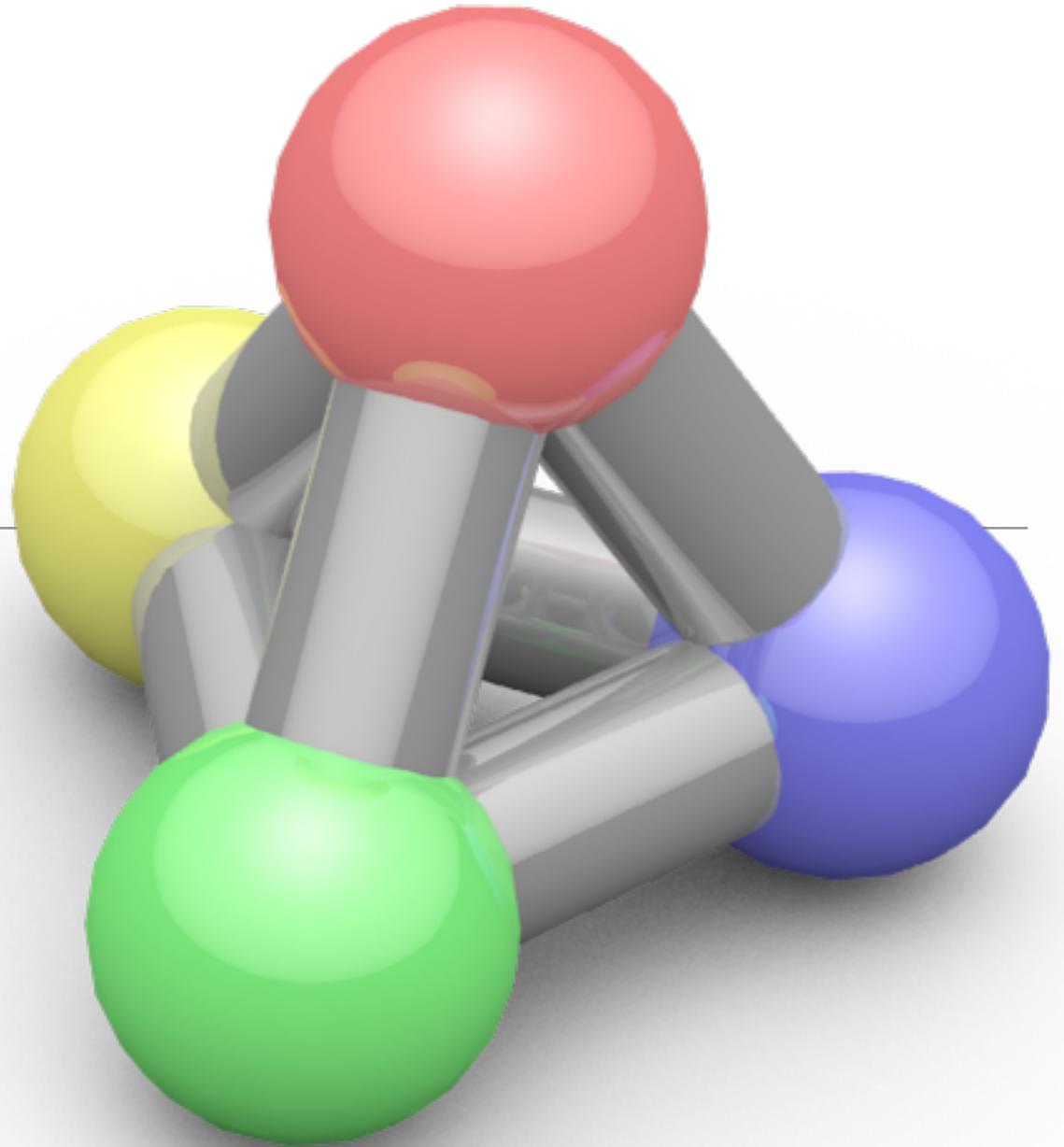


# Computer Haptics

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CPSC 453 – Fall 2016

Sonny Chan



**What the heck is  
computer haptics???**

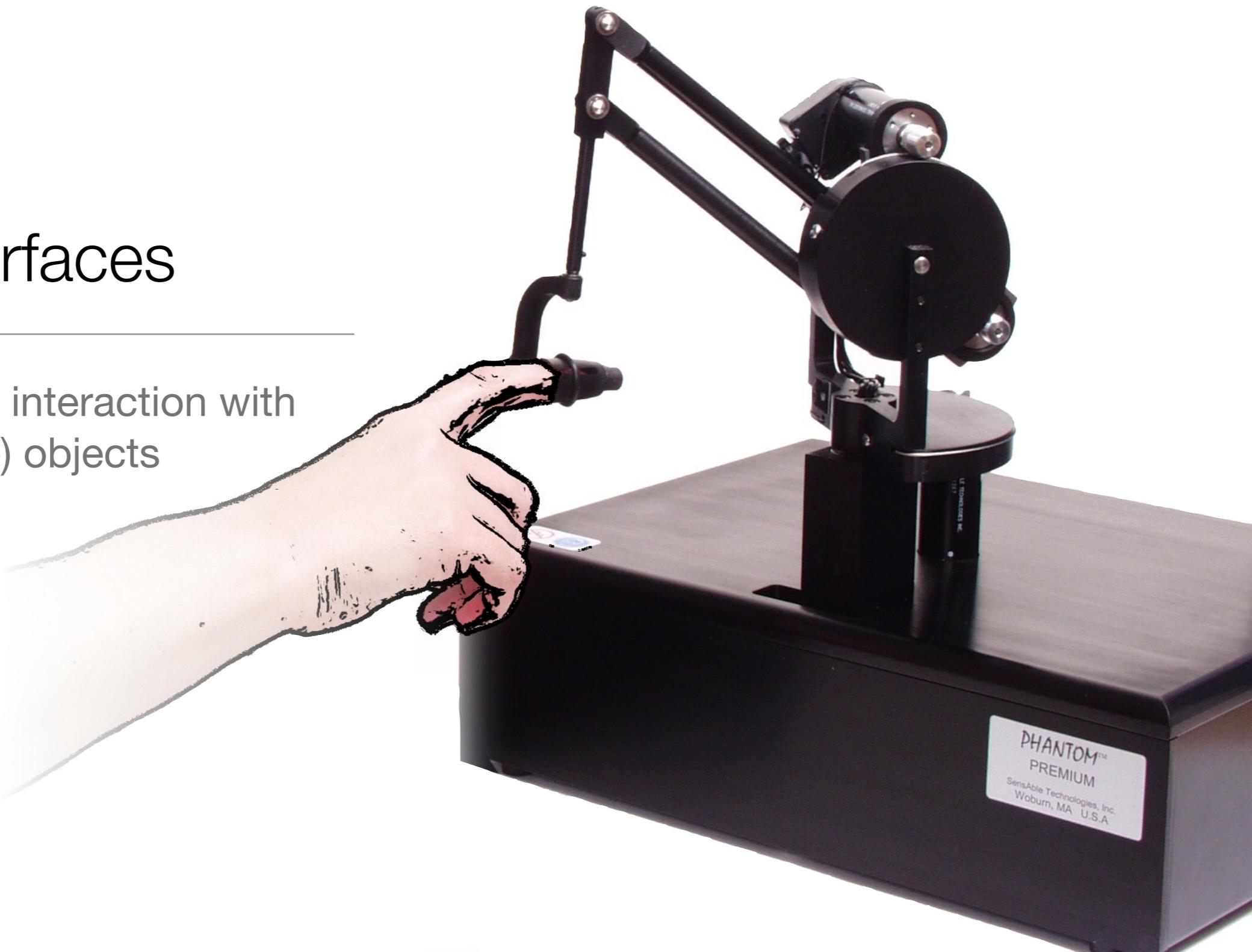
“Computer haptics is the discipline concerned with generating and rendering haptic stimuli to the human user”

**–Mandayam Srinivasan (MIT Touch Lab)**

# Haptic Interfaces

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Enables physical interaction with  
virtual (or remote) objects



