



## **Publications, Patents, Talks**

**2021**

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

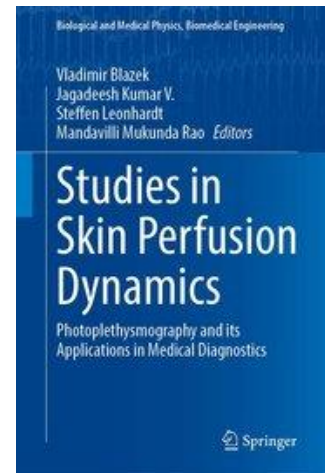
*Chair for Medical Information Technology  
Helmholtz-Institute for Biomedical Engineering  
RWTH Aachen University*

**Director:**

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

## Bücher 2021 / Books 2021

1. V. Blazek, J. Kumar V., S. Leonhardt, M. Mukunda Rao (eds.), „Studies in Skin Perfusion Dynamics - Photoplethysmography and its Applications in Medical Diagnostics“, Springer Nature Singapore Pte Ltd., 2021. ISBN: 978-981-15-5447-6 (hardcover), 978-981-15-5449-0 (ebook).



## Buchbeiträge mit anonymem Gutachterwesen 2021 / Peer-reviewed book chapters 2021

1. V. Blazek, „Skin Perfusion Studies: Historical Notes and Modern Measuring Strategies Using Non-invasive Photoelectric Sensor Concepts“. In: V. Blazek, J. Kumar V., S. Leonhardt, M. Mukunda Rao (eds.), „Studies in Skin Perfusion Dynamics“, Springer Nature Singapore, 2021, ISBN: 978-981-15-5447-6\_1 (Hardcover), DOI:10.1007/978-981-5449-0\_1, 32 pages
2. V. Blazek, C. Blazek, „Peripheral venous Dynamics, Venous Oxygen Saturation and Local Oxygen Consumption Measured with an Extended Photoplethysmographic Muscle Pump Test“. In: V. Blazek, J. Kumar V., S. Leonhardt, M. Mukunda Rao (eds.), „Studies in Skin Perfusion Dynamics“, Springer Nature Singapore, 2021, ISBN: 978-981-15-5447-6\_5 (Hardcover), DOI:10.1007/978-981-5449-0\_5, 11 pages
3. M. Hülsbusch, V. Blazek, „Photon-Tissue Interaction Modelled by Monte Carlo Method for Optimizing Optoelectronic Sensor Concepts“. In: V. Blazek, J. Kumar V., S. Leonhardt, M. Mukunda Rao (eds.), „Studies in Skin Perfusion Dynamics“, Springer Nature Singapore, 2021, ISBN: 978-981-15-5447-6\_10 (Hardcover), DOI:10.1007/978-981-5449-0\_10, 13 pages
4. C. Blazek, V. Blazek, „Selected Clinical Applications of Functional PPGI Perfusion Mapping in Dermatology. In: V. Blazek, J. Kumar V., S. Leonhardt, M. Mukunda Rao (eds.), „Studies in Skin Perfusion Dynamics“, Springer Nature Singapore, 2021, ISBN: 978-981-15-5447-6\_12 (Hardcover), DOI:10.1007/978-981-5449-0\_12, 15 pages

5. S. Leonhardt, „Concluding Remarks and New Horizons in Skin Perfusion Studies”, In: V. Blazek, J. Kumar V., S. Leonhardt, M. Mukunda Rao (eds.), „Studies in Skin Perfusion Dynamics”, Springer Nature Singapore, 2021, ISBN: 978-981-15-5447-6\_13 (Hardcover), DOI:10.1007/978-981-5449-0\_13, 10 pages

**Patentanträge und erteilte Patente  
mit Beteiligung des Lehrstuhls 2021 /  
*Granted Patents and filed Patent Applications 2021***

