The Living Book of Anatomy: See Your Insides in Motion

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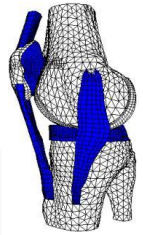
Learning anatomy

- Anatomical knowledge includes a large amount of structured, static and dynamic notions
- It is still learnt through atlases, books, dissection
- Learning could benefit from the use of emerging technology and augmented reality
- Hypothesis: using his/her own body may help the trainee to better understand dynamic notions

Our approach: the Living Book of Anatomy (LBA)

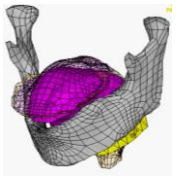
Capture (speech, motion)

User-model mapping



Knowledge base

- Fonctional anatomy
-Biomechanics
-Images, clinical cases
Etc.



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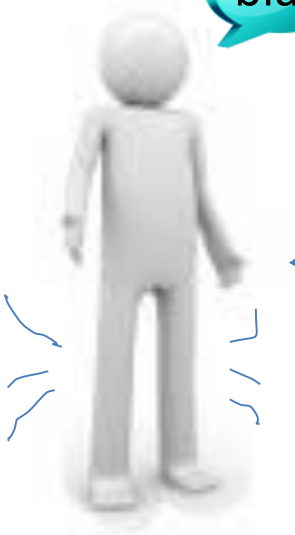
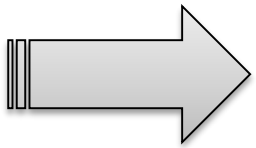
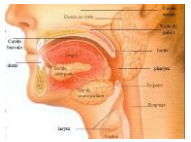
Interaction devices

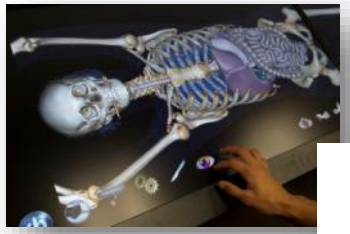






Short state of the art

- Visible Human Project
- Virtual Physiological Human
- Virtual dissection (Anatomage®)
- Medical augmented reality [Navab et al], VH dissector (MacLennan Comm College)
- Embodiment
  - Somatic learning [Freller2008]
  - « experiential anatomy »



Anatomy Transfer [Dicko 2013]

- Wrap a canonical anatomy to the shape of an arbitrary character

- Not interactive

The Anatomical Mirror

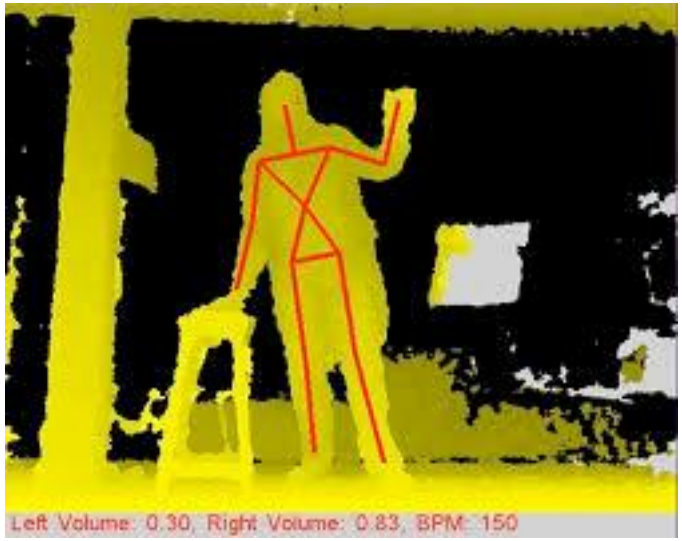
Challenges

- Modeling the user
- Tracking user pose
- Transfering anatomy
- In real time !
- Using affordable hardware