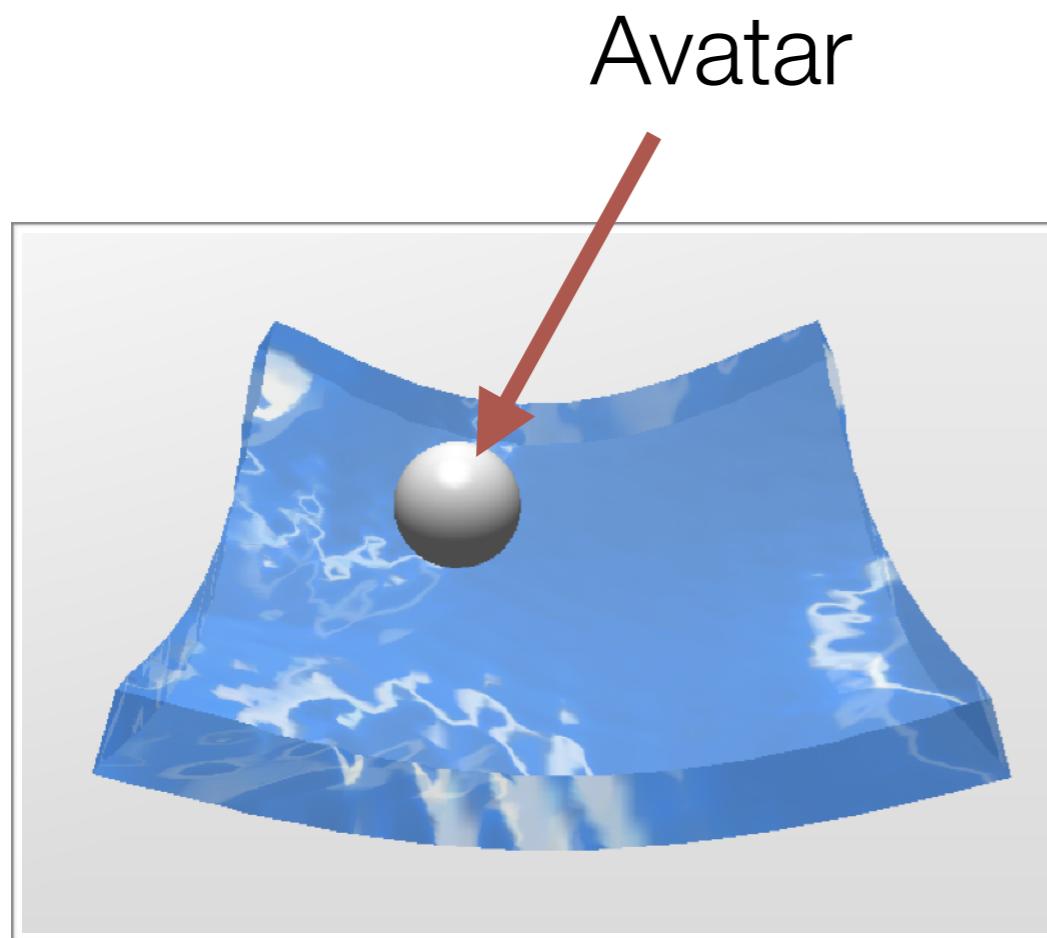


Visual-Haptic Simulation

Under the Hood

# How does a basic visual-haptic simulation work?

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Virtual Environment

Haptic Interface

# The Software-Hardware Interface

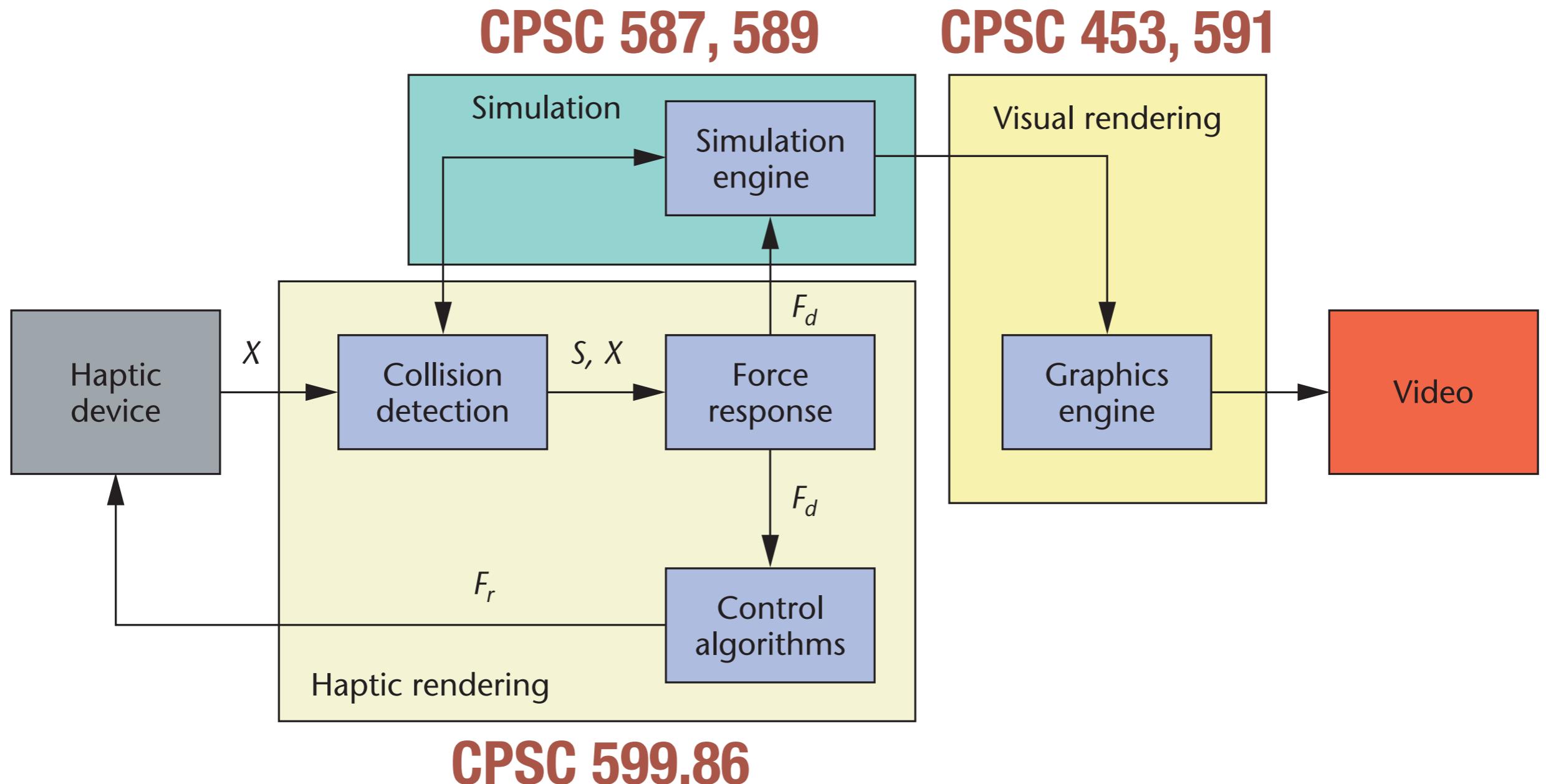
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“Haptic rendering is the process of computing and generating forces in response to user interactions with virtual objects.”

