

## Motion Retargeting for Grasp Animation

### About Gleechi:

Gleechi is a Stockholm-based startup that has developed the first software to make it possible to animate hands that can move and interact freely and realistically in games and Virtual Reality. The technology is based on 8 years of robotics research, and the company now has customers including one of the top 10 largest VR developers in the world as well as a world-leading automation company. Gleechi has received several awards, including Super Startup of 2015 by Veckans Affärer and ALMI Invest and Winner of the european competition EIT Digital Idea Challenge 2015.

Video demo: <https://www.youtube.com/watch?v=xkCt17JHEzY>

### Introduction:

With the recent growth of virtual reality (VR) applications, there is a demand to create highly immersive environments in which the avatar that the user embodies reflects any kind of actions in the virtual world as precise as possible. The major action humans use for interacting with the world is grasping of objects with their hands. Until now, the visual representation of grasping in VR has been resolved by very simple means only, such as attaching a rigid hand to the object that does not adapt to the shape, or manually animating a sparse set of grasps for pre-defined objects, or just not showing hands at all. Initial experiments have shown that hands that are too human-like and do not match the the players' expectations in appearance or behavior, often leads to a loss of the feeling of presence (i.e. making the players feel they are not really in the game). The effect is closely related to the "Uncanny Valley" effect, which refers to when features look and move almost, but not exactly, like natural beings, it causes a response of revulsion among the observers.

### Description:

Gleechi provides a software solution called VirtualGrasp which makes it possible to animate natural looking grasping interactions in real-time based on the constraints of the virtual world (such as shape of objects, kinematics of the hand, etc). This solution is not a hand tracking algorithm, but a tool that animates a given hand model. In VR applications, an important measure of success for such a system is to create hand and finger motions that both satisfy the physical constraints placed by the object, and are natural and realistic to the human eyes. Such a system should be able to generate natural hand-object interaction motions on hands with various skeleton structures and dimensions. This naturally creates a common problem in the animation industry called "Motion Retargeting" (MR).

Retargeting of motion is an instance of motion re-use, i.e. adapting an animated motion from one character to another character with similar or dissimilar skeleton dimension and proportion, while preserving the "essence" of motion. In the case of animating hand-object interaction, the essence of hand motion is to satisfy both contacting constraints with the grasped object and the natural looking of the finger configurations. The goal of this thesis is to design and implement such a motion retargeting system for the purpose of hand grasp animation.

**Tasks:**

- Summarize state-of-the-art of motion retargeting techniques, and investigate what the best method for hand motion retargeting is.
- Design and implement a selected MR technique for the specific problem of hand animation.
- Test, optimize and evaluate the implemented process.
- Summarize and discuss the findings in a report / thesis.

Supervisor at Gleechi: Dr. Dan Song

**References:**

- [1] [Motion capture and retargeting slides](#)
- [2] [A full-body motion calibration and retargeting for intuitive object manipulation in immersive virtual environments. VR 2016](#)
- [3] [On-line Motion Retargeting](#)
- [4] [Computer puppetry: an importance-based approach, ACM Trans on Graphics 2001](#)
- [5] [Using an intermediate skele and IK for motion retargeting. EuroGraphics 2000](#)
- [6] [http://research.cs.wisc.edu/graphics/Gallery/Retarget/motion\\_retargeting.htm](http://research.cs.wisc.edu/graphics/Gallery/Retarget/motion_retargeting.htm)

**Application info:**

Last apply date:	2017-07-31
Project work period:	Estimated to be 2017 Sep - 2018 Feb
Assignment type:	Degree project
Credits:	30 hp
How to apply:	Please email us your CV, transcript and an one-page personal letter.