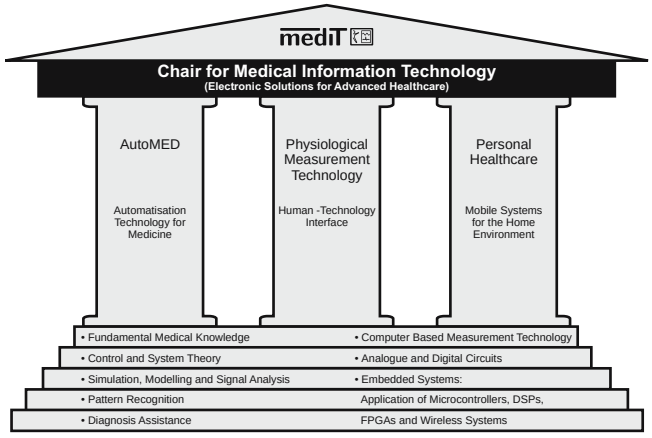
RESEARCH PROFILE

The Chair for Medical Information Technology is especially concerned with research problems in the field of Personal Healthcare and “Automation and Control in Medicine”.

The topic **Personal Healthcare** encompasses wearable medical devices, particularly diagnostic devices, designed for use at home. Current technological developments are in the fields of “intelligent textiles” and “Body Area Networks” (BAN), certain related basic research areas (e.g. signal processing and motion artefact rejection), and sensor fusion. Due to demographic trends, especially in developed nations, the laboratory also focuses on the needs of the elderly (e.g. enabling greater autonomy at home).

Automation and Control in Medicine is involved with the modeling and implementation of feedback controlled therapy techniques. Research topics include tools and methods for the modeling of disrupted physiological systems, sensor supported artificial ventilation, active brain pressure regulation, and dialysis regulation and optimization.

Where necessary, we also develop sensors and measurement electronics, for example in the areas of non-contact sensing techniques (e.g. magnetic bioimpedance), bioimpedance spectroscopy and inductive plethysmography. We are also interested in biomechatronics.



CONTACT

Director
Prof. Dr.-Ing. Dr. med. Steffen Leonhardt, M.Sc.
Philips Chair for Medical Information Technology
Helmholtz-Institute for Biomedical Engineering

Pauwelsstraße 20
52074 Aachen
Phone: +49 (0)241 80-23211 (office),
Fax: +49 (0)241 80-82442

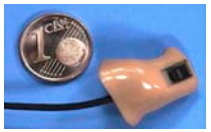
www.medit.hia.rwth-aachen.de

Staff
Dr.-Ing. Marian Walter, Senior Scientist
Heidi Balzer-Sy, Administrative assistant

Dipl.-Ing. Lisa Beckmann
Dipl.-Ing. Stefanie Jetzki
Dipl.-Ing. Henning Lüpschen
Dipl.-Ing. Matthias Steffen
Dipl.-Ing. Thorsten Vahlsing
Dipl.-Ing. Stefan Vogel

Guillermo Medrano, M.Sc.
Spencer Szczesny, M.Sc.

ELECTRONIC SOLUTIONS FOR ADVANCED HEALTHCARE


CHAIR FOR MEDICAL INFORMATION TECHNOLOGY

mediT

Helmholtz-Institute for Biomedical Engineering

RWTH AACHEN UNIVERSITY

RESEARCH PROJECTS

PROTECTIVE VENTILATION STRATEGIES

Henning Lüpschen

The “Open Lung Concept” (OLC) reduces ventilator induced lung injury by opening the collapsed lung (recruitment), and keeping it open with adequate positive end-expiratory pressures.

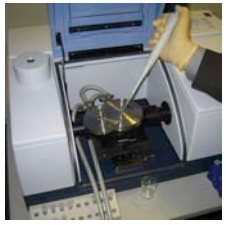
Project Goals:

- Development of an automated ventilation system that can execute protective ventilation strategies such as the OLC
- System integration of Electrical Impedance Tomography (EIT)

IN VIVO BLOOD-SUGAR DETERMINATION

Thorsten Vahlsing

The key to a healthy and comfortable treatment of diabetes is to close the control loop of measurement and insulin injection, but a suitable glucose sensor is not yet available.



Project Goals:

- Adapt the laboratory technique of infrared-spectroscopy for in vivo measurements
- Robust calibration and control algorithms
- A long-term stable measurement cell
- Animal model validation of the results

SMART ANAESTHESIA ASSISTANTS

Marian Walter

During anaesthesia the attending physician has to supervise a multitude of different physiological and technical parameters. In order to cope with the continuously increasing complexity of machines and procedures smart devices for therapy need to be developed.

Project Goals:

- Remote anaesthesia monitoring and supervision
- Smart anaesthesia assistants for dedicated situations
- Target controlled anaesthesia

BRAIN PRESSURE ANALYSIS

Stefanie Jetzki

This project deals with proper management of intracranial pressure and involves various subprojects aiming at improving diagnosis and therapy of hydrocephalus.

Project Goals:

- Brain pressure analysis: A monitoring system is being built for diagnosis of brain pressure
- Smart implant for controlled drainage
- Shunt performance test stand
- Certification of medical devices

MECHATRONIC IMPLANT

Spencer Szczesny

Development of a mechatronic shunt used to drain cerebro-spinal fluid from the skull for the treatment of hydrocephalus.

Project Goals:

- Design of actuator and valve mechanism for the shunt
- Integration with sensors, telemetry and microprocessor
- Automatic regulation of patient’s brain pressure

MAGNETIC IMPEDANCE

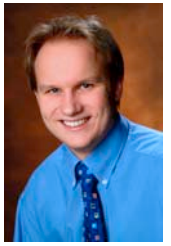
Matthias Steffen

Research and development towards non-contact measurement of heart and lung activity, aiming at the substitution of electrode based monitoring and its drawbacks (skin iritation, motion artefacts, etc.).

Project Goals:

- Design and implementation of measurement hardware (e.g. amplifiers, mixers, etc.)
- Development of different sensor coils
- Wearable, textile integration, advanced signal processing
- Quality assessment in vitro & in vivo

HEALTHY SLEEP



Stefan Vogel

In order to facilitate reliable and broad screening of sleep disorders like sleep apnea as well as prevention using simple methods, the “Mobile Sleep Lab for Patients @Home” is being developed.

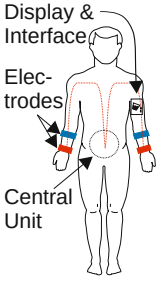
Project Goals:

- Development of suitable hardware components
- Multivariate signal analysis
- Artefact recognition, suppression and correction
- Classification of sleep quality by means of vital parameters and EEG

FLUID MANAGEMENT

Guillermo Medrano

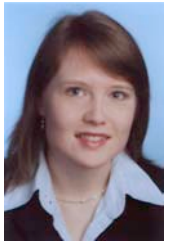
Development of a wearable, fluid-monitoring device for the elderly at home as a support to prevent dehydration.



Project Goals:

- Physiological understanding of the phenomenon of dehydration in the elderly
- Physiological meaning of bioimpedance measurements
- Suppression and correction of artefacts for a mobile application through suitable hardware and algorithms, multiparameter analysis and modelling

HEART FAILURE MANAGEMENT



Lisa Beckmann

Research and development in the field of bioimpedance measurements offer new possibilities to improve and support the prediction and therapy of heart failure.

Project Goals:

- Optimization of the bioimpedance measurement process regarding reliability and accuracy
- FEM Simulation studies of the human body
- Development of measurement hardware