**–J. Kenneth Salisbury**

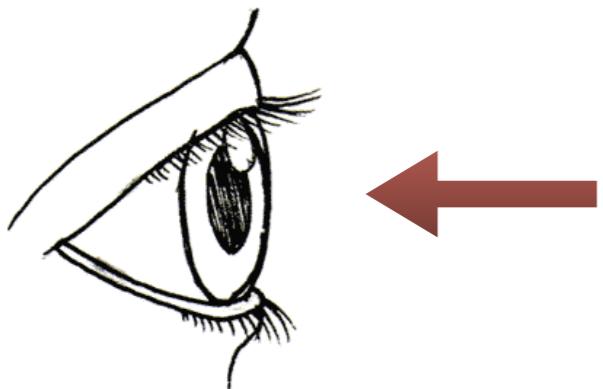
# Simulation Components



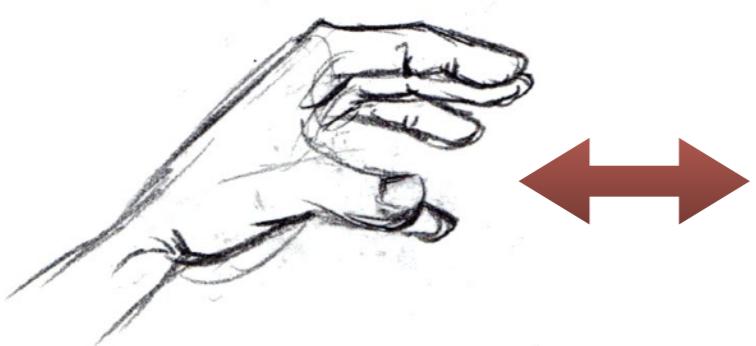
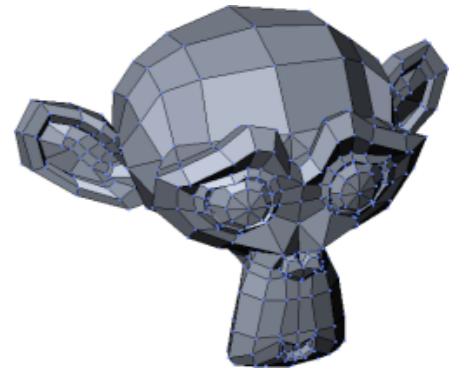
[From K. Salisbury et al., *IEEE Computer Graphics & Applications* 24(2), 2004]

# Haptic vs. Visual Rendering

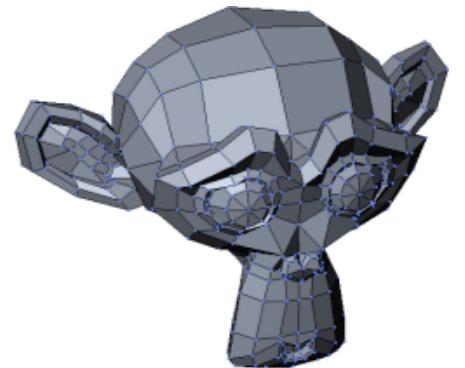
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Visual  
Rendering