**Artikel in Zeitschriften  
mit anonymem Gutachterwesen 2021 /  
*Papers in peer-reviewed Journals 2021***

1. M. Russ, E. Boerger, P. von Platen, R.C.E. Francis, M. Taher, W. Boemke, B. Lachmann, S. Leonhardt, P.A. Pickerodt, „Surfactant Depletion Combined with Injurious Ventilation Results in a Reproducible Model of the Acute Respiratory Distress Syndrome (ARDS)”, **J Vis Exp**. 2021 Apr 7;(170). doi: 10.3791/62327.
2. L. Bergmann, S. Leonhardt, D. Greven & B. J. E. Misgeld, “Optimal Assistive Control of a Pedal-electric Drive Unit,” **Control Engineering Practice (CEP)**, Volume 110, ISSN 0967-0661, 2021
3. B. Penzlin, L. Bergmann, Y. Li, L. Ji, S Leonhardt, C. Ngo, “Design and First Operation of an Active Lower Limb Exoskeleton with Parallel Elastic Actuation”, **Actuators**, Vol. 10. No. 4., Multidisciplinary Digital Publishing Institute, 2021.
4. X. Yu, C. Hoog Antink, S. Leonhardt, L. C. Bollheimer, T. Laurentius, „Non-Contact Measurement of Heart Rate Variability in Frail Geriatric Patients: Response to Early Geriatric Rehabilitation and Comparison with Healthy Old Community-Dwelling Individuals – A Pilot Study”, **Gerontology**. 2021 Sep 21; (Online Early Access). doi: 10.1159/000518628.
5. F. Voss, L. Korn, S. Leonhardt & M. Walter, „Modeling of Flow-Dependent Blood Conductivity for Cardiac Bioimpedance“, **International Journal of Bioelectromagnetism**. 23(2), 2021, pp 1-13.
6. Lyra, S.; Mayer, L.; Ou, L.; Chen, D.; Timms, P.; Tay, A.; Chan, P.Y.; Ganse, B.; Leonhardt, S.; Hoog Antink, C. (2021),” A Deep Learning-Based Camera Approach for Vital Sign Monitoring Using Thermography Images for ICU Patients”, **Sensors** 2021, 21, 1495, DOI: [10.3390/s21041495](https://doi.org/10.3390/s21041495)
7. Lyra, S., Voss, F., Coenen, A., Blase, D., Aguirregomezcorta, I.B., Uguz, D.U., Leonhardt, S.; Hoog Antink, C. (2021), “A Neonatal Phantom for Vital Signs Simulation”, **IEEE Transactions on Biomedical Circuits and Systems**, 15, 949-959, DOI: [10.1109/TBCAS.2021.3108066](https://doi.org/10.1109/TBCAS.2021.3108066).
8. Telyshev, D.V.; Pugovkin, A.A.; Ephimov, I.A.; Markov, A.; Leonhardt, S.; Walter, M.; Karimov, J.H.; Selishchev, S.V. Correlation between Myocardial Function and Electric Current Pulsatility of the Sputnik Left Ventricular Assist Device: In-Vitro Study. **Appl. Sci.** 2021, 11, 3359. <https://doi.org/10.3390/app11083359>
9. Nesterenko, Igor V.; Pugovkin, Alexander A.; Leonhardt, Steffen; Walter, Marian; Borchers, Patrick; Markov, Aleksandr; Karimov, Jamshid H.; Selishchev, Sergey V. and Telyshev, Dmitry V., "Electrodynamics of Axial-Flow Rotary Blood Pumps," in **IEEE Access**, vol. 9, pp. 164700-164711, 2021, doi: 10.1109/ACCESS.2021.3133803.

