

# 7<sup>th</sup> EURO BIOSENSORS AND BIOELECTRONICS CONFERENCE

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### **A new optical high-resolution three-axis sensor for navigation of medical devices**

A new optical, adaptable, multi-functional, high-resolution three-axis sensor is presented. The sensor can replace standard joysticks in medical devices such as electric wheelchairs or surgical robots and may also serve for navigation in the aerospace or marine sector. A laser diode is affixed to a movable axis and projects and interprets a random geometric shape on a CMOS or CCD chip. The downstream microcontroller's software identifies the geometric shape's center, distortion and size, and subsequently calculates x, y, and z coordinates, which can be processed in attached devices. Depending on the image sensor in use (e.g., 6.41 megapixels), the 3-axis sensor features a resolution of 1544 digits from right to left and 1038 digits up and down. Through interpolation, these values rise by a factor of 100. The movement carrier is positioned in a polymer sandwich which is capable of absorbing a large spectrum of forces upon it (approximately 1 g to 5 kg) and the carrier and thus the axis of the sensor can be moved by  $<1^\circ$  in any direction. The sensor features excellent reproducibility in terms of deflection to coordinates and the ability to return to its neutral position very precisely. Further properties are the high level of protection against electromagnetic and radio frequency interferences, and the adaptability and adjustability to fit a user's range of motion with respect to stroke and force. This new sensor device thus aims to optimize sensor systems such as joysticks in terms of safety, ease of use and adaptability.

### **Biography**

Christian Baumgartner is a Professor and Head of the Institute of Healthcare Engineering with European Testing Center of Medical Devices at Graz University of Technology, Austria. He is the author of more than 150 publications in refereed journals, books and conference proceedings. He is a Reviewer for more than 40 scientific journals, and conference proceedings, book and grant proposals and serves as Deputy and Series Editor as well as an Editorial Board Member of several scientific journals. His main research interests include "Biomedical sensors, cellular electrophysiology and signal processing, biomedical modeling and simulation, and clinical bioinformatics".

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