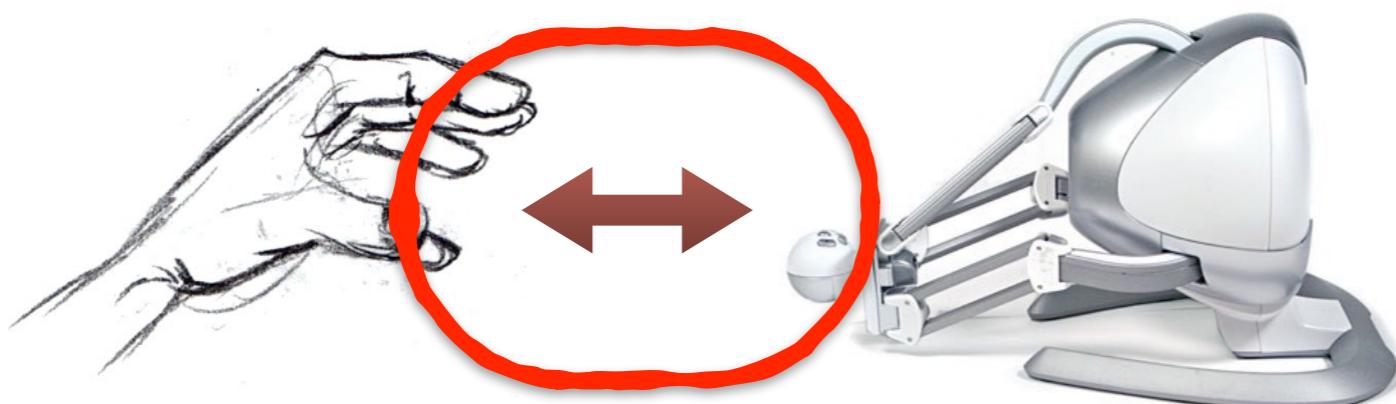
Haptic  
Rendering



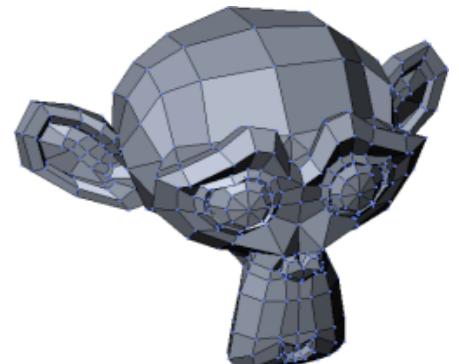
# Bi-Directionality

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- **Bi-directional information flow** is a distinguishing characteristic of haptic interfaces
- This has many consequences that must be understood and addressed in haptic rendering algorithms



