Human Digital Content Interaction for Immersive Home Entertainment
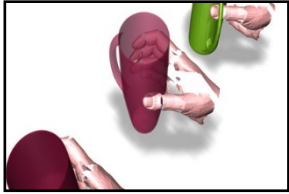
- Project Overview

Young J. Kim

Ewha Womans University
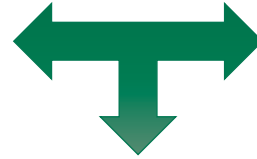
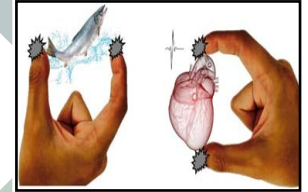# Human-Digital Content Interaction for Im mersive Home Entertainment

Vibro-tactile/Haptic Feedback

Immersive Display

Contents Augme ntation

IBL Rendering

Hand Manipulation

Pose Estimation

Ewha W. Univ.

Hand Animation and Force Feedback

- Interference-free Hand Modeling
- Grasp Planning and Synthesis
- Haptic Rendering

Korea Univ.

Interaction Techniques using Wearable Devices

- Pinch-based Interaction
- Vibro-tactile Pseudo-haptic Feedback
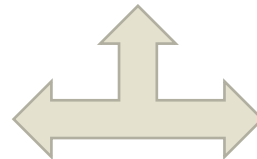- Full-body Interaction using Wearable Sensors

Human - Digital Content Interactions for Immersive 4D Home Entertainment

U. of Canterbury

Augmented Hand Interaction

- Augmenting immersive movie scene with user's body and environment
- Physical simulation-based natural hand gesture interaction in immersive movie

Victoria Univ.

Perception-based Rendering

- Perceptually optimized rendering for reducing simulator discomfort in HMD
- Perceptually optimized rendering for seamless composites

