

Project NISMO - Development of a new measurement method for non-invasive assessment of stroke volume variation for perioperative hemodynamic monitoring

Project objectives

- Development of a non-invasive Method for the painless determination of hemodynamic parameters using a piezoelectric finger sensor and ECG data
- First-time clinical testing with surgery and intensive care patients
- Optimization of perioperative fluid management
- Comparison with invasive hemodynamic monitoring

Sensor properties

- Piezo film array sensor
- Painless and pressure-free application on the finger
- Low energy consumption
- High patient comfort

Clinical testing

- Intraoperative and postoperative measurement
- Testing with PLR (passive leg raising) and fluid administration

Background

Hemodynamic monitoring is a central part of the routine clinical monitoring of surgery and intensive care patients. For this purpose, it is common to employ invasive systems using arterial catheters. While invasive systems may offer a high monitoring accuracy, they are associated with various risks for the patient, such as the danger of infections, damage to peripheral nerves or the formation of blood clots.

Project objectives

The objective of the project is the investigation of a new non-invasive measurement procedure for continuous monitoring of stroke volume variation in the operating room and intensive care setting. Stroke volume serves as a measure of global perfusion and is of key importance for the goal-oriented hemodynamic therapy of anesthesia patients. A valid and continuous hemodynamic monitoring process in the perioperative stage can help to optimize volume therapy as well as cardiac function. This allows for an acceleration of the recovery process and for a significantly improved postoperative outcome.

In contrast to conventional monitoring solutions the new method employs a piezoelectric film sensor as well as the electrocardiogram (ECG) to assess stroke volume variation (SVV). Consequently, the monitoring process is completely non-invasive and absolutely painless for the patient. The primary innovation of the project is the development of new algorithms to determine SVV based on the sensor data as well as derived parameters, such as pulse transit time (PTT).

Partner



Department of Anesthesiology and Operative Intensive Care Medicine, Charité-Universitätsmedizin Berlin Campus Mitte

Due to its six intensive care units with about 46.000 administered anesthetics and approximately 10.000 patients treated per year the Department of Anesthesiology and Operative Intensive Care Medicine of the clinical university Charité Berlin offers an ideal infrastructure for the investigation of the new measurement method.

In addition, the department's long term experience in the undertaking of clinical studies in perioperative and intensive care makes for an ideal partner for SectorCon GmbH in this common research project.

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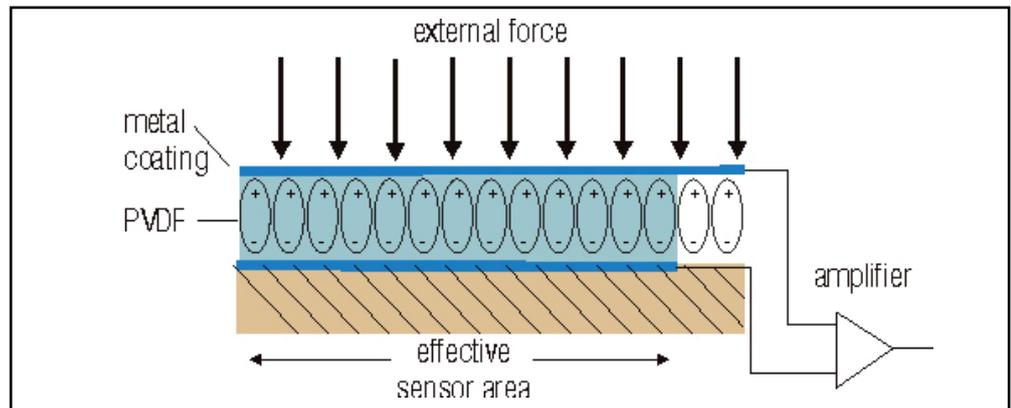
*Non-invasive
hemodynamic
monitoring with high
patient comfort*

*Patented piezo
film sensors*

*Clinical testing in
cooperation with
Charité-Universitäts-
medizin Berlin*

Sensor technology

The principle of operation of piezo film is the direct piezoelectric effect. If a mechanical force is applied to the material it results in smallest electrical charges which are proportional to the deformation of the film. Subsequently, it is possible to conduct the charges by a metal coating and make them measurable. Due to the high sensitivity of the sensors, this principle even admits to metering the pulse wave in the patient's finger.



General structure of piezo film sensors

Clinical testing and further development

The clinical testing and further development of the technology is conducted in close cooperation with our research partners of the Department of Anesthesiology and Operative Intensive Care Medicine of the clinical university Charité Berlin.

For this purpose, measurements are undertaken on cardiac surgery patients in comparison with invasive hemodynamic measurement. The measurement data is subsequently employed to improve the associated algorithms, software and signal processing as well as the sensor design.

For further information about our activities and business areas, please visit our website at www.sector.de

About SectorCon

SectorCon GmbH was founded in Berlin in 1992. Since then we stand for solid German Mittelstand, high professional competence as well as sustainable and responsible entrepreneurship. Our customers are the main focus of all of our activities. It is our aspiration to provide them with innovative, high quality products and services for business, science and administrative applications. Furthermore, it is of prime importance to us, that all of our work is shaped by both high technical expertise and high social skills as well as integrity and reliability.

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