FRIEDRICH-ALEXANDER
UNIVERSITÄT
ERLANGEN-NÜRNBERG
FACULTY OF ENGINEERING

Computeranimation

A Practical Introduction

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COMPUTER GRAPHICS • ERLANGEN

Introduction

Computer Graphics

Motivation

Organization

Matteo Colaianni

Member of the scientific staff at Computer Graphics Group Erlangen

Languages:

- English
- Italian
- German
- Espero aprender um pouco de Portugês

Topics:

- Virtual Cloth Simulation/Modeling/Fitting
- Physically Based Animation
- Statistical Shape Models

Contact Information: matteo.colaianni@fau.de

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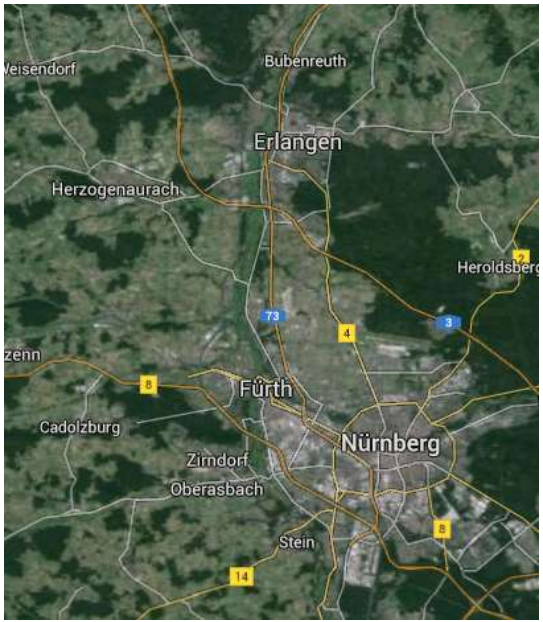

Erlangen:
105.000 habitants

Nuremberg:
495.000 habitants

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Nuremberg

This is where I live

Kaiserburg

Christkindlesmarkt

Dokumentationszentrum

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Nuremberg

You may suppose what we have in Bavaria:

Erlangen

This is where I spend most of my time (working)

Technical Faculty

Department CS

Schloßgarten Erlangen

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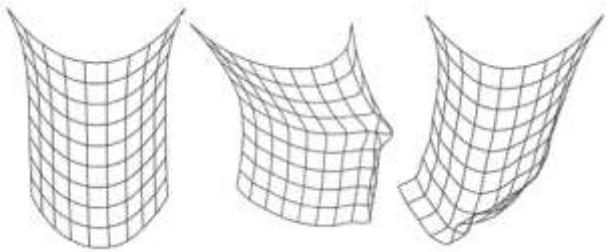
Erlangen

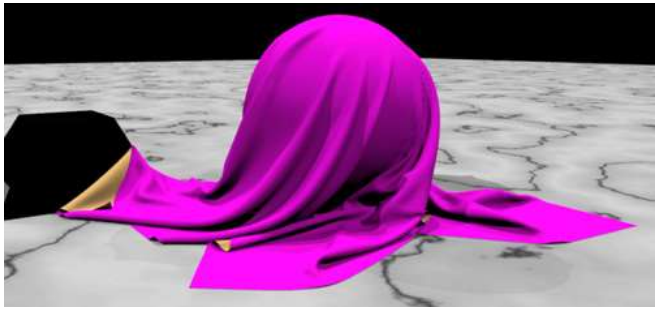
Guess it! There is also beer in Erlangen

Virtual Cloth Simulation

Simulate Garment's inner Structure



Resolve Collision Cases



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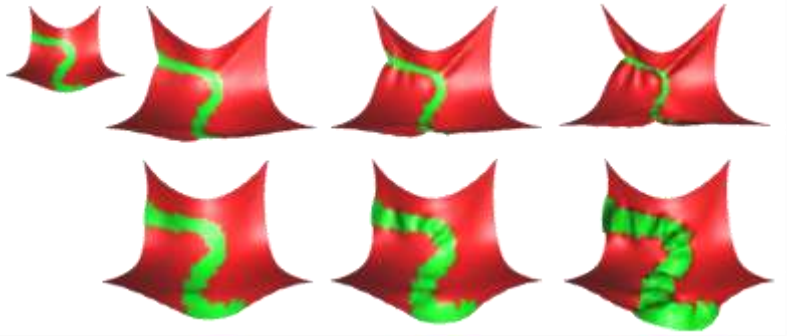
Virtual Cloth Modelling