EWHA OBJECTIVES

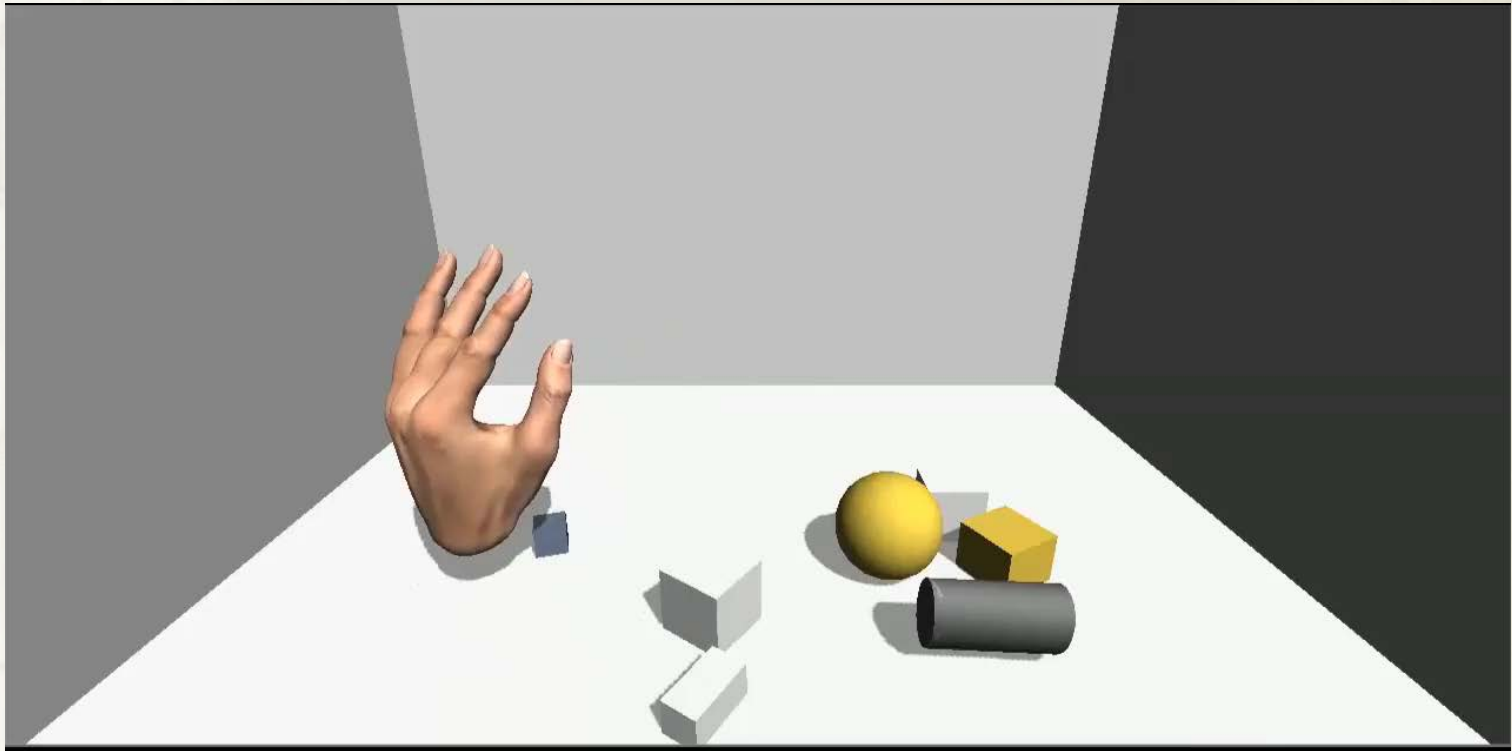**1** Interference-free Hand Modeling

2 Grasp Planning and Synthesis

3 Haptic Rendering
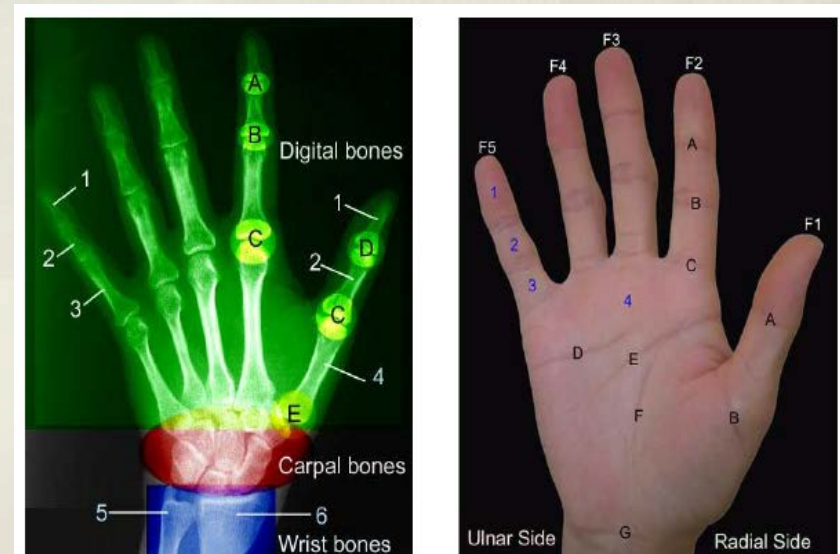
CURRENT PROGRESS

Kiran Nasim using Leap Motion and Unity engine

1st Year Goal

- Hand deformation modeling

  - ☐ Real-time physics-based

  - ☐ Complex bone structure, more than 20 DOF

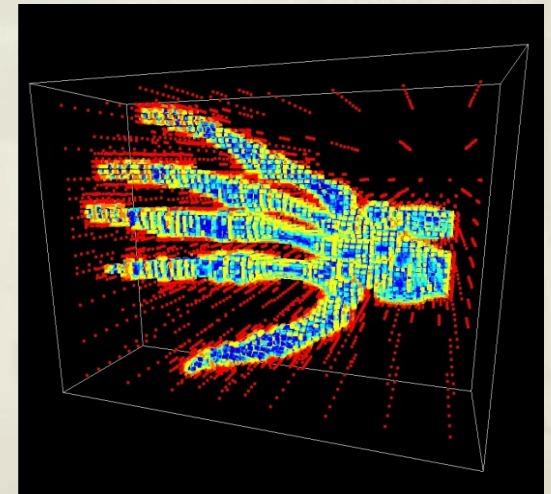 - ☐ Subtle skin deformation

  - ☐ Real-time FEM

Anatomy of the human hand

1ˢᵗ Year Goal

- Real-time collision resolution algorithms

  ❑ Interference-free hand modeling

  ❑ Overlapping effects

  ❑ Real-time distance field calculations

  ❑ Penetration depth computation

Distance fields calculation

2nd Year Goal

