

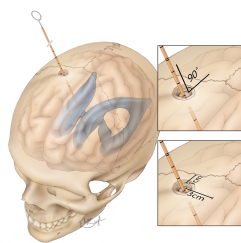


## Master Thesis: Vibro-tactile feedback in ventricle puncturing during External Ventricular Drain (EVD) procedure

**Context:** EVD is one of the first procedures that Neurosurgery residents encounter during their training. The lack of hands-on experience students have when they are first asked to do the procedure can lead to non-ideal placement in up to 40% of cases. The most difficult aspect to teach to residents is the haptic sensation felt during the procedure, especially the really specific "popping" felt when perforating the ventricle wall. Medical simulators have been proven to be a resourceful teaching and training technique in medical scenarios. Our approach is to integrate hardware components with augmented reality to give hands-on experience to residents. Based on previous preliminary tests done in the lab we found the force profile characteristic of this particular procedure, and want to use all the acquired data as feedback to the surgeon using a haptic input device to generate the specific sensation.

Vibro-tactile feedback has been proven useful in medical simulations and could give a more complete and realistic experience to the training surgeon, either as supplementary information to the force feedback or as stand alone information. Its implementation and efficacy has been vastly studied. In order to feed back the vibro-tactile information to the user, the haptic input device will have to be instrumentalized with appropriate custom-made hardware.

**Task description:** This master thesis project will focus on the integration of vibro-tactile feedback in the already existing set up. Your task will be to examine the existing data and determine if it is adequate to be used as vibro-tactile feedback. You can decide to carry out further tests to incorporate the provided data. After the hardware manufacturing to instrumentalize the device and the software tuning to make the information useful and feel natural, you will have to evaluate the prototype with a complete test set up.



### Workpackages:

- Literature research on relevant aspects of the thesis subject,
- Additional testing to have a more complete dataset,
- Manufacture necessary hardware components for vibro-tactile feedback,
- Test the overall concept with a complete test protocol.

### Your profile:

- You are pursuing a master's degree in mechanical or biomedical engineering or related discipline,
- You have experience in hardware development,
- You have knowledge in C++ and Matlab,
- You are curious, motivated and self-driven,
- You want to work in and contribute to an interdisciplinary and applied research environment.

Student: TBD

Start: Upon agreement

Duration: 6 months

### Supervision:

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### Contact:

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