Haptic  
Rendering





**So... what can we do with it???**

# Applications of Computer Haptics

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I mainly work on this one



3D Design &  
Modelling

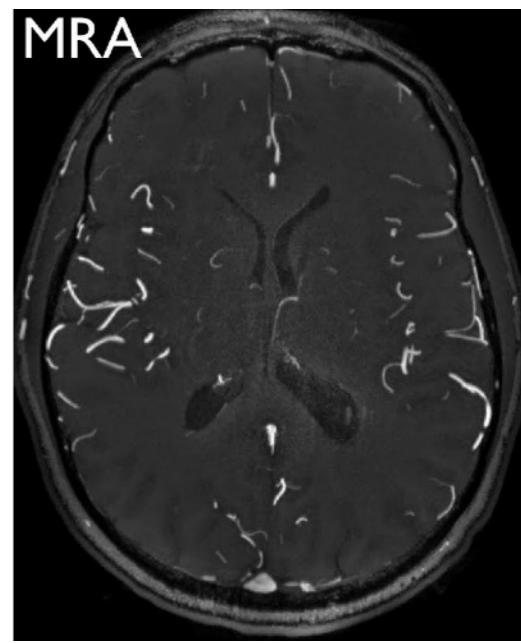
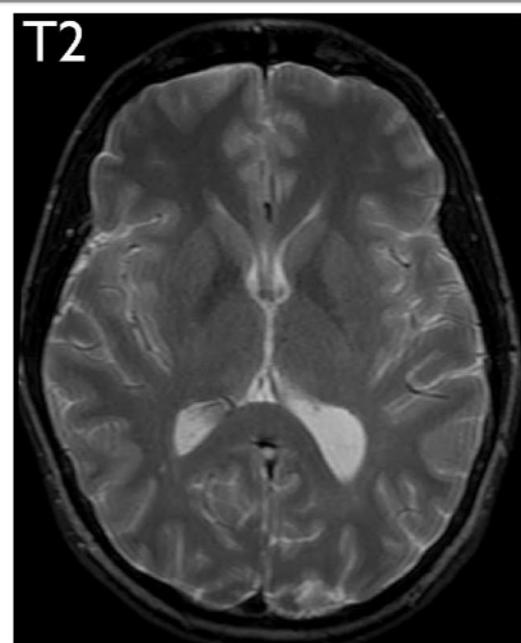
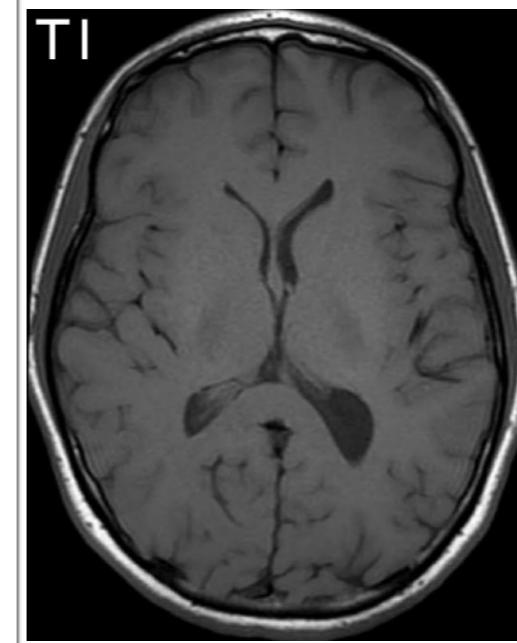
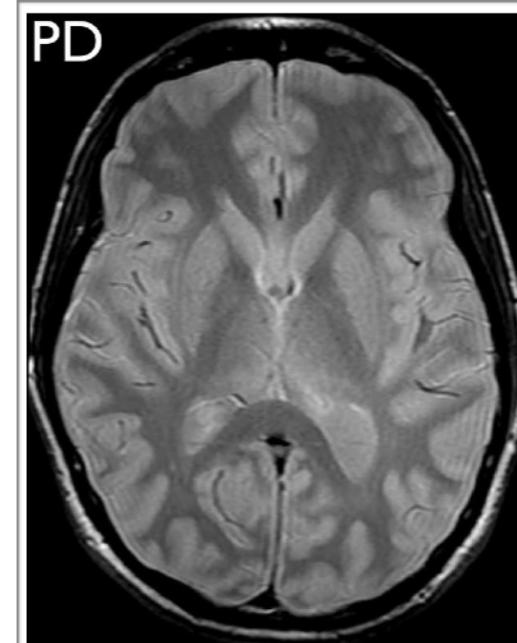
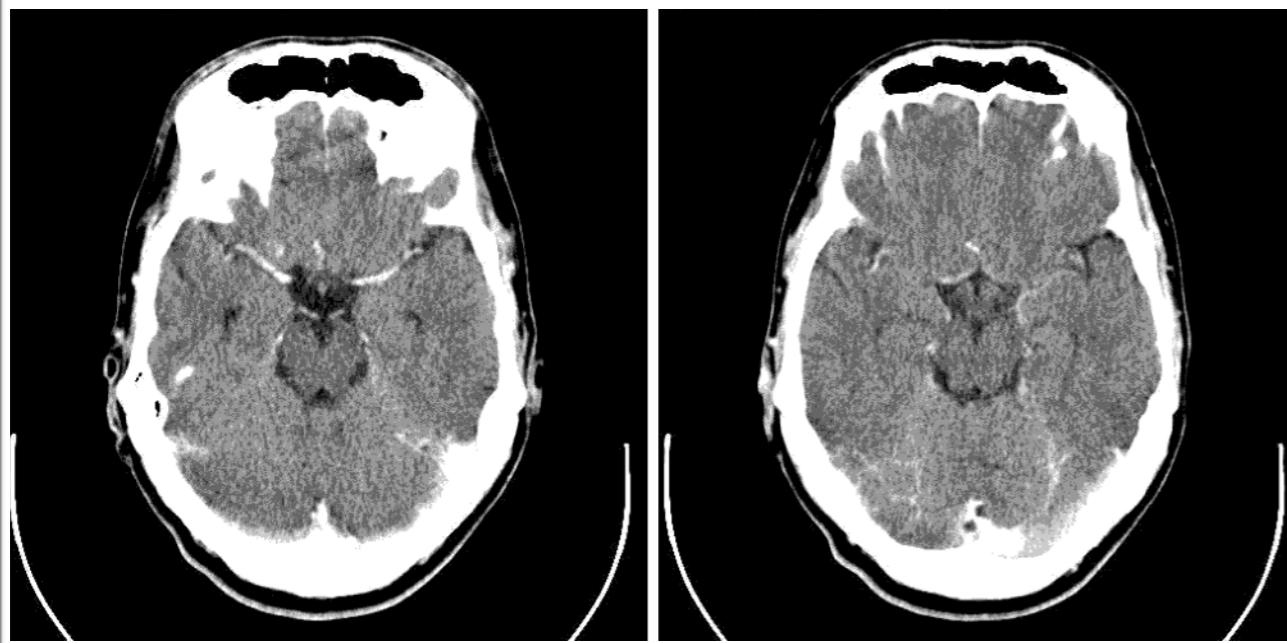
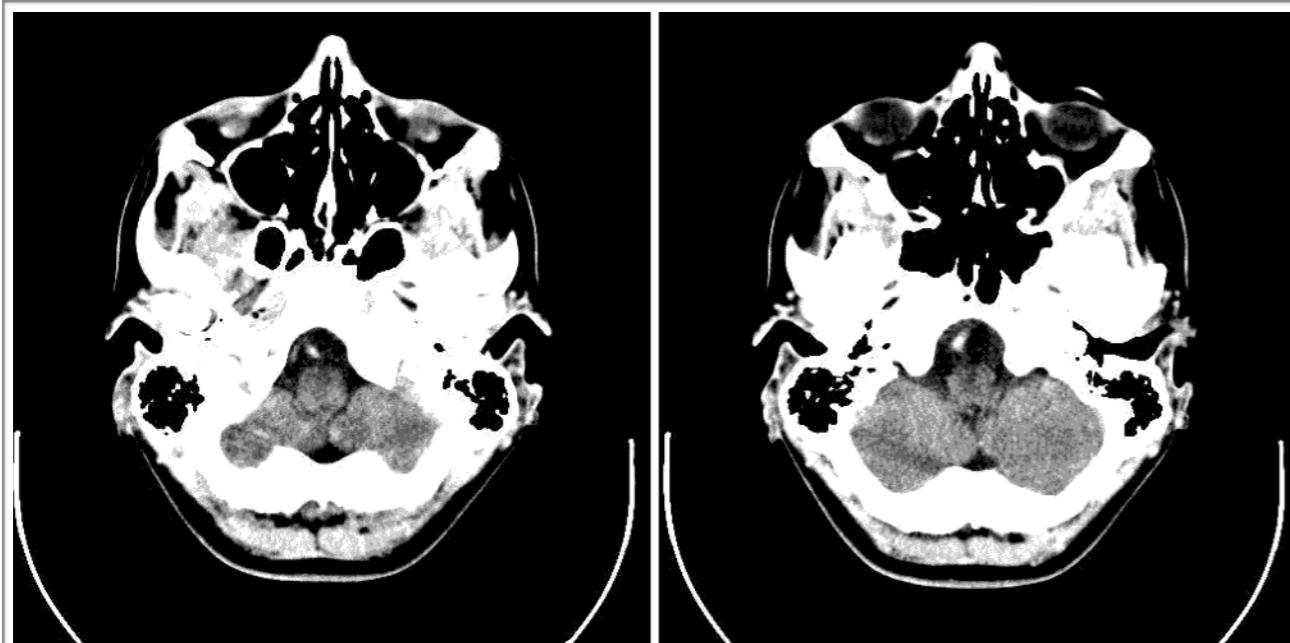


