Development of a neurofeedback-based computer game

Proposal: We are looking to develop a brain-computer interface to couple neural signals measured via electroencephalography (EEG) to control in real-time the movement of an object in the context of a computer game.

We are looking for two students to work on the following projects (start time: June 2023):

**Project 1: Development of the neurofeedback loop**
- **Task 1:** Get familiar with the recording of EEG signals
- **Task 2:** Identify a way to analyse EEG signals in real-time
- **Task 3:** Build a basic neurofeedback system using EEG signal fluctuations

**Project 2: Game development and neurofeedback implementation**
- **Task 1:** Develop a (simple) computer game e.g., a bar moving left-to-right and right-to-left to meet a bouncing ball
- **Task 2:** Implement the neurofeedback loop designed in Project 1 to control the bar movements

These projects would allow students to gain hands-on experience in software development in the neurofeedback research sector using the most novel methods to date. Students would also gain hands-on experience in the acquisition of EEG data in humans.

Interested students should be proficient in programming languages such as Python/JAVA. A basic understanding of EEG and neurofeedback methodology would be useful, but not necessary. Students with experience in game coding is a plus.

Contact Information: If you would be interested in either of the projects, please contact Juliana (juliana.zimmermann@tum.de) or Rachel (rachel.nuttall@tum.de) to discuss the projects further.