Minimally invasive surgery has become a standard technique for many operations (e.g., removal of the gallbladder). In contrast to open surgery the degrees of freedom for tissue manipulation and the haptic sense for the manipulation forces are limited. Especially in soft tissue operations surgeons are depending on their haptic sense as tumorous tissue often shows different haptic properties than healthy tissue.

The Intracorporal Manipulator INKOMAN is a surgical telemanipulator with multiple degrees of freedom and haptic feedback. It will help to overcome the before mentioned restrictions. As a universal platform INKOMAN can carry different surgical instruments.

A haptic feedback gives the impression of feeling intracorporal forces

An intracorporal force sensor measures interaction forces between tissue and instrument in three degrees of freedom

A haptic user interface is used for the control of the instrument tip and gives a force feedback of the intracorporal interaction forces

Dissection instruments are used to cut soft tissue

Endoscopes are used to monitor the manipulation actions

Piezoelectric actuators generate strong linear movements

A parallel kinematic mechanism generates bending movements from the linear actuation

A miniaturized positioning system generates in-situ movements