- Content interactions assistance

  ❑ Hand tracking device: Leap Motion

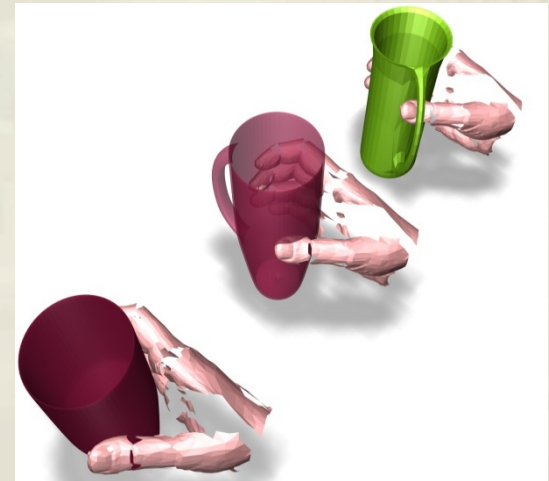 ❑ Virtual model in virtual space

  ❑ Dexterous manipulation

Leap Motion visualizer

2nd Year Goal

- **Grasp planning and synthesis**

  ❑ Real-time optimization

  ❑ Semi-automated programming
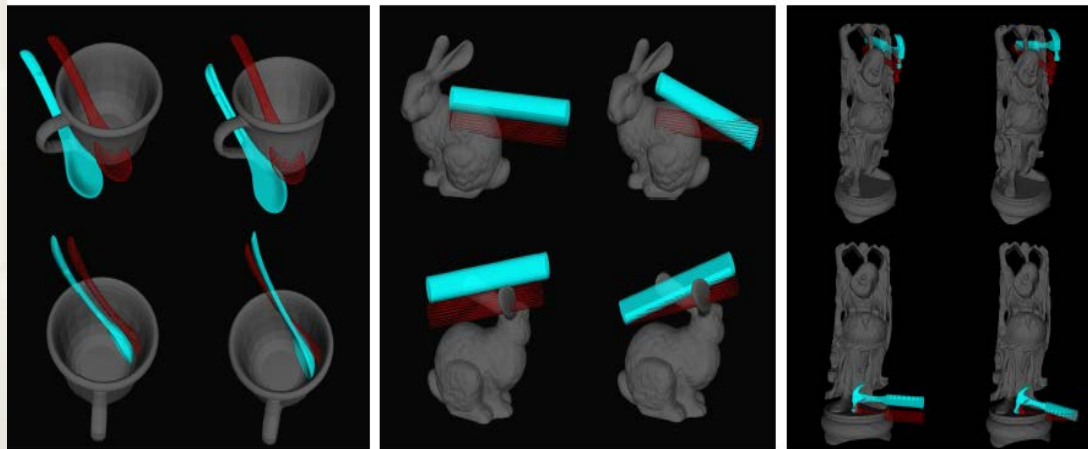
  ❑ Natural animation

Rigid-model for hand grip planning

3rd Year Goal

- **Haptic rendering**

  ❑ 6-DoF haptic device

  ❑ Parallel computation

  ❑ Force/Torque feedback

Penalty-based algorithm to compute response forces

3rd Year Goal

- Dimension reduction technique

  ❑ Map high DoF hand model to 6-DoF haptic device

  ❑ Complex transformation

  ❑ Model reduction algorithms

NEXT STOP

Korea University