



# Mathematics and CS Seminar

## Perceptual Engineering

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**Host: Bernd Bickel**

The distance between the real and the digital is clearest at the interface layer. The ways that our bodies interact with the physical world are rich and elaborate while digital interactions are far more limited. Through an increased level of direct and intuitive interaction, my work aims to raise computing devices from external systems that require deliberate usage to those that are truly an extension of us, advancing both the state of research and human ability.

I call my concept perceptual engineering," i.e., a method to alter the user's perception (or more specifically the input signals to their perception) and manipulate it in subtle ways. For example, modifying a user's sense of space, place, body, balance and orientation or manipulating their visual attention, all without the user's explicit input, and in order to assist or guide their interactive experience in an effortless way.

I build devices and immersive systems that use: cognitive illusions for managing attention; physiological signals for novel interaction; deep learning for automatic VR generation; 3D reconstruction for mapping real and virtual spaces; embodiment for remote collaborative learning; tangible interactions for augmenting play; haptics for enhancing immersion; and vestibular stimulation for mitigating movement related motion sickness.

My perceptual engineering" approach has been shown to, (1) support implicit and natural interactions with haptic feedback, (2) induce believable physical sensations of motion in VR, (3) provide a novel way to communicate with the user through proprioception and kinesthesia, and (4) serve as a platform to question the boundaries of our sense of agency and trust.

If we look at the evolution of computing over the last 50 years, interaction has gone from punch cards to mouse and keyboard to touch and voice. Similarly, devices have become smaller and closer to the user's body. With every transition, the things people can do have become more personal. The main question that drives my research is: what is the next logical step?

**Tuesday, March 12, 2019 10:00am - 11:00am**

IST Austria Campus Mondi Seminar Room 2, Central Building



This invitation is valid as a ticket for the IST Shuttle from and to Heiligenstadt Station. Please find a schedule of the IST Shuttle on our webpage: <https://ist.ac.at/en/campus/how-to-get-here/> The IST Shuttle bus is marked IST Shuttle (#142) and has the Institute Logo printed on the side.