Manipulate Garments Shape During Simulation



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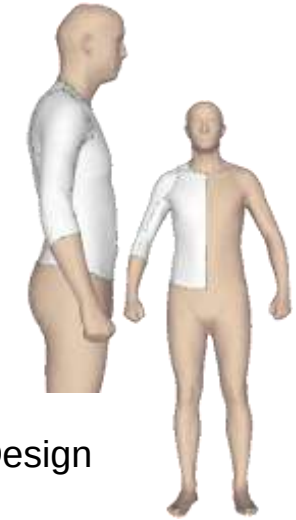
Virtual Cloth Fitting

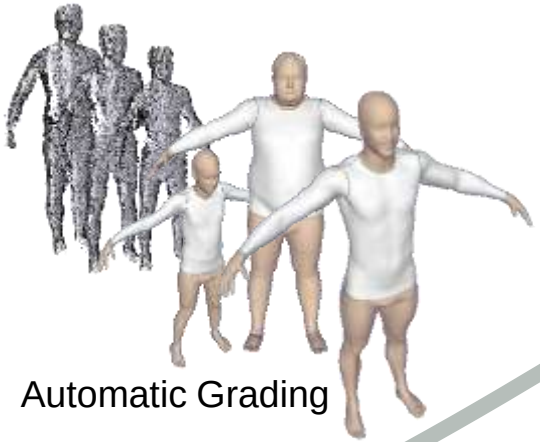
Morph Garment Cut Lines with Scan Data

- Virtual Apparel

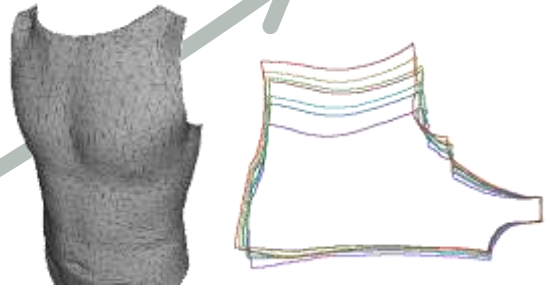
Prototyping/Analysis



3D Design



Automatic Grading



Cut and Flattening

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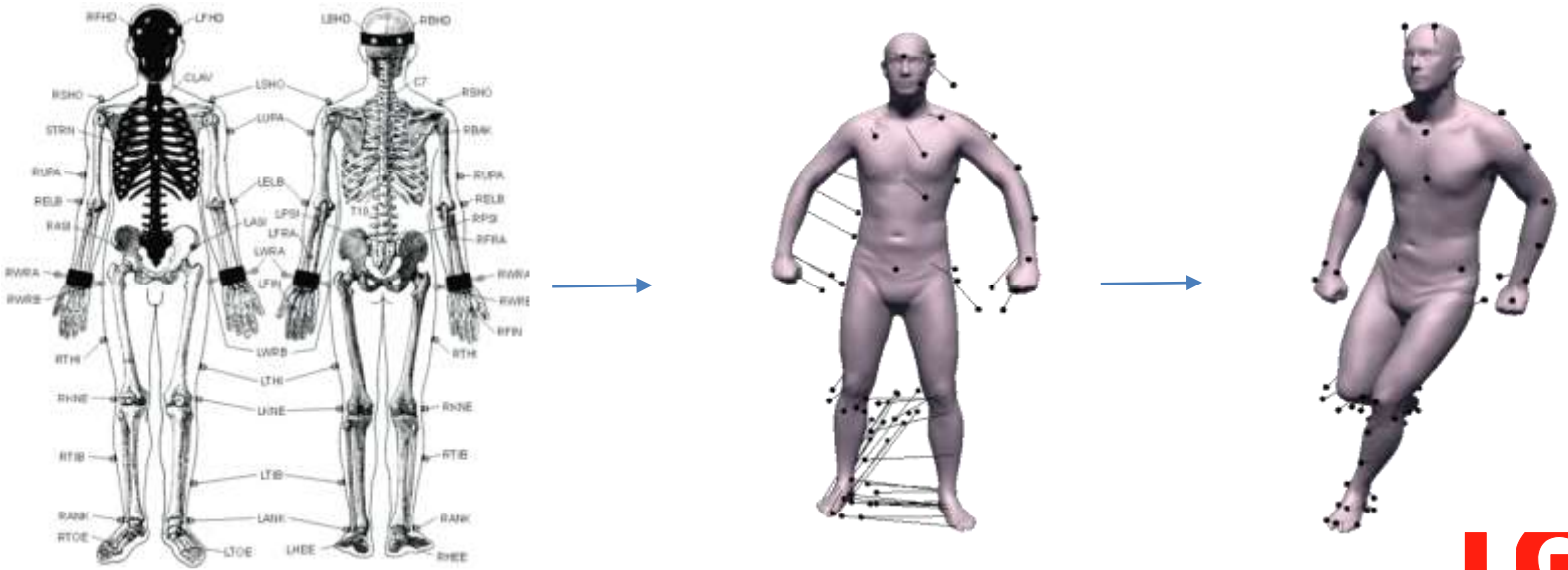
Physically Based Animation (1)