10. Denisov, M.V., Walter, M., Leonhard, S., Telyshev, D, Effects of the Design of a Rotary Blood Pump on Hemocompatibility. **Biomed Eng** 54, 327–332 (2021). <https://doi.org/10.1007/s10527-021-10032-y>
11. B. Hentze, T. Muders, C. Hoog Antink, C. Putensen, A. Larsson, G. Hedenstierna, M. Walter, S. Leonhardt, „A model-based source separation algorithm for lung perfusion imaging using electrical impedance tomography,” **Physiol. Meas.**, vol. 42, no. 8, p. 084001, Aug. 2021, doi: 10.1088/1361-6579/ac0e84.
12. T. Muders, B. Hentze, S. Kreyer. K.H, Wodack, S. Leonhardt, G: Hedenstierna, H. Wrigge, C. Putensen, „Measurement of Electrical Impedance Tomography-Based Regional Ventilation Delay for Individualized Titration of End-Expiratory Pressure”, **Journal of Clinical Medicine**, 10 (13), pp. 1- 16, <https://doi.org/10.3390/jcm10132933>.
13. M. Lueken, J. Loeser, N. Weber, C. Bollheimer, S. Leonhardt, C. Ngo, „Model-Based Step Length Estimation Using a Pendant-Integrated Mobility Sensor”, **IEEE Transactions on Neural Systems and Rehabilitation Engineering**, vol. 29, pp. 2655-2665, 2021, doi: 10.1109/TNSRE.2021.3133535
14. I. Badiola, V. Blazek, S. Leonhardt, C. Hoog Antink, „Learning about reflective PPG for SpO2 determination using Machine Learning”, **Current Directions in Biomedical Engineering**, vol. 7, no. 2, 2021, pp. 33-36. doi: 10.1515/cdbme-2021-2009.
15. P. Borchers, M. Walter, S. Leonhardt, D. Telyshev, A. Pugovkin, „Flow Profile generation for a left ventricular assist device using iterative learning control”, **Current Directions in Biomedical Engineering**, vol. 7, no. 2, 2021, pp. 279 282, doi: 10.1515/cdbme-2021-2071.
16. B. Penzlin, L. Bergmann, Y. Li, L. Ji, S. Leonhardt, C.Ngo, „Design and First Operation of an Active Lower Limb Exoskeleton with Parallel Elastic Actuation”, **Actuators**, 10(4), pp. 1-20, /doi.org/10.3390/act10040075.
17. L. Korn, S. Dual, J. Rixen, M. Meboldt, S. Leonhart, M. Schmid Daners, M. Walter, „Dual-modality Volume Measurement integrated on a Ventricular Assist Device”, **IEEE Transactions on Biomedical Engineering**, pp. 1-11, DOI: [10.1109/TBME.2021.3115019](https://doi.org/10.1109/TBME.2021.3115019).
18. L. Korn, S. Dahlmanns, S. Leonhardt, M. Walter, „Improved estimation of left ventricular volume from electric field modeling”, **Journal of Electrical Bioimpedance**, Vol. 12 (1), pp. 125-134, DOI: [10.2478/joeb-2021-0015](https://doi.org/10.2478/joeb-2021-0015).
19. T. Menden, M. Rumpf, L. Korn, S. Leonhardt, M. Walter, „Multi-channel bioimpedancebased on orthogonal baseband shifting”, **Physiological Measurement**, 42(6), pp. 1- 19, <https://doi.org/10.1088/1361-6579/ac0402>.
20. T. Menden, G. B. Alcaín, A. T. Stevenson, R. D. Pollock, H. Tank, P.Hodkinson, C. Jolley, T. G. Smith, S. Leonhardt, and M. Walter, “Dynamic Lung Behavior under high G-Acceleration Monitored with Electrical Impedance Tomography”, **Physiological Measurement**, 42(9): 12, 2021, DOI: [10.1088/1361-6579/ac1c63](https://doi.org/10.1088/1361-6579/ac1c63).
21. T. Menden, J. Matuszczyk, S. Leonhardt, and M. Walter, “Bandwidth and Common Mode Optimization of Current- and Voltagesources in Bioimpedance Spectroscopy”, **Journal of Electrical Bioimpedance**, 12(1): 11, 2021. DOI: [10.2478/joeb-2021-0016](https://doi.org/10.2478/joeb-2021-0016).

