

UNIVERSITY OF TECHNOLOGY CHEMNITZ

BACHELOR THESIS

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# Inspection and comparison of automated methods for embedding skeletons and motion retargeting for 3D Scans

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*A thesis submitted in fulfillment of the requirements  
for the degree of Bachelor of Science  
in the*

November 7, 2024



## Declaration of Authorship

I, Mick KÖRNER, declare that this thesis titled, “Inspection and comparison of automated methods for embedding skeletons and motion retargeting for 3D Scans” and the work presented in it are my own. I confirm that:

- This work was done wholly or mainly while in candidature for a research degree at this University.
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- Where I have consulted the published work of others, this is always clearly attributed.
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- I have acknowledged all main sources of help.
- Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself.

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UNIVERSITY OF TECHNOLOGY CHEMNITZ

# *Abstract*

Professorship of Computer Graphics and Visualization

Bachelor of Science

**Inspection and comparison of automated methods for embedding skeletons and  
motion retargeting for 3D Scans**

by Mick KÖRNER

The Thesis Abstract is written here (and usually kept to just this page). The page is kept centered vertically so can expand into the blank space above the title too...



## *Acknowledgements*





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# List of Abbreviations

**LAH** List Abbreviations **Here**  
**WSF** What (it) Stands For





# Physical Constants

Speed of Light  $c_0 = 2.997\,924\,58 \times 10^8 \text{ m s}^{-1}$  (exact)



# List of Symbols

$a$	distance	m
$P$	power	W (J s <sup>-1</sup> )
$\omega$	angular frequency	rad



*For/Dedicated to/To my...*



## **Chapter 1**

# **Introduction (0. Aufgabenstellung)**

### **1.1 The Problem**

### **1.2 Overview**





## Chapter 2

# Related Work

### 2.1 3D Animation Basics (0.5 Basics)

#### 2.1.1 Joints

#### 2.1.2 Skeletal Format

#### 2.1.3 Pose Space vs. Work Space

#### 2.1.4 Forward Kinematics

## **2.2 Inverse Kinematics (1. Inverse Kinematics)**

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### **2.3.2 Jacobian Constraints**

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### **2.4.1 Available Tools**

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### **2.5.2 Thinning Approaches (TODO genauer anschauen für mögliche impl?)**

### **2.5.3 Skin Matching Approaches**

### **2.5.4 SMPL fitting**

### **2.5.5 Re-Meshing**



## Chapter 3

# Motion Retarget Editor (6. Editor)

### **3.1 Chosen Tools**



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## 3.2 Scene Management

### **3.3 User Interface**

#### **3.3.1 Picking System**

#### **3.3.2 Imgui Integration**

## **3.4 Animation System**

### **3.4.1 Sequencer**

### **3.4.2 Motion Retargeting and Rigging Integration**

### **3.4.3 Editing Tools (Restore Restpose, apply Transform etc.)**

## **3.5 Inverse Kinematics Implementation**

### **3.5.1 Jacobian Method**

### **3.5.2 CCD**

### **3.5.3 FABRIK**

## **3.6 Constraints Implementation**

### **3.7 Motion Retargeting**

## **3.8 Model Import and Export**





## Chapter 4

# Conclusion and Future Work (7. Future)

### 4.1 Editor Improvements

### 4.2 Utilizing Skinning Alternatives

### 4.3 Other Useful Tools

### 4.4 Clothing

### 4.5 Motion Blending

### 4.6 Blender Addon

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# Bibliography

- [1] Michael Gleicher. “Comparing Constraint-Based Motion Editing Methods”. In: *Graphical Models* 63.2 (Mar. 2001), pp. 107–134. ISSN: 15240703. DOI: [10.1006/gmod.2001.0549](https://doi.org/10.1006/gmod.2001.0549). URL: <https://linkinghub.elsevier.com/retrieve/pii/S1524070301905491>.