Project Motion Data into A Statistical Space For Deformation Analysis



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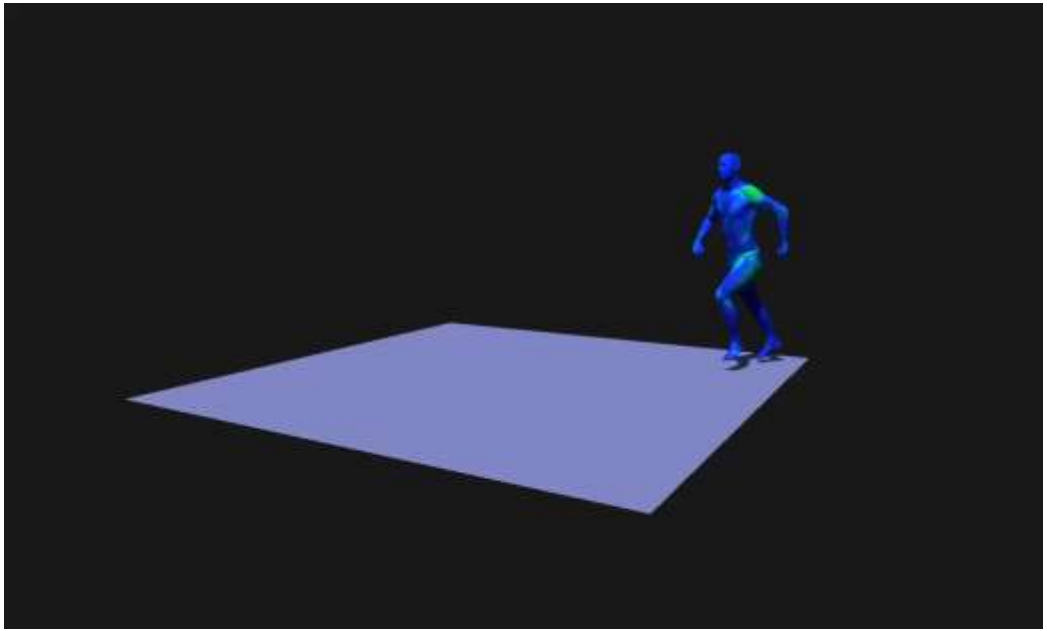
Physically Based Animation (2)

This Way we get Deformation Information for Motion



Introduction

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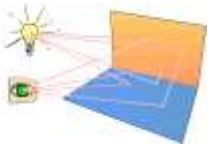
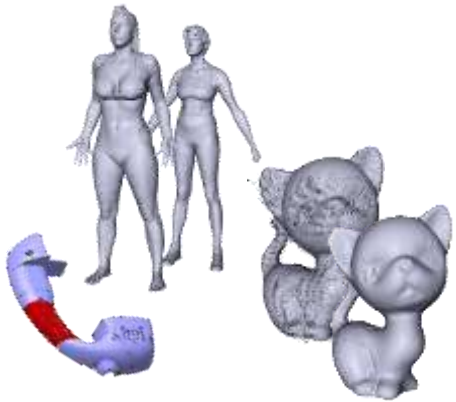
Overview

- Computer Graphics Group Erlangen (Department of Computer Science FAU Erlangen-Nürnberg)
- Mainly divided into three research/teaching fields:

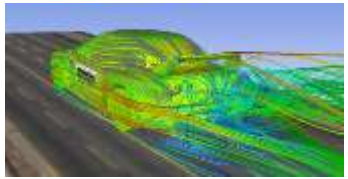


Rendering

Geometry Processing



Scientific Visualization



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Special Fields of Research

- Ongoing Research on Mixed Reality

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Special Fields of Research

- Ongoing Research on Mixed Reality

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Special Fields of Research

- Kinect Fusion at Scale

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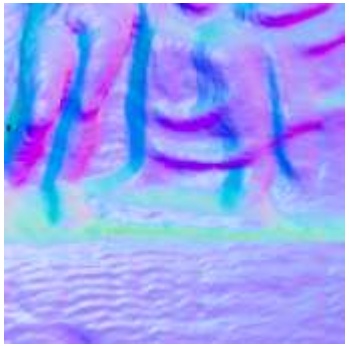
Special Fields of Research

- Shading based scan refinement

Original



Fusion

Refined (Close-Up)

Refined Result

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Rendering creates stunning effects

- Photorealistic Synthesis of Images
- Photometric simulation of different Materials
- Great Effects in Real Time

…but: “Animation is where things come to life!”

