Technische Universität Berlin

Fachgebiet Mikrotechnik

Prof. Dr. Heinz Lehr

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Hörsaal EW 115 A

Robotic Platform for Minimally Invasive Surgery

Seminar lecture presented by Dipl.-Ing. Sebastian Schlegel



In minimally invasive surgery, one major concern are kinematic restrictions resulting from the use of one or only few small entry points in the patient's body. A novel system for robotic telemanipulation is presented featuring highly dexterous instrument arms controlled via an intuitive user interface. The instrument arms are attached to a platform that is fixed outside the patient's body. Apart from mechanical support, this platform also supplies energy to the instruments and is used for their control and all communications with the user interface.

The platform contains servo drives for each of the instrument arms' degrees of freedom. Two degrees of freedom are effectuated in the platform itself. Kinetic energy is transmitted by miniaturized rigid components using kinematics specifically designed to minimize platform volume. A universal coupling mechanism allows different kinds of instruments to be used with the system. The mechanism transmits kinetic energy to drive the instrument arms, electric currents to power sensors in the arms as well as sensor signals.

The platform's footprint in the operating room is considerably smaller than with conventional telemanipulators. Manipulation forces exercised by the platform's motors were transmitted reliably via the coupling mechanism and the arms' lengths and were adequate for test manipulations.

