

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

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

**Veröffentlichungsliste /  
*Publications and Talks***

**2009**

## **Buchbeiträge / *Book Chapters***

- [1] R. Kopp, S. Leonhardt and S. Kowalewski, "**Extracorporeal Membrane Oxygenation for Cardiac and Pulmonary Indications: Improving Patient Safety**", Yearbook of Intensive Care and Emergency Medicine, Springer Verlag, Berlin, 2009, pp. 341-349.

## **Patentanträge / *Patent Applications***

- [1] H. Mai, L. Beckmann, N. Jungbecker, S. Kim, M. Walter und S. Leonhardt, „**Flächenelektrode und Kleidungsstück mit einer solchen**“, Deutsche Patentanmeldung (DE 10 2009 028 314.5), 6. Aug. 2009

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

- [1] C. Preis, H. Luepschen, S. Leonhardt, D. Gommers, “**Experimental case report: development of a pneumothorax monitored by electrical impedance tomography**”, Clin Physiol Funct Imaging. 2009 May; 29(3):159-62.
- [2] I.G. Bikker, S. Leonhardt, J. Bakker, D. Gommers, “**Lung volume calculated from electrical impedance tomography in ICU patients at different PEEP levels**”, Intensive Care Med. 2009 Aug;35(8):1362-7.
- [3] S. Leonhardt, M. Hexamer und O. Simanski, “**Smart Life Support: modellbasierte Entwicklung und Automatisierung von lebensunterstützenden Systemen / Smart life support: model-based design and control of life-supporting systems**”, editorial, Biomedizinische Technik (Berlin). 2009 Oct; 54(5):229-231.
- [4] A. Brunberg, S. Heinke, J. Spillner, R. Autschbach, D. Abel and S. Leonhardt, “**Modeling and Simulation of the Cardiovascular System - A Review of Applications, Methods and Potentials / Modellierung und Simulation des Herz-Kreislauf-Systems: ein Überblick zu Anwendungen, Methoden und Perspektiven**”, Biomedizinische Technik (Berlin). 2009 Oct; 54(5):233-44.
- [5] T. Finocchiaro, S. Heinke, M. Behbahani, M. Leßmann, M. Laumen, U. Steinseifer, T. Schmitz-Rode, S. Leonhardt, M. Behr and K. Hameyer, “**Methods of design, simulation and control for the development of new VAD/TAH / Methoden zur Konstruktion, Simulation und Regelung für die Entwicklung von neuen VAD/TAH-Konzepten**”, Biomedizinische Technik (Berlin). 2009 Oct; 54(5):269-281.
- [6] R. Kopp, M. Walter, J. Arens, A. Stollenwerk, S. Leonhardt, T. Schmitz-Rode, S. Kowalewski and R. Rossaint, “**Regelungs- und Sicherheitskonzepte für extrakorporale Systeme zur Lungenunterstützung / Automatic control and safety concepts for extracorporeal lung support**”, Biomedizinische Technik (Berlin). 2009 Oct; 54(5):289-97.
- [7] S. Vogel, M. Hülsbusch, Th. Hennig, V. Blazek and S. Leonhardt, “**In-Ear Vital Signs Monitoring using a Novel Micro-Optic Reflective Sensor**”, IEEE Transactions on Information Technology in Biomedicine (TITB), Vol. 13, No. 6, November 2009, pp. 882-889.
- [8] K. Heimann, M. Steffen, N. Bernstein, N. Heerich, S. Stanzel, A. Cordes, S. Leonhardt, T. Wenzl und T. Orlikowsky, “**Kontaktlose Überwachung von Atemtätigkeit und Herzaktion mittels magnetischer Bioimpedanzmessung in einem neonatalen Tiermodell**”, Biomedizinische Technik (Berlin). 2009 Dez; 54(6): 337–345.

