

Ergonomics of microsurgical instrumentation

For common hand tools, such as a screw driver, ergonomics of handles is well studied and helps in optimizing performance, health and well-being of the tool user. Unfortunately, little is known about ergonomics of handles of tools used in microsurgery, such as the one depicted in fig. 1. We would like to investigate, whether ergonomics principles used in design of common tools also apply to microsurgical tools. In this student work, a variety of handles for microsurgery will be designed and tested. Performance testing will be based on a previously developed platform (fig. 2).



Figure 1: Microsurgical instrument (left) and various ways of grasping the instrument (right).



Figure 2: Microsurgical simulator for testing ergonomics design of microsurgical instrumentation. Microsoft's HoloLens is used as display technology. Continuous tracking and evaluation of micro-manipulations by means of an optical IR system.

<https://www.ethz.ch/de/news-und-veranstaltungen/eth-news/news/2019/03/augmented-reality.html>

Tasks

The aim of this student work is to adapt ergonomic principles in the design handles of microsurgical hand held tools. Further, variants of design are 3D printed and tested in the microsurgical simulator.

Your tasks are:

- Familiarize with previous master thesis investigating the microsurgical simulator
- Study literature on ergonomics of hand tools
- Design and print microsurgical handles
- Set up and run a user study to test designed handles
- Report findings in a written report and in an oral presentation

Requirements

- Motivated to learn and work
- Organizational skills

Support and contacts

The Human Factors Engineering group can provide a broad interdisciplinary technical and scientific support and has a solid experience in the many disciplines required to run the project. For further information please contact: mmenozzi@ethz.ch or rosandro@ethz.ch or call: 044 632 39 81 (M. Menozzi). Start date: autumn semester 2019 or later.