

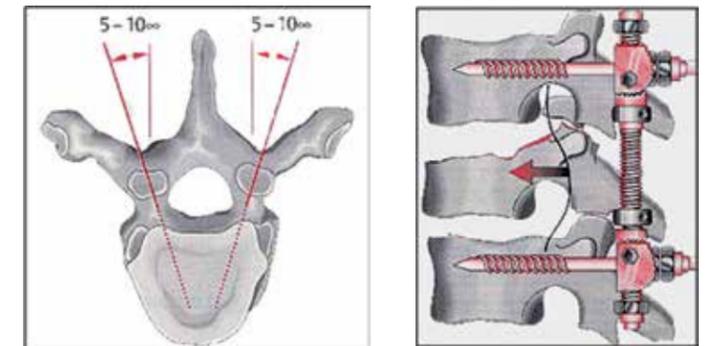
## Robot-based surgical assistance system for spine applications

This project is part of the activities of a ZESS research team working in the field of medical technology. In close cooperation with physicians and industrial partners, the components of the universal surgical assistance system modiCAS are designed, implemented, and tested. The system represents an integral solution for computer and robot assisted surgery, supporting all steps from pre-operative planning till surgical execution.

Funded in the framework of the ZIM program of the BMWi (German Ministry of Economic Affairs), the project is carried out in cooperation with the medium-sized company 4plus GmbH, Erlangen/Germany. The main objective is to improve quality and results of surgical interventions at the spine. The basic technology of the modiCAS surgical assistance robot which has been developed in previous research projects by the ZESS team will be tailored to a specific application, the placement of pedicle screws in spinal fusion procedures. In such procedures, two or more vertebrae are permanently joined ("fused") together into one solid element in order to prevent pain-causing motion

for example in cases of spine instability, disc disease, or fractures. To achieve this, pedicle screws have to be fixed in the vertebral bodies above and below the lesion and rigidly connected by titanium rods. The very accurate placement of the screws in the center of the pedicles is crucial for the result of the procedure. This prevents damage of the sensitive nerves in the spinal canal on the one hand, and on the other hand assures the necessary high stiffness of the fixation system.

The project partners will design all modules needed for pre-operative 3D planning of the pedicle screw locations, registration of image data and patient anatomy, and interactive control of the assistance robot. Particular emphasis will be put on the development of an intuitive and robust man-machine-interface to exploit the potential benefits of the computer- and robot-supported approach. Compared to conventional manual surgery high reproducible accuracy and less error rates can be expected. Furthermore the robot-based approach is well suited to support new less invasive surgical techniques.



### I Project Management and Execution

Management:

Dr.-Ing. Jürgen Wahrburg

Contact:

Universität Siegen  
Dr.-Ing. Jürgen Wahrburg  
Zentrum für Sensorsysteme  
Medizintechnik  
Paul-Bonatz-Straße 9-11  
D-57076 Siegen

E-Mail: [wahrburg@zess.uni-siegen.de](mailto:wahrburg@zess.uni-siegen.de)  
web: <http://www.zess.uni-siegen.de/modicas>

Telefon: +49 (0) 271 740-4442  
Fax: +49 (0) 271 740-2336