. Eisenbrand, R. Kopp, S. Leonhardt, "Hardware-in-the-loop test bench for artificial lungs", Proceedings of the XIV Russian-German Conference on Biomedical Engineering, 3.-6.7.2019, St. Petersburg, Russia, ISBN 978-5-7629-2492-4.
18. L. Bergmann, L. Liu, C. Ngo, B. Misgeld, S. Leonhardt, "Zero-torque control of an exoskeleton joint actuator using a disturbance observer", Proceedings of the XIV Russian-German Conference on Biomedical Engineering, 3.-6.7.2019, St. Petersburg, Russia, ISBN 978-5-7629-2492-4.
19. B. Romanski, C.-F. Benner, B. Glasmacher, S. Leonhardt, M. Walter, „In Silico Comparison of Control Strategies of Insulin Therapy for Type 1 Diabetes during Physical Activity using the Extended Sorensen Glucoregulatory Model", Proceedings of the XIV Russian-German Conference on Biomedical Engineering, 3.-6.7.2019, St. Petersburg, Russia, ISBN 978-5-7629-2492-4.
20. Diogo Filipe Pereira Fontes Fernando Silva, Steffen Leonhardt, Christoph Hoog Antink, "Synthesis of Cardiac Signals Using a Copula-Approach", Proceedings of the XIV Russian-German Conference on Biomedical Engineering, 3.-6.7.2019, St. Petersburg, Russia, ISBN 978-5-7629-2492-4, <https://doi.org/10.1063/1.5121995>.

**American Control Conference (ACC) 2019, Philadelphia, USA, 10 – 12 July 2019**

21. Lukas Ortmann, Dawei Shi, Eyal Dassau, Francis J. Doyle III, Berno Misgeld, Steffen Leonhardt, „Automated Insulin Delivery for Type 1 Diabetes Mellitus Patients using Gaussian Process-based Model Predictive Control", American Control Conference (ACC) 2019, Philadelphia, USA, 10 – 12 July 2019, ISBN 978-1-5386-7926-5, pp 4118-4123.

**41<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Berlin, Germany, July 23 - 27, 2019**

22. Y. Li, Z. Li, B. Penzlin, Z. Tang, Y. Liu, X. Guan, L. Ji, S. Leonhardt, "Design of the Clutched Variable Parallel Elastic Actuator (CVPEA) for Lower Limb Exoskeletons", in 41<sup>st</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) (pp. 4436-4439), Berlin, Germany, July 23 - 27, 2019.
23. B. Hentze, T. Muders, M. Walter, C. Putensen, and S. Leonhardt, "A Deconvolution Method for Perfusion Imaging under Ongoing Ventilation Using Electrical Impedance Tomography," in 41<sup>st</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Berlin, Germany, 2019.
24. M. Paul, X. Yu, B. Wu, C. Weiss, C. H. Antink, V. Blazek, S. Leonhardt, "Waveform Analysis for Camera-based Photoplethysmography Imaging," in 41<sup>st</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Berlin, Germany, July 23 - 27, 2019, pp. 2713-2718. Doi: 10.1109/EMBC.2019.8857581.



25. Xinchu Yu, Sonia Cruz, Joao P. Batista, Cornelius Bollheimer, Steffen Leonhardt, Christoph Hoog Antink, "Using a Motion Capture System as Reference for Motion Tracking in Photoplethysmography Imaging", in 41<sup>st</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Berlin, Germany, July 23 - 27, 2019, pp. 3915-3918. Doi: 10.1109/EMBC.2019.8856810.

**International Conference in Computing in Cardiology 2019, Singapore, 8-11 September 2019**

26. Simon Lyra, Steffen Leonhardt, Christoph Hoog Antink, "Early Prediction of Sepsis using Random Forest Classification for Imbalanced Clinical Data", International Conference in Computing in Cardiology (CinC) 2019, Singapore, 8-11 September 2019.
27. Christoph Hoog Antink, Yen Mai, Jukka Ranta, Adrian Tarniceriu, Christoph Brüser, Steffen Leonhardt, Niku Oksala, Antti Vehkaoja, "On the Performance of Bed-Integrated Ballistocardiography in Long-Term Heart Rate Monitoring of Vascular Patients", International Conference in Computing in Cardiology (CinC) 2019, Singapore, 8-11 September 2019.

**International Symposium on Intracranial Pressure and Neuromonitoring (ICP) 2019, Leuven, Belgium, 8 – 11 September 2019**

28. Carlos Castelar, Benedikt Maurer, Steffen Leonhardt, Chuong Ngo, „Hardware-in-the-Loop Model of the Pulsating Brain”, International Symposium on Intracranial Pressure and Neuromonitoring (ICP) 2019, Leuven, Belgium, 8 – 11 September 2019.

