

Project HD Sense

Development of a novel piezo capacitive sensor for hemodynamic monitoring

Project objectives

- Development of an innovative sensor technology for the determination of absolute and static pressure and force values
- Application area in anesthesia and intensive care for non-invasive patient monitoring
- Exploration of the assessment of perfusion, cardiovascular activity and fluid responsiveness

Technology

- Piezo capacitive measurement process
- Thin-layered design
- Low weight
- Low costs of material
- Measurement of changes of capacity with an integrated microcontroller
- Matrix sensor layouts feasible
- Combined arrays with piezo electric sensors feasible

Background

The monitoring of arterial pressure as well as pressure derived hemodynamic parameters 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, which are associated with various risks for the patient, such as the danger of infections, damaging of peripheral nerves and the formation of blood clots. Systems for extended hemodynamic monitoring may in addition require venous access, with the consequence that extended monitoring, while in principle desirable, may not be employed in certain patient groups due to reasons of risk and stress.

Project objectives

The objective of the project is the investigation of a new continuous and non-invasive measurement procedure for the monitoring of hemodynamic parameters in the operating room and intensive care setting. The central innovation for this purpose is the development of a novel piezo capacitive sensor for the direct acquisition of pressure and force parameters. As the sensor is pressurelessly attached on the patient's skin above superficial arteries, the entire measurement process is completely painless.

In contrast to conventional piezo electric materials, the piezo capacitive technology is capable to measure absolute pressure and force values. Moreover, it allows for the measurement of static as well as dynamic pressures and forces. Consequently, the technology offers a broad range of parameters for the investigation of hemodynamic processes.

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 sensor technology.

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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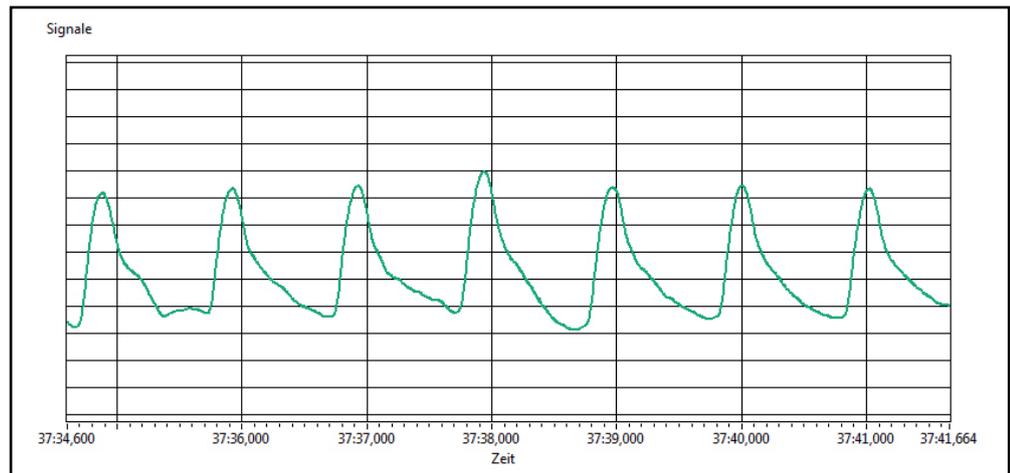
Innovative piezo capacitive sensors

Measurement of absolute force and pressure

Detection of dynamic and static force and pressure

Sensor technology

The operating principle of the sensor relies on the measurement of changes in capacity, which are induced when an external force is applied to the sensor. Each sensor cell consists of a multi-layer structure with an elastic material in the core of the cell. The application of an external force leads to the compression of the sensor cells which can be measured as a change in capacity by an integrated microcontroller. Moreover, by the planar arrangement of a multitude of cells, it is possible to create high-resolution matrix sensors. This allows for the capturing of the two-dimensional distribution of pressure.



Data acquired in the operating room on a patient's finger

Clinical testing and further development

The further development of the technology is currently undertaken in close cooperation with our research partners of the clinical university Charité Berlin. The main objective is to examine the application of the new sensors in the perioperative setting during anesthesia and critical care. The prospective goal is to employ the technology for the monitoring of cardiovascular activity, perfusion and fluid responsiveness.

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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