22. R. D. Pollock, C. J. Jolley, N. Abid, J. H. Couper, L. Estrada-Petrocelli, P. D. Hodkinson, S. Leonhardt, S. Magor-Elliott, T. Menden, G. Rafferty, G. Richmond, P. A. Robbins, G. A. D. Ritchie, M. J. Segal, A. T. Stevenson, H. D. Tank, and T. G. Smith, "Pulmonary effects of sustained periods of high-G acceleration relevant to suborbital spaceflight", ***Aerospace Medicine and Human Performance***, 92(8):633-641, 2021. DOI: [10.3357/AMHP.5790.2021](https://doi.org/10.3357/AMHP.5790.2021).
23. S.C. Behr, C. Platen, P. Vetter, N. Heussen, S. Leonhardt, T. Orlikowsky, K. Heimann, „Detction of acute ventilatory problems via magnetic induction in a newborn animal model”, ***Pediatric Research***, online first, pp. 1-7, DOI: 10.1038/s41390-021-01594-4
24. S. Dahlmanns, S. Reich-Schupke, Franziska Scholleman, Markus Stücker, S. Leonhart, D. Teichmann, „Classification of chronic venous diseases based on skin temperature patterns”, ***Physiological Measurement*** 42(4), pp, 1-13, DOI: 10.1088/1361-6579/abf020
25. S. Shckukin, A. Kobelev, Y.N. Lipich, C. Ngo, Y.V. Gulyaev, A. N. Briko, A. Hülkenberg, S. Leonhardt, "Fusion of Electromyogram and Bioimpedance (Electrical Impedance Myography) for Force-Moment Control in Medical Assisted Devices", Vestnik Rossijskogo fonda fundamental'nych issledovanij = ***Russian Foundation for Basic Research Journal N*** 1–2 (109–110) January–June 109/110(1/2), pp. 112-125,
26. M. Mathissen, N. Hennes, F. Faller, S. Leonhardt, D. Teichmann, „Investigation of Three Potential Stress Inducement Tasks During On-Road Driving”, ***IEEE Transactions on Intelligent Transportation Systems***. online first, pp. 1-10, DOI: 10.1109/TITS.2021.-3112811.
27. N. Weidner, J. Kretschmann, H. Bomberg, S. Antes, S. Leonhardt, C. Tschan, J. Oertel. T. Volk, A. Meiser, H.V. Groesdonk, „Real-Time Evaluation of Optic Nerve Sheath Diameter (ONSD) in Awake, Spontaneously Breathing Patiens”, ***Journal of Clinical Medicine***, 10(16), pp. 1-9, DOI: [10.3390/jcm10163549](https://doi.org/10.3390/jcm10163549).

Submitted:

1. L. Bergmann, O. Lück, D. Voss, P. Buschermöhle, L. Liu, S. Leonhardt, C. Ngo, "Lower-Limb Exoskeleton with Compliant Actuators: Design, Modeling and Human Torque Estimation," *IEEE/ASME Transactions on Mechatronics*, 2021
2. D. U. Uguz, T. C. Canbaz, C. H. Antink, M. Lüken, S. Leonhardt, „A Novel Sensor Design for Amplitude Modulated Measurement of Capacitive ECG”, *IEEE Transactions on Instrumentation and Measurement*, in press.
3. Borik, S.; Lyra, S.; Perlitz, V.; Leonhardt, S.; Blazek, V. (2021). On the spatial phase distribution of cutaneous low-frequency perfusion oscillations. *Scientific Reports – Nature* (under review)
4. Lyra, S.; Rixen, J.; Heimann, K.; Karthik, S.; Joseph, J.; Jayaraman, K.; Orlikowsky, T.; Sivaprakasam, S.; Leonhardt, S.; Hoog Antink, C. (2021). Camera Fusion for Real-Time Temperature Monitoring of Neonates using Deep Learning. *Medical & Biological Engineering & Computing* (under review)

5. Voss, F.; Lyra, S.; Blase, D.; Leonhardt, S.; Lüken, M. (2021). A Setup for Camera-Based Detection of Simulated Pathological States using a Neonatal Phantom. Sensors (under review)
6. I. Badiola, V. Blazek, V.J. Kumar, B. George, S. Leonhardt, and C. Hoog Antink, "Accuracy enhancement in reflective pulse oximetry by considering wavelength-dependent pathlengths", *Physiological Measurement*, Article reference: PMEA-104517

## **Organisation von eingeladenen Zeitschriften-Ausgaben im Jahr 2021**

### ***Organisation of invited special issues in peer-reviewed journals in 2021***

1. Wenjin Wang, Steffen Leonhardt, Lionel Tarassenko, Caifeng Shan, Daniel McDuff, „Guest Editorial Camera-Based Monitoring for Pervasive Healthcare Informatics“, *IEEE Journal of Biomedical and Health Informatics*, 25(5): 1358-1360, 2021. Special issue on Camera-Based Monitoring for Pervasive Healthcare Informatics.

