

# Aufgabenbeschreibung

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Bachelorarbeit/Studienarbeit N.N.

## **Develop and construct a high torque rotational piezo motion amplifier**

The Institut für Medizingerätetechnik is investigating surgical telerobotics with haptic feedback. Currently, haptic feedback is commonly achieved through the use of elastic actuators. However, these actuators currently cannot provide high-frequency haptic feedback. Therefore, this project is focused on creating high torque, rotational motion using high-frequency translational motion amplified piezo-stack actuators. The rotational motion produced is used for haptic feedback to a hand. The small displacement provided by the existing motion amplified piezo actuator is required to provide a relatively large rotational motion ( $>2^\circ$ ), while still being able to provide a high loaded actuation frequency  $> 300$  Hz and torque ( $>5$  Nm). The design should use a minimal number of existing motion amplified piezo actuators, be low mass, and be able to be easily changed to increase rotational displacement. The final prototype will be evaluated using an existing purpose built apparatus.

The main points to be addressed are:

- Investigate motion amplifiers, translational and rotational, which are able to provide a high frequency and torque response.
- Identify and evaluate various rotational motion amplifier designs for use with existing motion amplified piezo actuators, maximising use of 3D printed materials to simplify production complexity.
- Simulate the expected response of the chosen rotational motion amplifier design with and without load.
- Develop and construct the rotational motion amplifier with piezo actuation.
- Evaluate the prototype with the purpose built apparatus.

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.