Medical / Surgical



Entertainment

# Medical Imaging

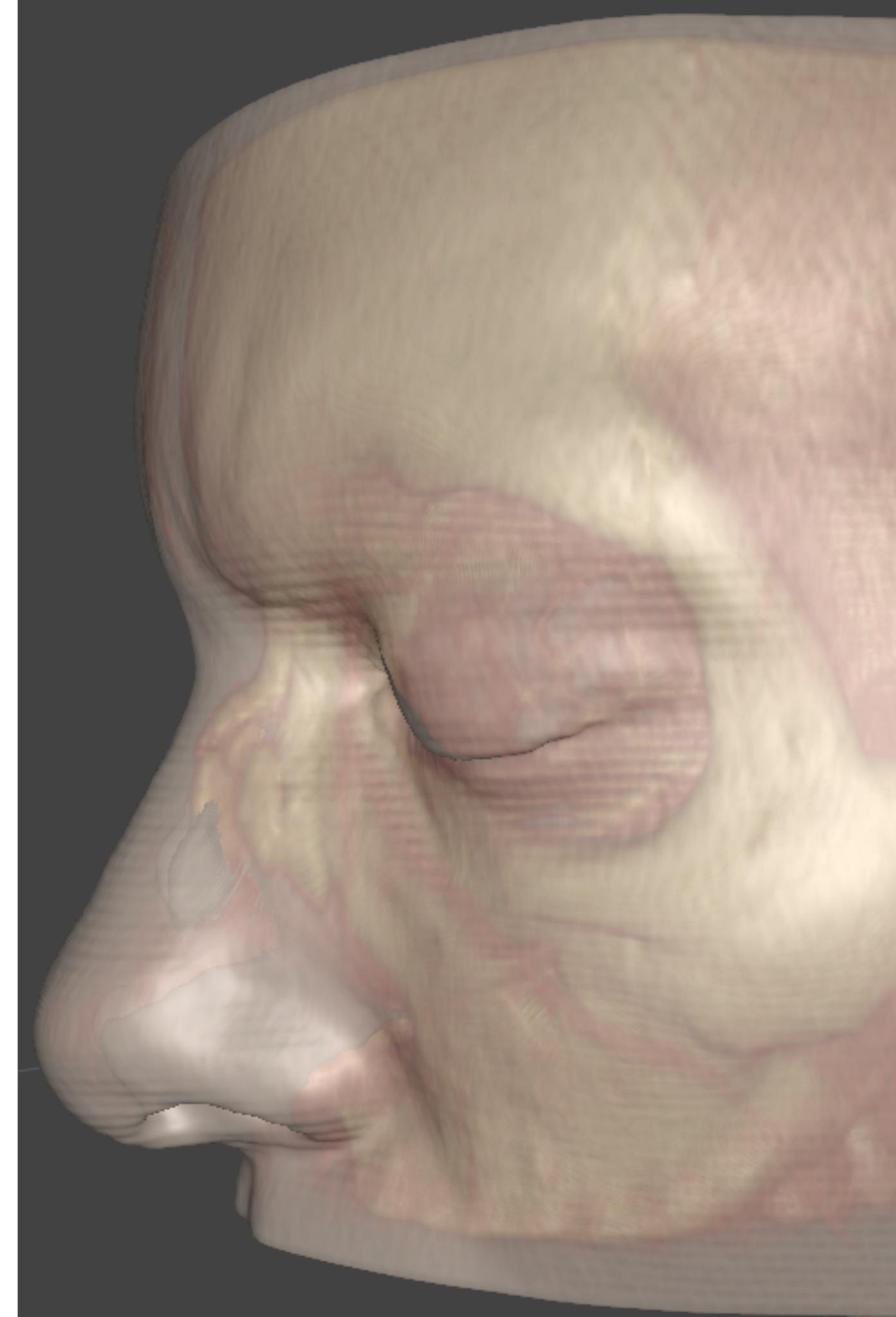


Computed Tomography

MRI

# Volume Rendering

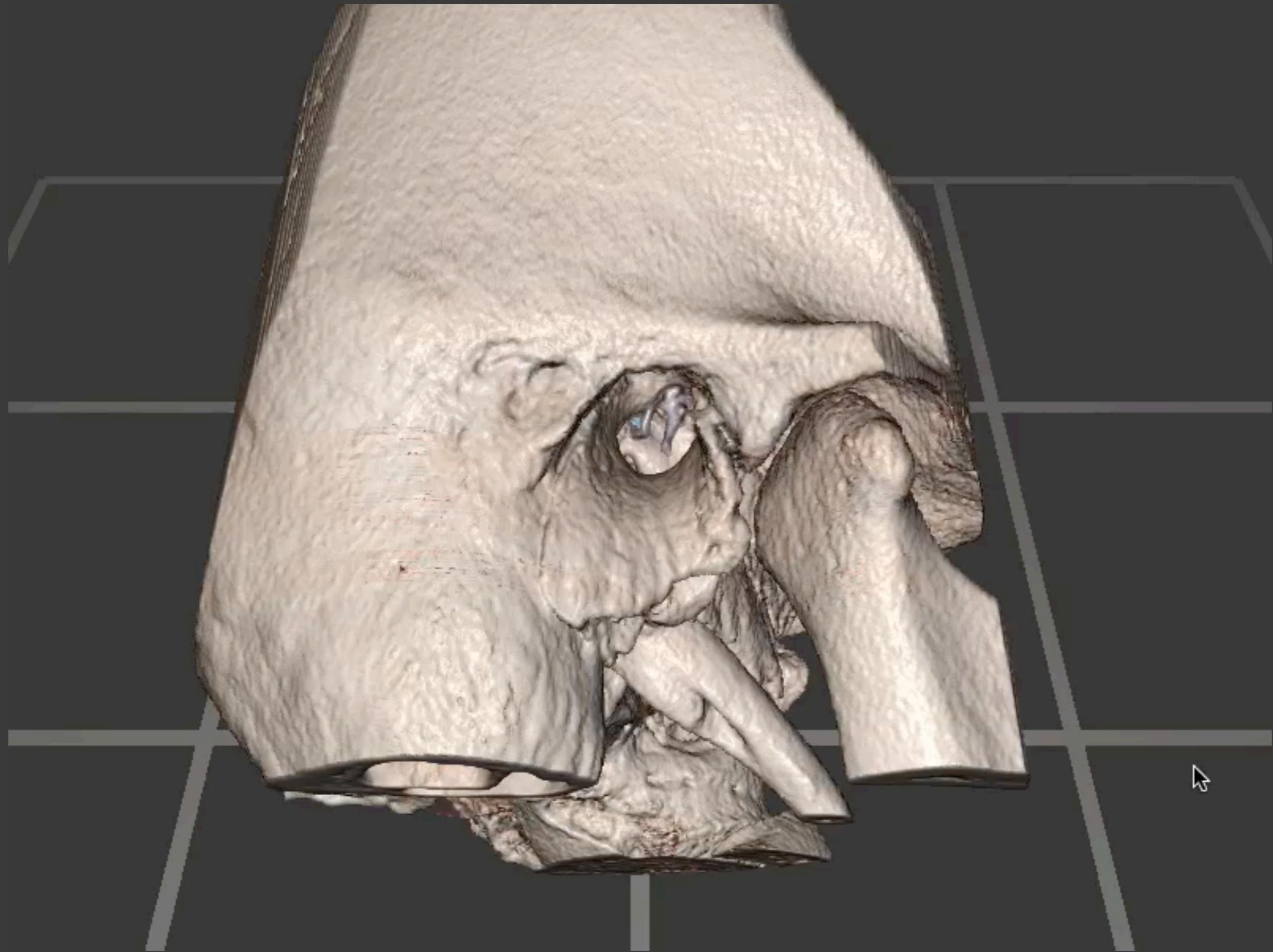
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## Virtual Surgical Rehearsal

Jason Henry, New York Times



Interested in learning more?

CPSC 599.86  
Winter 2017