**2019 International Congress of Parkinson’s Disease and Movement Disorders, Nice, France, 22 – 26 September 2019**

29. A. Braczynski, J. Schulz, S. Leonhardt, C. Hoog Antink, „A videographic tool for quantitative assessment of the Glabellar Reflex”, Abstracts of the 2019 International Congress of Parkinson’s Disease and Movement Disorders, Vol. 32, Supl. 2, p. 721.

**International Conference on Computer Vision (ICCV) and 2<sup>nd</sup> International Workshop on Computer Vision for Physiological Measurement (CVPM) 2019, Oct. 27 – Nov. 2, 2019, Seoul, Korea**

30. Christian Pilz, Vladimir Blazek, Ibtissem Ben Makhlof, Steffen Leonhardt, "On the Vector Space in Photoplethysmography Imaging", International Conference on Computer Vision (ICCV) and 2nd International Workshop on Computer Vision for Physiological Measurement (CVPM), Oct. 27 – Nov. 2, 2019, Seoul, Korea.

**58<sup>th</sup> Conference on Decision and Control (CDC) - Nice, France - December 11<sup>th</sup> -13<sup>th</sup>, 2019. <https://cdc2019.ieeecss.org/>**

31. Berno Misgeld, Marc Efken, Lin Liu, Tetsuya Iwasaki, Steffen Leonhardt, "CPG assistive motion control for variable stiffness actuators, 58th Conference on Decision and Control (CDC) Nice, France, 11 – 13 December, pp 7758 – 7763.

# Eingeladene Vorträge 2019 / Invited Talks and Lectures 2019

1. S. Leonhardt, "Introducing RWTH Aachen University and Biomedical Engineering at RWTH", NIT Nagaland, Dimapur, Nagaland, March 18<sup>th</sup>, 2019

2. S. Leonhardt, "Closed-loop Systems in Medicine – why nature is closing the loop and we should do that, too!", NIT Nagaland, Dimapur, Nagaland, March 19<sup>th</sup>, 2019

3. S. Leonhardt, "*Thou shalt not touch* - Techniques for Contact-free Monitoring", NIT Nagaland, Dimapur, Nagaland, March 21<sup>st</sup>, 2019

4. S. Leonhardt, "Lung Ventilation and Perfusion Monitoring using Electrical Impedance Tomography (EIT)", Amrita Vishwa Vidyapeetham University, Medical School, Cochin, Kerala, April 1<sup>st</sup>, 2019

5. S. Leonhardt, "*Thou shalt not touch* - Techniques for Contact-free Monitoring", Amrita Vishwa Vidyapeetham University Main Campus, Amrithapuri, Kerala, April 2<sup>nd</sup>, 2019

6. S. Leonhardt, "Closed-loop Systems in Medicine – why nature is closing the loop and we should do that, too!", IITD&M Kancheepuram, Chennai, Tamil Nadu, April 15<sup>th</sup>, 2019

7. S. Leonhardt, "Closed-loop Systems in Medicine – why nature is closing the loop and we should do that, too!", IIT Madras, Chennai, Tamil Nadu, April 23<sup>rd</sup>, 2019

8. S. Leonhardt, "Lung Ventilation and Perfusion Monitoring using Electrical Impedance Tomography (EIT)", IIT Madras, Chennai, Tamil Nadu, April 24<sup>th</sup>, 2019.



9. S. Leonhardt, "Driver Monitoring: Towards safe transitions, personalisation and user acceptance", 13th IST European Congress, Eindhoven, the Netherlands, 3 – 6 June 2019.



10. S. Leonhardt, "Closed-loop Systems in Medicine why nature is closing the loop and we should do that, too!", University at Buffalo, MAE Seminar, Sep. 12th, 2019



11. S. Leonhardt, "Closed-loop Systems in Medicine – why nature is closing the loop and we should do that, too!", Massachusetts Institute of Technology, IMES Lunch Seminar, Sep. 24th, 2019.



12. S. Leonhardt, "Nonobtrusive Methods for Physiological Driver and Passenger State Estimation", 28th Aachen Colloquium Automobile and Engine Technology, Aachen, 8. Okt. 2019.



13. S. Leonhardt, "Nonobtrusive Methods for Physiological Driver and Passenger State Estimation", 9th Aachen Colloquium China in Beijing, November 14th, 2019



14. S. Leonhardt, "Closed-Loop Control of Therapy in Post-Disaster Situations", IORA Workshop, 19. Nov. 2019, Aachen.



15. C. Hoog Antink, „Alles, nur nicht anfassen!“ Science Slam as part of the 30. Symposium on Intensive Medicine + Intensive Care Bremen (22.02.2019)



16. C. Hoog Antink, „Unobtrusive Sensing of Cardiorespiratory Signals“, Invited talk as part of the lecture series at the Peter L. Reichertz Institute for Medical Informatics Braunschweig (25.04.2019)



**Organisation von eingeladenen Zeitschriften-Ausgaben  
im Jahr 2019**  
*Organisation of invited special issues in peer-reviewed  
journals in 2019*

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