[https://www.youtube.com/watch?v=K16xFw5SDFk]

Motivation

Animation can be classified

	Kinematics	Dynamics
Rigid Bodies	Movement along Paths	Accelerated Objects
Non Rigid	Skeletal Deformation	Cloth Simulation

Rigid Movement In Video Games

[Official Star Citzien Dogfight Launch Trailer]

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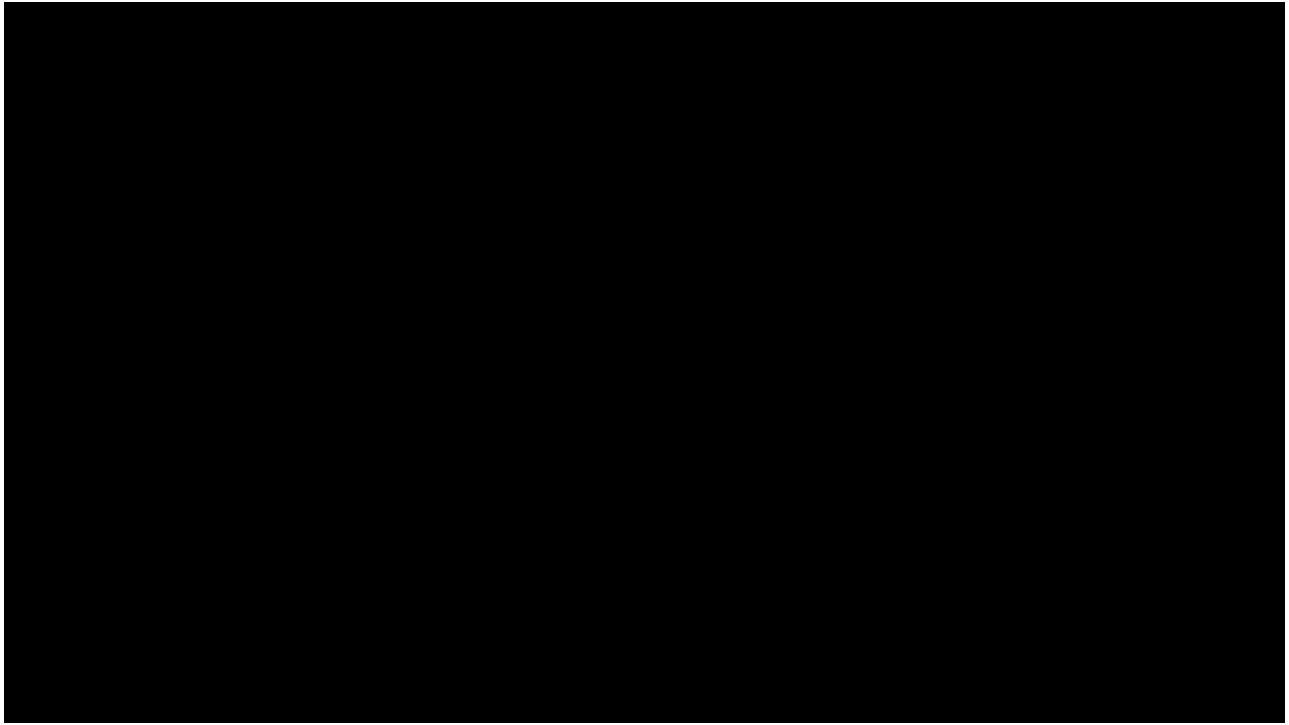
Non-rigid Deformation

[https://www.youtube.com/watch?v=BolgBSXjxeE]

Particle Based Effects in Movies



[Unreal Engine 4 – Elemental Demo]

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In this course you will learn

- An understanding of how different types of animation work
- Basic knowledge in creating Animation
- Basic skills in Programming Animation Techniques in C/C++ and GLSL

Requirements

- Basics in Linear Math
- Solid Programming Skills (preferable in C/C++)

Optional

- Basic Knowledge in Blender
- Basic OpenGL and GLSL (Shading Language)

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Organization

Lectures

- 3 Times / Week (1,5 h each)
- Impart Knowledge about the basic theoretical Concepts
- Divided in Theory and Application Part

Exercises

- You receive some assigments to do as homework
- Every second lecture we deliver one assignment sheet

Organization

Topics

- Rigid Transformation
- Animation
- Collision
- Dynamic
- Mass-Spring Simulation
- Rigging and Skeletal Animation
- Motion Capturing using RGB-D Sensor

I want to know you now!!!