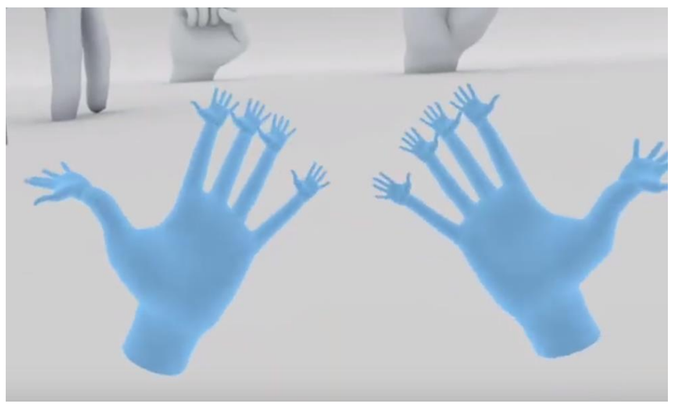
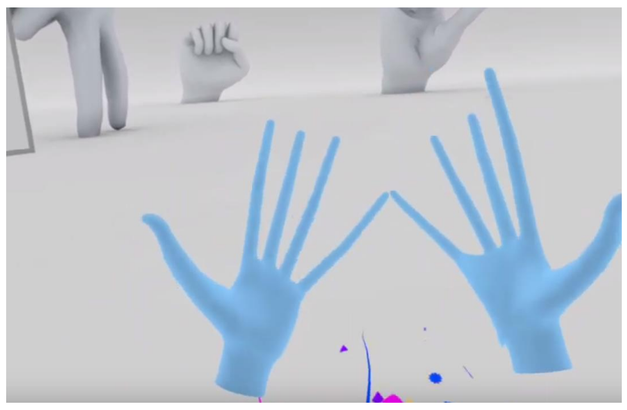
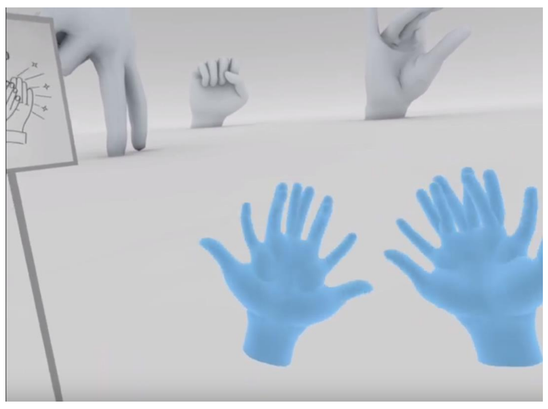
# Topic: Novel Forms of Hand Interaction in Virtual Reality

**Project IGR205**

## Supervisor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## Description

Hand-based interaction is considered one of the most intuitive and natural ways of interacting in Virtual Reality. However, having a one-to-one tracking is not only resulting in quick fatigue while interacting with virtual content (e.g. gorilla arm effect), but is also limiting the potential possibilities of VR going beyond our current human abilities.

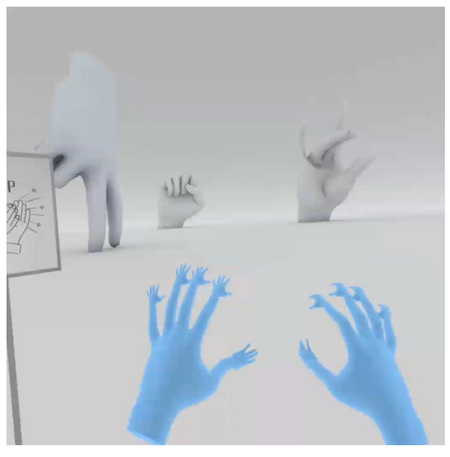
Researchers in the field of HCI already started to explore potential ways of leveraging hand tracking by overcoming current physical limitations and enabling new forms of interaction metaphors, not focusing on a one-to-one translation of the tracked hand information. As an example, an early work by Poupyrev et al. presented "Go-Go Interaction" [1], an interaction technique that had a non-linear mapping of the hand to be able to reach beyond the limits of our arms (a metaphor used from the cartoon Inspector Gadget). More recently, Oculus released their hand-tracking API on the Oculus Quest to Developers, which already started to explore non-traditional/non-direct mapping of the hand-tracking data (see Examples on the left).

## Goal

The goal of this project is to design and implement a novel interaction around hand-tracking in VR which creates some form of benefit over a traditional one-to-one mapping (e.g. more precision, less fatigue, new abilities). Students are encouraged to think outside the box and forget traditional models of our body (e.g. what if our arm could stretch infinitely ?, what if we would have more than 5 fingers ?). In a first step, each group will receive one Oculus Quest and will design and develop their novel form of hand-interaction (The DIVA group is able to provide 3 Oculus Quests. Therefore, three individual groups are able to work on this project). In a second step, the students will implement their idea using Unity3D and the Oculus SDK. The last step, consists of implementing an application (e.g. a simple game) that leverages and showcases this novel type of interaction. Each group is expected to meet once a week with their supervisor and discuss their ideas and the direction of the project. Each student will get an Oculus Quest to be able to develop individually.

## Examples/Sources:

https://www.roadtovr.com/creative-uses-oculus-quest-hand-tracking-daniel-beauchamp/



https://www.youtube.com/watch?v=HfgCS_tTcPs

## Prerequisite

- Object Oriented Programming (e.g. Java, C++, C#)
- Basic understanding of Computer Graphics
- Basic understanding of Human-Computer Interaction (HCI) Methods
- (optional) First experiences working with 3D Game Engines (e.g. Unity3D, UnrealEngine)

## Acquired skills

- Being able to apply a research driven design process for HCI projects.
- Being able to develop VR applications in Unity3D
- Being able to use the Oculus Rift SDK
- Understanding the spatial paradigm behind Augmented and Virtual Reality
- Outstanding projects will have the option to contributing to a scientific publication at a top tier HCI Conference (e.g. ACM CHI, ACM UIST)


[1] Ivan Poupyrev, Mark Billinghurst, Suzanne Weghorst, and Tadao Ichikawa. 1996. The go-go interaction technique: non-linear mapping for direct manipulation in VR. In Proceedings of the 9th annual ACM symposium on User interface software and technology (UIST '96). Association for Computing Machinery, New York, NY, USA, 79–80. DOI:https://doi.org/10.1145/237091.237102



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