The Virtual TryOn
Personalised Fashion Models for Real-time Garment Evaluation

Bart Kevelham
Prof. Nadia Magnenat-Thalmann

MIRALab – University of Geneva
What is a “Virtual TryOn”? 

- An (online) application, allowing you to try on virtual garments
  - For consumers
    - Online shopping: “I like this garment, but how does it look on my body and will it fit?”
  - For designers
    - Rapid prototyping/evaluation of a design in various sizes and with various fabrics
Available components

- I did not have to develop this from scratch
- Several libraries were available
  - **Body Sizing** (Mustafa Kasap)
  - Skinning and **motion retargeting** (Etienne Lyard)
  - **Garment Simulation** (Pascal Volino)
- And let’s not forget the designers
  - They provided the bodies, garments, animations…
- So let’s walk through the components
Available: Body Sizing

- An accurate body is essential
  - To “try on” clothing, you need a virtual body that represents your own
- Start from a template body
  - Generate a body with your sizes based on anthropometric data [KMT07]

Available: Motion Retargeting

- Animation is usually pre-recorded
  - Through the use of motion capture equipment
- Any changes to the body’s morphology influence its animation e.g.
  - A heavier set person has a different gait than a lighter person
  - Someone with longer legs will have a longer stride
- The recorded animation needs to be adapted to account for these changes
Available: Garment Simulation

- Physical simulation of garments
  - Simulation based on measured physical parameters of used fabrics
  - Includes grading information
    - Selection of various different garment sizes
    - No need to change to different meshes
  - 2 Simulation modes:
    - Real-time (preview) simulation
    - High-Quality simulation

Proceedings of Motion in Games 2008, Lecture Notes in Computer Science (to appear)
What did I contribute so far

- With all the available components, what is my contribution?
  - Integration
  - Built a personalizable dressed virtual human
  - Contained in a simple library that can be used in various contexts
    - VTO, Remote AR, …

- Added functionality of the VTO
  - Make sure we can interface with it from the web
  - Recording of high quality videos
Let’s analyze: bottlenecks

- Body sizing and motion retargeting are **not** the bottlenecks
  - They only compute when the body is changed
  - They do so quite fast
- The major bottlenecks are:
  - Garment simulation
    - Resolution of garments is limited (*)
  - Collision detection
    - Currently a simple scheme
Let’s analyze: the reason

- Of course simulation is a “hard” problem
  - Our demands don’t help
  - Accuracy is important to us

- We don’t use the resources at our disposal
  - 4-core Intel Xeon E5410 @ 2.33GHz
    - We only use a single core
    - The others are idling
  - GeForce 9800 GX2
    - Merely used for relatively simple rendering tasks
    - 768GFlops of computational power barely used

I could contribute here!
Let’s optimize resource usage

- **CPU Optimization?**
  - Utilize all cores, spread the work
  - We will get more, so why not prepare for the future

- **GPU Optimization?**
  - Lots of calculations that could be done in parallel
  - Relatively cheap computational power

- **Why?**
  - Faster VTO (Or higher quality in same time)
  - New scenarios
    - Distributed web service?
CPU: What is happening?

- Extensive research in parallelization of cloth simulation
GPU: What is happening?

- Garments

- Haptics quite strongly represented
  - Sofa framework (http://www.sofa-framework.org)
    - Focus on medical
    - [CTA08] Efficient Nonlinear FEM for Soft Tissue Modelling and Its GPU Implementation within the Open Source Framework SOFA

- Commercially available
  - Physx SDK
    - Taken over by Nvidia. Ported to CUDA
    - Nurien (Dressed avatars. Focus on social networking)

- Collision detection limited

My plans?

- The main VTO development has been done
  - Improvements are always possible
  - But now we can start to optimize

- Focus on GPU optimization
  - Cloth simulation
    - Port current simulation to the GPU
    - Adapt, improve, innovate
  - Collision detection
    - Current scheme translates nicely
    - Investigate other more accurate schemes
Conclusion

See you next year with some results!
Questions are welcome