## **Konferenzbeiträge mit Beteiligung des Lehrstuhls 2021 / Conference Proceedings 2021**

### **2021 Ural Symposium on Biomedical Engineering, Radioelectronics and Information Technology (USBEREIT), Yekaterinburg, Russian Federation, May 13 - 14 May 2021**

1. A. Briko, V. Kapravchuk, S. Selutina, S. Shckukin, Y. Gulyaev, S. Leonhardt, "Amplitude Parameters of Electrical Impedance Myography with Different Pressure of the Electrode System Research", 2021 Ural Symposium on Biomedical Engineering, Radioelectronics and Information Technology (USBEREIT), pp. 0129 - 0132 DOI: 10.1109/USBEREIT51232.2021.9455098.
2. A. Kobelev, T. Goidina, S. Shckukin, Y. Gulyaev, P. Luzhnov, S. Leonhardt, "Stand for Determining the Forearm Tissues Resistivity in-Vivo", 2021 Ural Symposium on Biomedical Engineering, Radioelectronics and Information Technology (USBEREIT), pp. 0086 – 00089. doi: 10.1109/USBEREIT51232.2021.9455038.

### **13th International Conference on Bioelectromagnetism, 26.-28. May 2021, online**

3. Hülkenberg A., Leonhardt S., Shchukin S., Kobelev A., Briko A., Ngo C., "A FEM Model Simulating Current Density Distribution Within Thigh-Muscles", International Journal of Bioelectromagnetism: IJBEM 23(2), pp. 20 / 1-9 (2021)

### **15. Interdisziplinäres Symposium - AUTOMED - Automatisierung in der Medizintechnik, June 8 – 9, 2021, Basel, Switzerland Germany (Virtual)**

4. P. von Platen, A. Hallmann, A. Pomprapa, S. Leonhardt, P.A. Pickerodt, M. Russ, M. Taher, W. Braun, L. Hinken, R. Köbrich, R.C.E. Francis, M. Walter, „System identification of the FiO2 to SpO2 relationship during mechanical ventilation”, Proceedings on Automation in Medical Engineering (AUTOMED), Vol. 1, No. 1, 2021. doi: <https://doi.org/10.5281/zenodo.4925887> , June 8 – 9, 2021, Basel, Switzerland.
5. L. Bergmann, C. Moazzami, S. Leonhardt, C. Ngo, "Workflow for 3D Modeling of Compliant Actuators for Active Exoskeletons," Proceedings on Automation in Medical Engineering (AUTOMED), Vol. 1, No. 1, 2021. doi: <https://doi.org/10.5281/zenodo.4922726>, June 8 – 9, 2021, Basel, Switzerland.
6. A. Lohse, M. Walter, M. Deiniger, T. Seemann, D. Ziles, T. Breuer, S. Leonhardt, "Flexible pattern generation for phrenic nerve stimulation", Proceedings on Automation in Medical Engineering (AUTOMED), Vol. 1, No. 1, 2021. doi: <https://doi.org/10.5281/zenodo.4922879>, June 8 – 9, 2021, Basel, Switzerland.



7. F. Röhren, B. Penzlin, S. Leonhardt, C. Ngo, "System Identification and control of the ankle joint with functional electrical stimulation", Proceedings on Automation in Medical Engineering (AUTOMED), Vol. 1, No. 1, 2021. doi: <https://doi.org/10.5281/zenodo-4922773>.

**21<sup>st</sup> International Conference on Biomedical Applications of Electrical Impedance Tomography (EIT 221), National University of Ireland, Galway, 14 – 16 June 2021**

8. J. Rixen, S. Leonhardt, C. Ngo, "A systematic analysis of an a priori D-Bar EIT algorithm using the GREIT figures of merit", 21<sup>st</sup> International Conference on Biomedical Applications of Electrical Impedance Tomography, June, 14 – 16, 2021, Galway, Ireland.

**2021 IEEE International Symposium on Medical Measurements and Applications (MeMeA), Neuchâtel, Switzerland, June 23 – 25, 2021 (virtual)**

9. D. U. Uguz, S. Leonhardt, and C. H. Antink, "Modulated ECG: Utilization of the Time-Variant Coupling in Capacitive ECG." 2021 IEEE International Symposium on Medical Measurements and Applications (MeMeA). IEEE, 2021.

