Concept design of a stationary 360 laparoscopic camera integrated with a VR headset

The Institut für Medizingerätetechnik is investigating methods to improve tele-operated robotic surgery. Currently, the positioning of a camera during surgery is controlled by manual separate unintuitive controllers, and requires large mechanical movements to achieve the desired perspectives. Therefore, this project is focused on investigating the idea of using a 360-degree camera integrated with a VR headset to minimise required camera movement and provide intuitive control of the camera viewing perspective. The larger view camera perspective will enable less/no movement of the camera, while software will map a portion of this view to the narrower perceivable view of a human, depending on the orientation of their head. The camera will need to be small enough to fit into conventional laparoscopic equipment and provide a resolution equivalent or better than currently offered cameras. This project will assess the current surgical camera positioning methods and the feasibility of this idea. In addition, a conceptual plan of the system setup and the required equipment will be developed.

The main points to be addressed are:

- Literature search and evaluation of current surgical camera positioning methods, and applications of 360 cameras in a similar manner.
- Concept design and evaluation of various 360 laparoscopic camera configurations.
- Selection and specification of the required equipment needed to implement the concept, including estimated costs, and PC specifications required to drive the VR headset and 360 camera.
- Conceptual plan of the overall system setup in situ.

Supervision will be provided in English by a native English speaker (From New Zealand). As a result, the thesis should also be written in English.