Kinect® sensor

- Color image
- Depth image

- Skeletal points

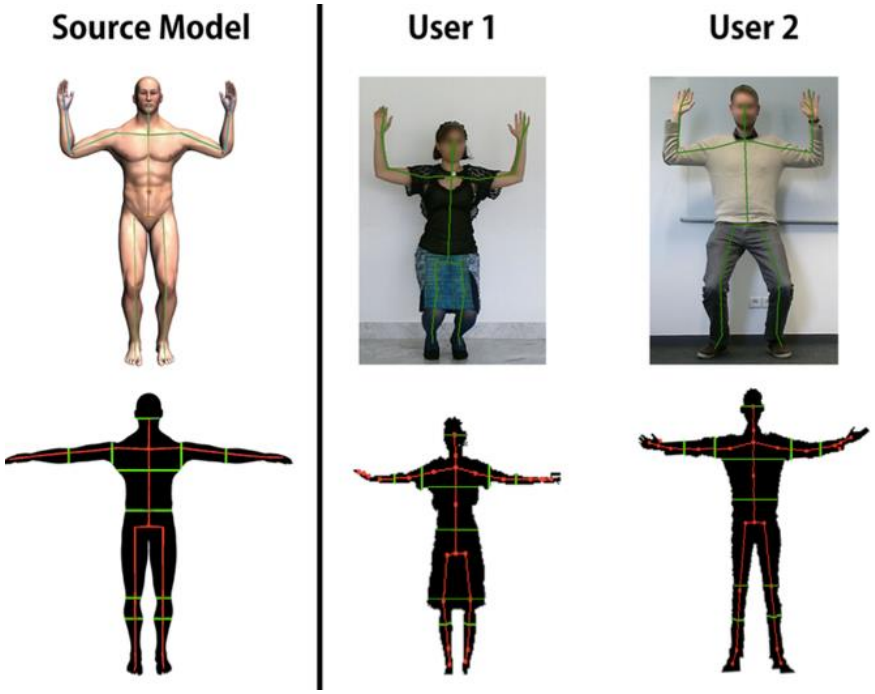


Our approach

- Initialization:
  - model user skeleton + thickness
  - transfer complete anatomy
- Run-time:
  - compute user pose
  - display anatomy using Linear Blend Skinning

User Model

- Articulated skeleton
  - compute bone lengths
- Anatomy
  - Compute thickness using depth map

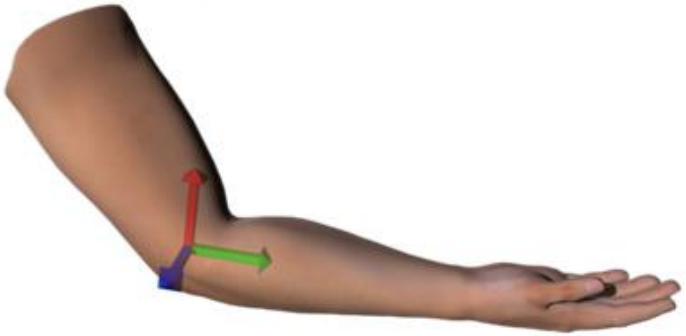


Compute user pose

- Limitations of the sdk
  - bones defined by end points
  - no temporal coherence
- Our approach
  - use a physical skeletal model
  - attract it to the bone points

Augmented Reality Display

- Display anatomy using Linear Blend Skinning

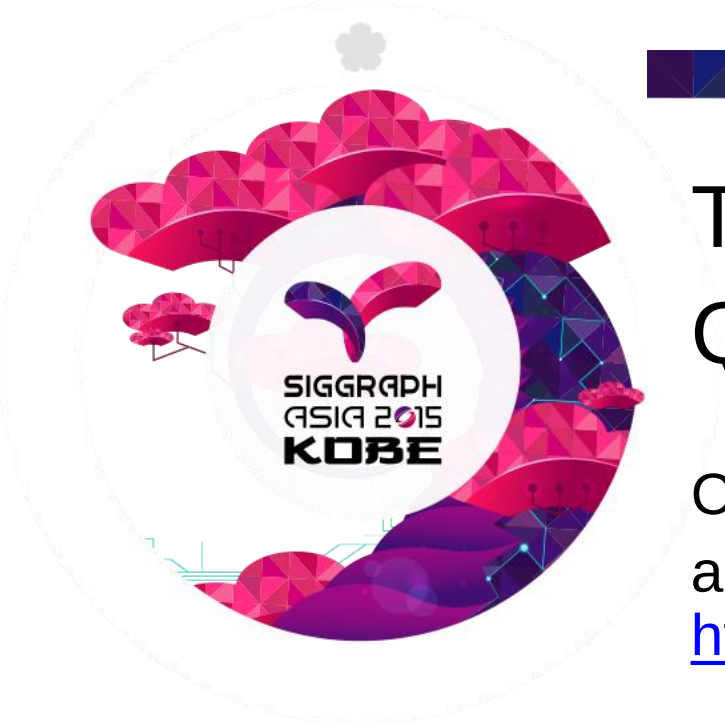


- Superimpose on color image

Results

Living Book of Anatomy Project: See your Insides in Motion !

Emerging Technologies- 0020



Thanks !

Questions ?

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