**International Conference in Computing in Cardiology 2021, Brno, Czech Republic, 13-15 September 2021**

10. O. Linschmann, M. Rohr, S. Leonhardt and C. H. Antink, "Multi-label Classification of Cardiac Abnormalities for Multi-lead ECG Recordings Based on Auto-encoder Features and a Neural Network Classifier," *2021 Computing in Cardiology (CinC)*, 2021, pp. 1-4, doi: 10.23919/CinC53138.2021.9662702

**11th IFAC Symposium on Biological and Medical Systems (BMS2021), September 19-22, 2021, Ghent, Belgium**

11. P. von Platen, A. Pomprapa, A. Lohse, S. Leonhardt, P.A. Pickerodt, M. Russ, M. Taher, E. Boerger, R.C.E. Francis, M. Walter. "Automated Positive End-Expiratory Pressure Titration during Mechanical Ventilation." IFAC-PapersOnLine 54, no. 15 (2021): 412-417. doi: <https://doi.org/10.1016/j.ifacol.2021.10.291> , September 19-22, 2021, Ghent, Belgium

**2021 International Consortium on Rehabilitation Robotics (ICORR), September 23 – 25, 2021, Virtual Event**

12. L. Bergmann, G. Koginov, S. Leonhardt, R. Riener, M. Xiloyannis, "Human-in-the-Loop optimization of hip and knee assistance for downhill walking with the Myosuit," International Consortium on Rehabilitation Robotics (ICORR), Virtual Event, 2021.

**55<sup>nd</sup> DGBMT Annual Conference on Biomedical Engineering, Hannover, Germany, October 05 – 10, 2021**

13. M. Walter, R. Kopp, C. Lübke and S. Leonhardt, "HIL-Lung - Hardware-in-the-Loop simulation environment for artificial lungs", BMT2021, 55th Annual Conference of the German Society for Biomedical Engineering, 5.-7.10.2021, "05-1500-A14" Biomedical Engineering / Biomedizinische Technik, vol. 66, no. s1, 2021, pp. 71-77. <https://doi.org/10.1515/bmt-2021-6014>.
14. M. Lamberti, R. Kopp, C. Lübke, S. Leonhardt, M. Walter, A. Stollenwerk, "Safety and Automation Concepts for Artificial Implantable Lungs – SmartLungControl", 55<sup>th</sup> Annual Conference of the German Society for Biomedical Engineering (BMT2021), 5.-7.10.2021, "05-1715-P8" Biomedical Engineering / Biomedizinische Technik, vol. 66, no. s1, 2021, pp. 202-204. <https://doi.org/10.1515/bmt-2021-6028>.
15. P. Borchers, D. Telyshev, A. Pugovkin, S. Leonhardt, M. Walter, „Flow profile generation for a left ventricular assist device using iterative learning control”, 55<sup>th</sup> Annual Conference of the German Society for Biomedical Engineering (BMT2021), 5.-7.10.2021, Biomed Eng. Biomed. Tech. 2021, 66(s1), S. 265, doi: 10.1515/bmt-2021-6039.
16. I. Badiola, V. Blazek, S. Leonhardt, C. Hoog Antink, "Learning about reflective PPG for SpO2 determination using Machine Learning", 55<sup>th</sup> Annual Conference of the German Society for Biomedical Engineering (BMT2021), 5.-7.10.2021, Biomed Eng. Biomed. Tech. 2021, 66(s1), S. 239, doi: 10.1515/bmt-2021-6034.
17. B. Penzlin, C. Lyu, L. Bergmann, C.-F. Benner, Y. Li, L. Ji, M. Lüken, S. Leonhardt, C. Ngo, „Interactive gait control of an active lower limb exoskeleton using insole FSR for detection of patient’s movement intention”, 55<sup>th</sup> Annual Conference of the German Society for Biomedical Engineering (BMT2021), 5.-7.10.2021, Biomed Eng. Biomed. Tech. 2021, 66(s1), S. 2161, doi: 10.1515/bmt-2021-6020.
18. C.-F. Benner, L. Pan, S. Leonhardt, M. Walter, „Robust Control of Blood Glucose in the Intensive Care Unit”, 55<sup>th</sup> Annual Conference of the German Society for Biomedical Engineering (BMT2021), 5.-7.10.2021, Biomed Eng. Biomed. Tech. 2021, 66(s1), S. 133, doi: 10.1515/bmt-2021-6018.