## **Konferenzbeiträge / Conference Proceedings**

- [1] L. Beckmann, S. Kim, N. Jungbecker, G. Ingerl, S. Leonhardt, "**Entwicklung intelligenter Textilien für die Überwachung des Ernährungs- und Wasserhaushalts**", 2. Deutscher AAL Kongress 2009, Berlin, 27. - 28. Jan. 2009.
- [2] S. Heinke, A. Kerekes, D. Sieben, S. Leonhardt, "**Anwendungsorientierte Implementierung eines einzylindrigen Temperaturmodells in Dymola**", ASIM-Workshop ARGESIM, Dresden, 5. - 6. März 2009.
- [3] S. Heinke und S. Leonhardt, "**Objektorientierte Modellbildung eines mechanischen Lungenmodells zur Kunstherzregelung**", 8. Workshop AUTOMED – Automatisierungstechnische Verfahren für die Medizin, Technische Universität Berlin, 20.-21. März 2009.
- [4] T. Wartzek, M. Walter, A. Stollenwerk, R. Kopp, A. Kashefi, S. Leonhardt, "**Automatisierung der extrakorporalen Membranoxygenierung**", 8. Workshop AUTOMED – Automatisierungstechnische Verfahren für die Medizin, Technische Universität Berlin, 20.-21. März 2009.
- [5] H. Wrigge, T. Muders, J. Zinserling, H. Luepschen, S. Leonhardt, C. Putensen, "**Measurement of regional ventilation inhomogeneity by Electric Impedance Tomography**", Am J Respir Crit Care Med, abstracts issue, April 2009; 179:A1610
- [6] B. Eilebrecht, T. Hoffmann, "**Capacitive force sensors for long-term respiratory monitoring**", 13<sup>th</sup> International Students' Conference on Electrical Engineering (Poster 2009), Prag, Tschechische Republik, May 21<sup>st</sup>, 2009.
- [7] S. Kim, M. Pistor, "**Development of a Body Sensor Network for Medical Signal Acquisition**", 13<sup>th</sup> International Students' Conference on Electrical Engineering (Poster 2009), Prag, Tschechische Republik, May 21<sup>st</sup>, 2009.
- [8] R. Pikkemaat, "**Estimation of Regional Mechanical Parameters of the Lung-Tissue based on EIT-Measurements**", 13<sup>th</sup> International Students' Conference on Electrical Engineering (Poster 2009), Prag, Tschechische Republik, May 21<sup>st</sup>, 2009.
- [9] T. Wartzek, S. Vogel, T. Hennig, O. Brodersen, M. Hülsbusch, M. Herzog and S. Leonhardt, "**Analysis of Heart Rate Variability with an In-Ear Micro-Optic Sensor in View of Motion Artifacts**"; 6<sup>th</sup> International Workshop on Wearable and Implantable Body Sensor Networks (BSN 2009), Berkeley, CA, USA, June 3-5, 2009.
- [10] S. Leonhardt, M. Walter, T. Wartzek, A. Kashefi, A. Stollenwerk und R. Kopp, "**Regelung des Gasaustauschs für die extrakorporale Oxygenierung**", AUTOMATION 2009, Baden-Baden, 16. - 17. Juni 2009.

- [11] D. Teichmann, R. Pikkemaat, H. Luepschen and S. Leonhardt, "**Thoracic EIT considering organ-shapes by using an inhomogeneous and anisotropic laplacian regularization matrix**", 10<sup>th</sup> International Conference on Biomedical Applications of Electrical Impedance Tomography (EIT 2009), Manchester, UK, June 16<sup>th</sup> -19<sup>th</sup>, 2009.
- [12] T. Muders, J. Zinserling, H. Luepschen, S. Leonhardt, C. Putensen and H. Wrigge, "**Monitoring of cyclic opening and closing of ventilatory lung units by Electrical Impedance Tomography**", 10<sup>th</sup> International Conference on Biomedical Applications of Electrical Impedance Tomography (EIT 2009), Manchester, UK, June 16<sup>th</sup> -19<sup>th</sup>, 2009.
- [13] R. Pikkemaat, D. Teichmann, H. Luepschen and S. Leonhardt, "**Extended Ventral Electrode Patterns for 3D Electrical Impedance Tomography in Time-Critical and Intensive Care Applications**", 10<sup>th</sup> International Conference on Biomedical Applications of Electrical Impedance Tomography (EIT 2009), Manchester, UK, June 16<sup>th</sup> -19<sup>th</sup>, 2009.
- [14] M. Walter, T. Wartzek, R. Kopp, A. Stollenwerk, A. Kashefi, S. Leonhardt, "**Automation of long term extracorporeal oxygenation systems**", European Control Conference 2009 (ECC'09), Budapest, Hungary, 23.-26. August 2009.
- [15] A. Cordes, J. Foussier and S. Leonhardt, "**Breathing Detection with a Portable Impedance Measurement System: First Measurements**", 31<sup>st</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'09), Minneapolis, MN, USA, September 2<sup>nd</sup> -6<sup>th</sup>, 2009.
- [16] L. Beckmann, S. Hahne, G. Medrano, S. Kim, M. Walter, S. Leonhardt; "**Monitoring change of body fluids during physical exercise using Bioimpedance Spectroscopy**"; 31<sup>st</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'09), Minneapolis, MN, USA, September 2<sup>nd</sup> -6<sup>th</sup>, 2009.
- [17] M. Hülbusch, V. Blazek, M. Herzog, St. Vogel, T. Wartzek, D. Starke, "**Development of a miniaturized in-ear pulse oximeter for long term monitoring of risk patients**", World Congress on Medical Physics and Biomedical Engineering (WC 2009), Munich, Sep. 7<sup>th</sup> -12<sup>th</sup>, 2009.
- [18] A. Abbas, K. Heimann, Th. Orlikowsky and S. Leonhardt, "**Non-contact Respiratory Monitoring based on Real-time IR-Thermography**", World Congress on Medical Physics and Biomedical Engineering (WC 2009), Munich, Sep. 7<sup>th</sup> -12<sup>th</sup>, 2009.
- [19] H. Luepschen, S. Konowalczyk, T. Meier, R. Pikkemaat and S. Leonhardt, "**Automatic lung recruitment maneuvers using robust closed-loop control of the oxygen saturation in mechanical ventilation**", World Congress on Medical Physics and Biomedical Engineering (WC 2009), Munich, Sep. 7<sup>th</sup> -12<sup>th</sup>, 2009. IFMBE Proceedings 25/VII, pp. 703-706

