Robot Simulation in Mixed Reality – User Study

# Purpose

The purpose of this study is to evaluate the quality of the created application. The application should be easy to understand and easy to operate. The user should be able to understand the functionality of the application and execute simple tasks with it.

# Materials

The HoloLens 1 will be worn by the user. The supervisors run the ROS-server on a laptop, as well as the application via holographic emulation.   
Additionally, the NASA TLX (Task Load Index) questionnaire and the SUS (System Usability Scale) questionnaire will be used.

# Methods

The study is split into two parts. Each part consists of a short introduction and explanation on how to operate the interface and what the goal of the task is, followed by the user executing the task and filling out the questionnaires.   
One task is to operate the mobile robot unit Jackal and the other task is to operate the manipulation robot Panda. The order of these tasks is randomized for each user to eliminate the influence of fatigue, etc.   
The supervisors observe the subjects, as well as the state of the system and note every irregularity such as system failure, bugs and errors. Additionally, the time for executing the task is recorded.   
Due to the COVID-19 situation, the HoloLens is disinfected after each use. To uphold social distancing rules, only 5 people may be in the room at any time.

# Data Interpretation

The results from the questionnaires can be used to evaluate the quality of the interface. From the SUS reference, a score of 68 or higher is above average. For the NASA TLX, a lower score is better.