**Sixth International Conference on Advances in Biomedical Engineering, ICABME, Werdanyeh, Lebanon, October 07 – 09, 2021**

19. J. Babayan, M. Lükenn, A. Berking, A. Pickartz, K. Reetz, F. Holtbernd, S. Leonhardt, C. Ngo, "Everyday Life Tremor Signal Processing in PD Patients using BSN", 2021 Sixth International Conference on Advances in Biomedical Engineering (ICABME), Oct. 7 – 9, 2021, pp. 184 – 188, DOI: [10.1109/ICABME53305.2021.9604898](https://doi.org/10.1109/ICABME53305.2021.9604898).

# Eingeladene Vorträge 2021 /

## *Invited Talks and Lectures 2021*

### Physical Talks

1. S. Leonhardt, S. Dahlmanns, et al. „Funktionale Untersuchung des Ulcus cruris Venosum mittels Infrarotthermographie“, 63. Jahrestagung der Deutschen Gesellschaft für Phlebologie, 8.-11. Sep. 2021, Eurogress Aachen.
2. V. Blazek et al. „Kamerabasierte Photoplethysmographie – neue Möglichkeiten für die kontaktlose, orts aufgelöste Erfassung der peripheren Beinvenenhämodynamik“, 63. Jahrestagung der Deutschen Gesellschaft für Phlebologie, 8.-11. Sep. 2021, Eurogress Aachen.
3. S. Leonhardt, „Wearables in der Medizin – Entwicklung, Standortbestimmung und Zukunft“, **Keynote-Lecture**, 55. Jahrestagung der Deutschen Gesellschaft für Biomedizinische Technik (DGBMT), Hannover, 7. Okt. 2021.

### Remote/Digital Talks

4. S. Leonhardt, „Über den Einfluß der Corona-Pandemie auf die Entwicklung der Medizintechnik ...“, Vortrag für die lokale Stipendiatengruppe der Studienstiftung des Deutschen Volkes, Jan 12<sup>th</sup>, 2021, 7 pm via ZOOM
5. S. Leonhardt, „The PV1000 Project: Ventilators and the Pandemic – State of the Art, Recent Developments and Future Challenges“, DWIH New Delhi, India, via Webex, Apr 14<sup>th</sup>, 2021.
6. S. Leonhardt, „PV1000 - designing a pandemic ventilator“, Seminar at VCU, Richmond, VA, April 16<sup>th</sup>, 2021, 6 pm CET via ZOOM.
7. S. Leonhardt, „Unobtrusive vital sign monitoring in automotive environments“, IoE Workshop on Wire-free, multi-modal non-contact physiological sensing and monitoring, via ZOOM, April 7<sup>th</sup> – 20<sup>th</sup>, 2021.
8. S. Leonhardt, „PV1000 - designing a pandemic ventilator“, Leonardo Lecture, RWTH, May 3<sup>rd</sup>, 2021, 6.30 pm CET via ZOOM.
9. S. Leonhardt, „Unobtrusive vital sign monitoring in automotive environments“, Workshop on '*Recent Trends in Biomedical Instrumentation and Assistive Technology*', NIT Trichy, Tamil Nadu, India, May 26<sup>th</sup>, 2021, 10 am IST = 6.30 am CET.
10. S. Leonhardt, „Motion analysis and motion assist - body sensor networks and exoskeletons“, UTP IETC 2021, University of Petronas, Malaysia, Oct 28<sup>th</sup>, 2021, via ZOOM, 14:00 pm to 14:30 pm Malaysian time = 7:00 – 7:30 am German time.
11. V. Blazek, „Photoplethysmography Imaging (PPGI): selected notes on history, etymology, today's modi operandi and new horizons“, Invited Lecture, IoE Workshop on Wire-free, multi-modal non-contact physiological sensing and monitoring, IITM, Chennai, India, via ZOOM, April 7<sup>th</sup> – 20<sup>th</sup>, 2021.
12. S. Leonhardt, „Wearables, Body Sensor Networks and beyond ...“, 2<sup>nd</sup> Int. Workshop on Sensors and Devices, Artificial Intelligence and Wearable Markets (2021 IEEE WSAIM), Dec. 13<sup>th</sup>, 2021.

13. M. Lueken, "Unobtrusive Monitoring of Gait Using Smart Wearables", International Workshop on Smart Wearables for Biomedical Applications, RWTH Aachen University Profile Areas and Tokyo Tech ANNEX Aachen, Jun 6th, 2021, 09:00 - 12:00 (CET), via ZOOM