- [20] S. Kim, L. Cousin, L. Beckmann, M. Walter and S. Leonhardt, "**A Body Sensor Network Based Support System for Automated Bioimpedance Spectroscopy Measurements**", World Congress on Medical Physics and Biomedical Engineering (WC 2009), Munich, Sep. 7<sup>th</sup> -12<sup>th</sup>, 2009.
- [21] R. Pikkemaat, H. Luepschen, T. Meier, T. Aach and S. Leonhardt, "**Regional Pulmonary Time-Constant Maps based on EIT-Measurements**", World Congress on Medical Physics and Biomedical Engineering (WC 2009), Munich, Sep. 7<sup>th</sup> -12<sup>th</sup>, 2009. IFMBE Proceedings 25/VII, p. 604-607
- [22] B. Eilebrecht, M. Czaplik, M. Walter, T. Wartzek, R. Rossaint and S. Leonhardt, "**Implementation of a capacitive ECG measurement system in clinical practice: an interim report**", World Congress on Medical Physics and Biomedical Engineering (WC 2009), Munich, Sep. 7<sup>th</sup> -12<sup>th</sup>, 2009.
- [23] G. Medrano, L. Beckmann, M. Gube, T. Kraus and S. Leonhardt, "**Continuous HF and segmental Bioimpedance Spectroscopy Measurements during a Week**", World Congress on Medical Physics and Biomedical Engineering (WC 2009), Munich, Sep. 7<sup>th</sup> -12<sup>th</sup>, 2009.
- [24] L. Beckmann, A. Cordes, E. Saygili, A. Schmeink, P. Schauerte, M. Walter, S. Leonhardt, "**Monitoring of body fluid in patients with chronic heart failure using Bioimpedance-Spectroscopy**", World Congress on Medical Physics and Biomedical Engineering (WC 2009), Munich, Sep. 7<sup>th</sup> -12<sup>th</sup>, 2009.
- [25] T. Wartzek, M. Walter, T. Schmitz-Rode, S. Kowalewski, R. Rossaint and S. Leonhardt, "**In Vivo Validation of an Automatic Controlled Extracorporeal Membrane Oxygenator**", World Congress on Medical Physics and Biomedical Engineering (WC 2009), Munich, Sep. 7<sup>th</sup> -12<sup>th</sup>, 2009.
- [26] K. Lunze, J. Stålhand, S. Leonhardt, "**Modeling of Stretch-Activated Sarcolemmal Channels in Smooth Muscle Cells**", World Congress on Medical Physics and Biomedical Engineering (WC 2009), Munich, Sep. 7<sup>th</sup> -12<sup>th</sup>, 2009.
- [27] T. Meier, H. Luepschen, J. Karsten, R. Pikkemaat, H. Gehring, S. Leonhardt, "**Automation of protective ventilation in acute lung injury**", World Congress on Medical Physics and Biomedical Engineering (WC 2009), Munich, Sep. 7<sup>th</sup>-12<sup>th</sup>, 2009. IFMBE Proceedings 25/VII, p. 675-678
- [28] T. Muders, J. Zinserling, H. Luepschen, S. Leonhardt, H. Wrigge C. Putensen, "**Monitoring of cyclic opening and closing of ventilatory lung units using Electrical Impedance Tomography**", World Congress on Medical Physics and Biomedical Engineering (WC 2009), Munich, Sep. 7<sup>th</sup> -12<sup>th</sup>, 2009. IFMBE Proceedings 25/VII, pp. 578-581.
- [29] J. Karsten, A. Jedmowski, H. Luepschen, H. Heinze, H. Gehring, S. Leonhardt, and T. Meier, "**Monitoring of Perioperative Ventilation Therapy by Electrical Impedance Tomography (EIT) in Clinical Practice**", World Congress on Medical Physics and Biomedical Engineering (WC 2009), Munich, Sep. 7<sup>th</sup> -12<sup>th</sup>, 2009. IFMBE Proceedings 25/VII, pp. 653-656.

