New Process and Device for Minimal Invasive Surgical Suturing

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One of the most challenging tasks in minimal invasive surgeries is the knotting of suture strands due to the lack of space for performing a free hand knotting. Furthermore, the differences between knotting performances of each individual surgeon, sutures are barely uniform from one closure to the other or even from one surgery to another. This may result in suboptimal healing processes due to insufficiencies or dead tissue at the wound area leading to necessary reoperations. Therefore, a new process and device has been developed by the Fraunhofer-Institute for Production Technology to replace conventional knots in minimal invasive surgeries by a new laser welding process. In this paper, the process concept, which is based on small fasteners, will be presented. After some insights on the design and production of the fasteners, results from proof-of-concept experiments will be discussed, which show the outstanding robustness and reproducibility of the welding process. In conclusion, a first prototype of a corresponding minimal invasive suturing device will be presented that has successfully been tested in first laboratory experiments. The new process and device for minimal invasive surgical suturing promises to enable an easier, faster, more reproducible, more uniform, and more sufficient performance of sutures with defined suture tensioning compared with conventional, difficult knotting procedures.

SOMNUS: A Sleep-Measuring Shirt Based on Chest Expansion and Respiratory Patterns

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This paper presents a shirt embedded with simple capacitive sensors that accurately monitors the respiration of a sleeping person through chest expansion. It will also discuss a software package that, when coupled with this device, can determine sleep stages from the acquired data. Current sleep studies are the only medically accepted form of sleep health detection and diagnosis; due to the relatively high price of these studies, only persons with breathing-related disorders are referred to them. These studies depend on polysomnography, the use of various bodily signals for sleep detection; patients are often connected to over 20 sensors ranging from brain wave electrodes to blood oxygen trackers. The Somnus shirt is a comfortable, low-cost solution that could be used in the patient's regular sleep setting. Through some preliminary testing, our respiration-monitoring prototype was able to produce respiration data similar to that of sensors employed in current sleep laboratories while achieving a higher level of comfort for the user; also, the software package was able to analyze sleep with accuracy comparable to current sleep laboratory technicians.

