Oficina de Patents i Llicències
UNIVERSITAT POLITÈCNICA DE CATALUNYA

High resolution non-contact measurement of biophysical parameters

A prototype of a novel laser-based displacement sensor enabling sub-nanometric resolution measurements of biophysical parameters has been developed. The system is in addition extremely compact (few cm3), robust and non-contact. Partners to further develop the current prototype, to pursue novel applications, and/or to establish commercial agreements along with technical cooperation are sought.

The Challenge

A number of biophysical parameters of relevance may be measured using different optical techniques. However, parameters such as pulse shape, blood flow rate or bioelectrical signals contain relevant information on the inner state of the human body. The relevance of measuring such parameters with very fine detail is expected to enable better, earlier-stage, predictive therapies.
The ideal measurement technique should thus be of high resolution, accurate, non-contact, repeatable, with low-cost components, non-invasive and non-ionizing, in order to minimize the discomfort of patients in clinical stages or risks in treatments.

The Technology

Laser feedback interferometry is a non-contact, non-invasive technique which has been used for monitoring a number of biophysical parameters in the past. The technology presented involves a novel optical head which enables a stable, portable, compact, single-point, low cost sensing approach without contact with the user, based in the optical feedback phenomena. A combination of two laser feedback interferometers enable a self-referenced optical head which enables high sensitivity measurements (x100 enhancement) of parameters like

- Blood flow rate
- Bioelectrical currents and voltages
- Pulse rate and shape
- Small-scale skin motion

The technology can equally be applied to detection of badly acquired signals due to patient motion (e.g artifacts in pulse oximetry), or to precise measurement of micro and nanofluidic flows.

Innovative advantages

- Novel proprietary optomechanical setup and algorithmics.
- Small, compact and robust, enabled as a external sensor head for an instrument
- Simple principle adaptable to different biophysical parameters
- Non-invasive, non-contact, with low power consumption
- Large accuracy single point measurement (1nm change in optical path)
- Low cost, very compact unit immediately turned into an optical head.
- Dedicated signal processing for

Current stage of development

First lab prototype fully operative, hardware and software ready for demo.

Applications and Target Market

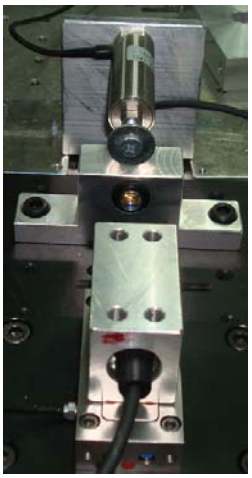
Target market involves medical device and equipment manufacturers or developers. As an instance, the system can be applied to measurement of bioelectrical currents, pulse shape, ECG, mecanomiography and other parameters under delicate patients, like in neonathology or intensive care monitoring. The setup is also fully functional in electronics applications, for measurement or current or voltage; in mechanics, for detection of very small displacements, or in fluidics, for measurement of fluid flow.

Reference number

MKT2011/0055_H

A non-contact, compact optical head enables high accuracy measurements of biophysical parameters

Laser optical head applied to skin (blood flow measurement)



Present prototype of nm-resolution sensor

Business Opportunity
Technology available for licensing with technical cooperation

Patent Status
PCT application

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