Technische Universität Berlin

Fachgebiet Mikrotechnik

**Prof. Dr. Heinz Lehr** 

Mittwoch, den 26. August 2015

15:00 bis 15:30 Uhr

Hörsaal EW 115 A

## **Advanced Sensing in Instruments for Minimally Invasive Surgery**

## Seminar lecture presented by Simon Albrecht, M.Sc.

Integrated sensors are used to ensure safe operations of a highly maneuverable single-port laparoscopic instrument. The subject of the talk deals with collision detection, positioning control, and gripping force sensors.

Gripping forces for haptic feedback were measured indirectly based on the equivalent motor current to close the gripper jaws. Direct force measurements are obtained according to the strain in the actuation mechanism. The results were compared with the gripping force measured by a reference force sensor which was placed between the jaws of the end-effector.



Collisions were detected by a fiber sensor inspired by cat whiskers protruding from a joint. An external optical setup deduces any contact with the patient's body from a deflection of the fiber before the rigid joint collides with the patient.



The positioning sensor is needed to compensate position errors caused by flexible segments in the instrument's drive shaft. Therefore a Hall sensor measures the characteristic magnetic field between two poles of a magnetic strip. To configure the travel range, the strip can be arranged under a certain angle.

Test results obtained with these sensors based on lab prototypes and experimental data will be provided and discussed within this talk.