- [30] M. Kiefer, A. Aschoff, B. Orakcioglu, A. Unterberg, W.-I. Steudel, I. Krause, S. Leonhardt, M. Walter, R. Tolba, N. Gronloh, R. Eymann, **“Initial Experiences with a new telemetric ICP transducer in animal experiments”**, Hydrocephalus 2009, September 16<sup>th</sup> –19<sup>th</sup>, 2009, Baltimore, Maryland, USA.
- [31] I. Krause, S. Jetzki, H. Rehbaum, S. Linke, M. Walter, M. Kiefer, R. Eymann, W.-I. Steudel, S. Leonhardt, **“Dynamic bench testing of shunt valves”**, Hydrocephalus 2009, September 16<sup>th</sup> –19<sup>th</sup> 2009, Baltimore, Maryland, USA.
- [32] H. Luepschen, T. Muders, J. Zinserling, T. Meier, G. Hedenstierna, S. Leonhardt, C. Putensen, H. Wrigge, **„Measuring Cardiac Stroke Volume using Electrical Impedance Tomography in an ARDS Pig Model“**, 22<sup>nd</sup> Annual Congress of the European Society of Intensive Care Medicine (ESICM 2009), Vienna, Austria, October 11<sup>th</sup>-14<sup>th</sup>, 2009. Intensive Care Med, 35:Suppl 1, p. 227.
- [33] T. Muders, H. Luepschen, J. Zinserling, T. Meier, G. Hedenstierna, S. Leonhardt, C. Putensen, H. Wrigge, **“Pulmonary Ventilation/Perfusion Matching during different Strategies of PEEP Setting in Porcine Lung Injury”**, 22<sup>nd</sup> Annual Congress of the European Society of Intensive Care Medicine (ESICM 2009), Vienna, Austria, October 11<sup>th</sup>-14<sup>th</sup>, 2009.
- [34] N. Jungbecker, L. Beckmann, S. Kim, T. Gries and S. Leonhardt, **“NUTRIWEAR – An intelligent System for the Monitoring of Body Composition based on textile Electrodes”**, International Conference on Intelligent Textiles and Mass Customisation (ITMC 2009), Casablanca, Morocco, Nov. 12<sup>th</sup> - 14<sup>th</sup>, 2009.
- [35] S. Kim, L. Beckmann, M. Pistor, L. Cousin, M. Walter and S. Leonhardt, **“A Versatile Body Sensor Network for Health Care Applications”**, 5<sup>th</sup> International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP 2009), Melbourne, Australia, Dec. 7<sup>th</sup> -10<sup>th</sup>, 2009.

## **Eingeladene Vorträge 2009 / Invited Talks and Lectures 2009**

- [1] S. Leonhardt, „**Grundlagen und Einführung in die EIT**“, 19. Symposium Intensivmedizin und Intensivpflege, Bremen, 18.-20. Feb. 2009
- [2] S. Leonhardt, „**Nicht-invasive Methoden zur Überwachung von Vitalparametern**“, Innovations-Forum der Fachmesse MEDTEC Europe, Stuttgart, 5. März 2009
- [3] S. Leonhardt, „**Textile Medizinelektronik – Beispiele und Trends**“, Kolloquium Medizintechnik, Leibniz Universität Hannover, 30. März 2009
- [4] S. Leonhardt, „**Herz-Kreislauf-Diagnostik mit Vitalsensoren**“, OptoNet Workshop, Jena, 2. April 2009.
- [5] S. Leonhardt, „**Elektronik in der Medizin – Aktuelle Anwendungen und Trends für die Zukunft**“, keynote lecture, Fachtagung Medizinelektronik des Forums MedTech Pharma e.V., Nürnberg, 30. Juni 2009.
- [6] S. Leonhardt, „**New Trends in Respiratory Instrumentation**“, keynote lecture, World Congress on Medical Physics and Biomedical Engineering (WC 2009), Munich, Sep. 7<sup>th</sup> -12<sup>th</sup>, 2009.
- [7] S. Leonhardt, „**EIT Technology – Basic Principles and Potential Clinical Applications**“, Dräger Symposium on Electrical Impedance Tomography (EIT), October 10<sup>th</sup>-11<sup>th</sup>, 2009, Schloss Wilhelminenberg, Vienna, Austria.
- [8] S. Leonhardt, „**Digitalisierung und Automatisierung in der Medizintechnik - Welche Qualifizierungsanforderungen kommen auf die Branche zu?**“, Vortrag auf Einladung des Vorstands der IG Metall, Branchenseminar Medizintechnik für Betriebsräte nach § 37.6 BetrVG, 19. Nov. 2009, Tagungshotel La Strada, Kassel.