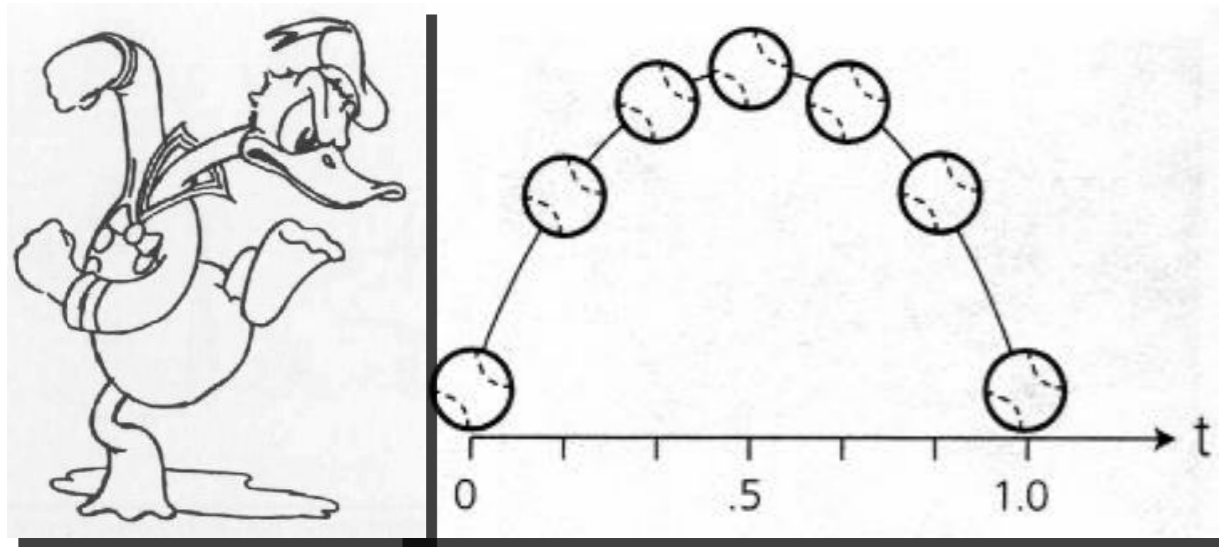


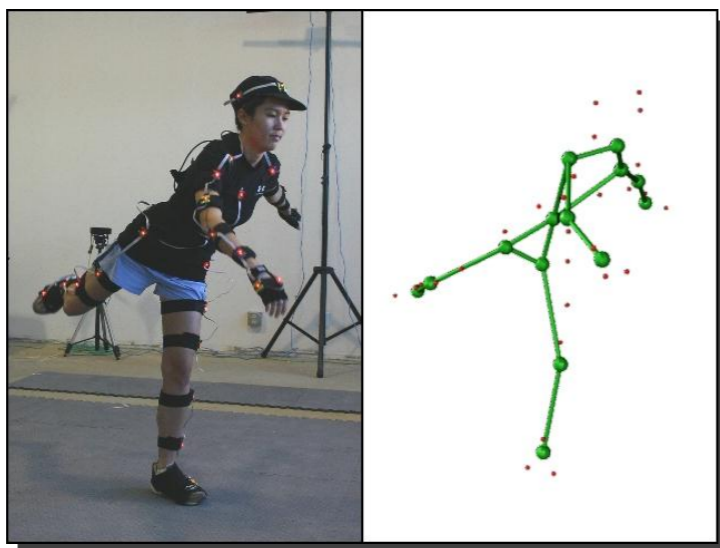
Techniques for Creating Animation



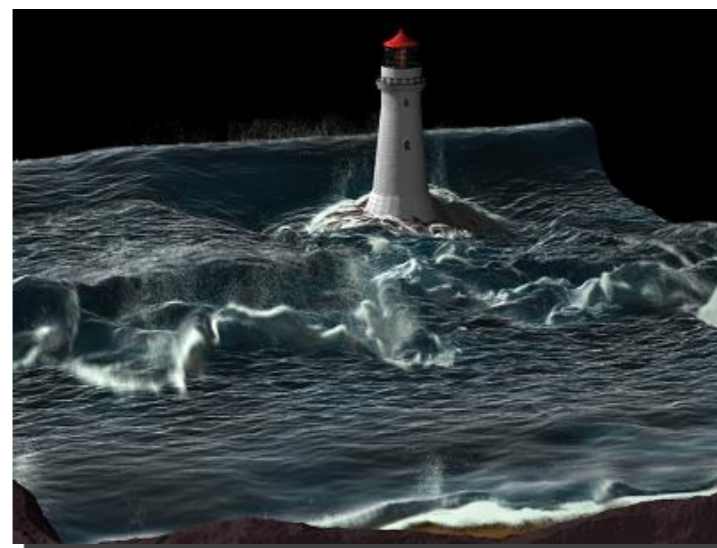
Keyframing



Procedural Animation



Data-driven Animation

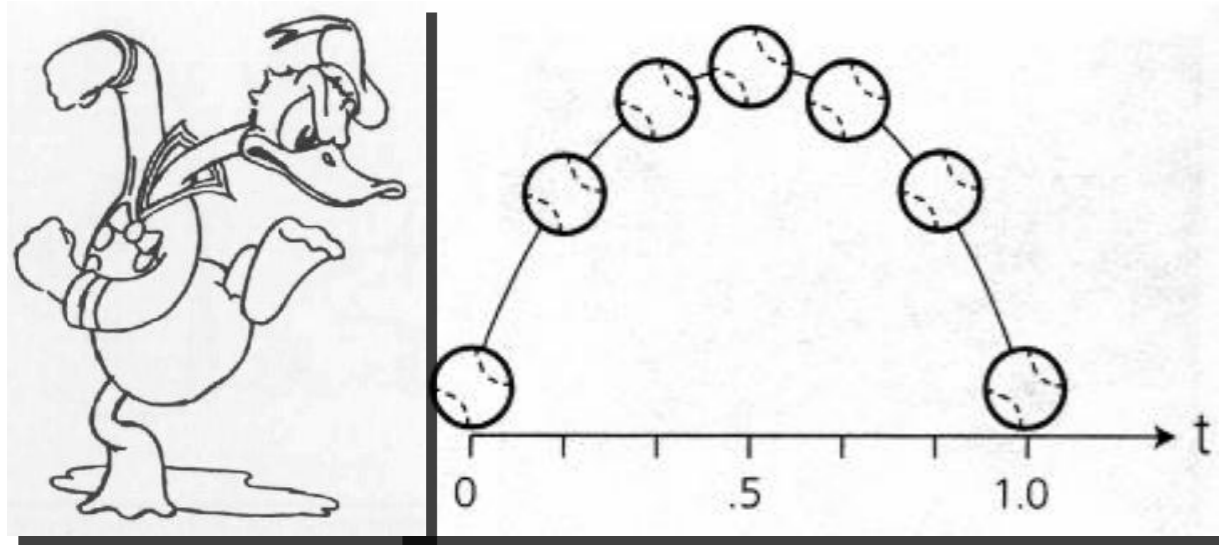


Physical Simulation

Reminder

Send me your 5 paper
selections by Tuesday

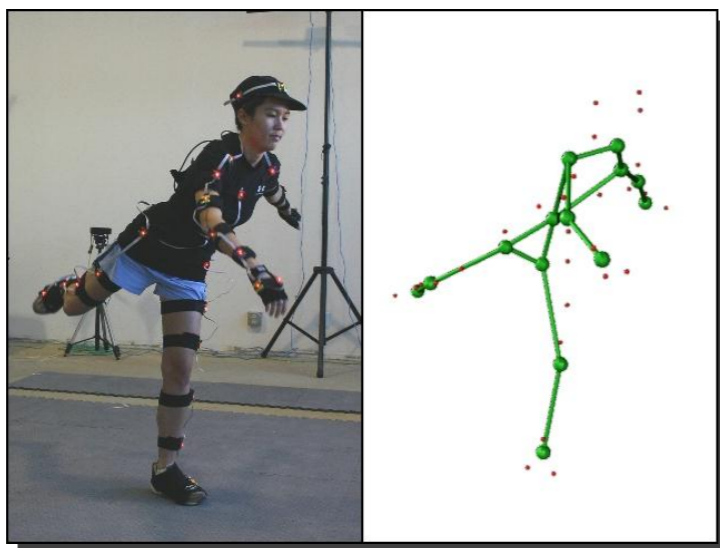
Techniques for Creating Animation



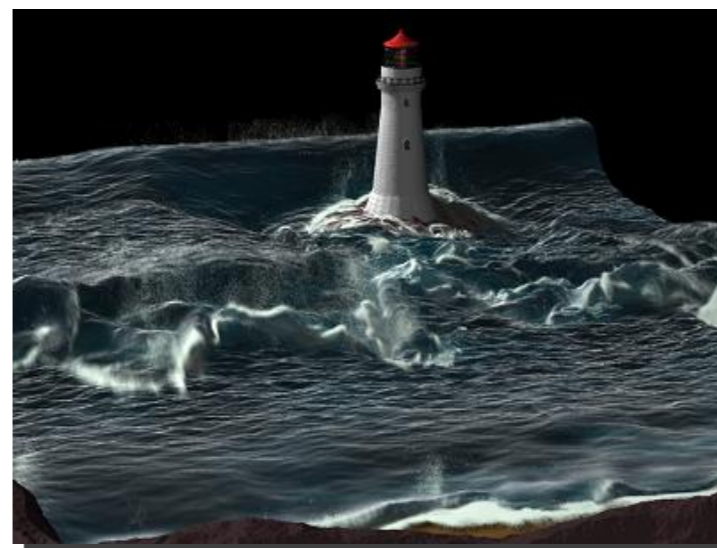
Keyframing



Procedural Animation



Data-driven Animation



Physical Simulation

Keyframing: animation



A basic walk cycle tutorial:

<http://www.anticz.com/Walks.htm>

3D Keyframing: setup



Model, rig, and animate your
character in Maya

<http://www.youtube.com/watch?v=rWKLPDfamm0>

Keyframing = Traditional Animation?



ParaNorman – stop motion

<http://www.youtube.com/watch?v=CGnBT0J5jCs>



**Brave – 3D animation using
Pixar's animation pipeline**

<http://www.youtube.com/watch?v=7IXKCzko2gM>

Keyframing = Traditional Animation?



http://blogs.suntimes.com/ebert/2011/01/the_best_animated_films_of_201.html

Principles of Traditional Animation

[Lasseter, SIGGRAPH 1987]

- Stylistic conventions followed by Disney's animators and others
- From experience built up over many years
 - Squash and stretch -- use distortions to convey flexibility
 - Timing -- speed conveys mass, personality
 - Anticipation -- prepare the audience for an action
 - Followthrough and overlapping action -- continuity with next action
 - Slow in and out -- speed of transitions conveys subtleties
 - Arcs -- motion is usually curved
 - Exaggeration -- emphasize emotional content
 - Secondary Action -- motion occurring as a consequence
 - Appeal -- audience must enjoy watching it

Procedural Animation



<http://www.massivesoftware.com>

<http://www.youtube.com/watch?v=W5pNPJAhsBI>

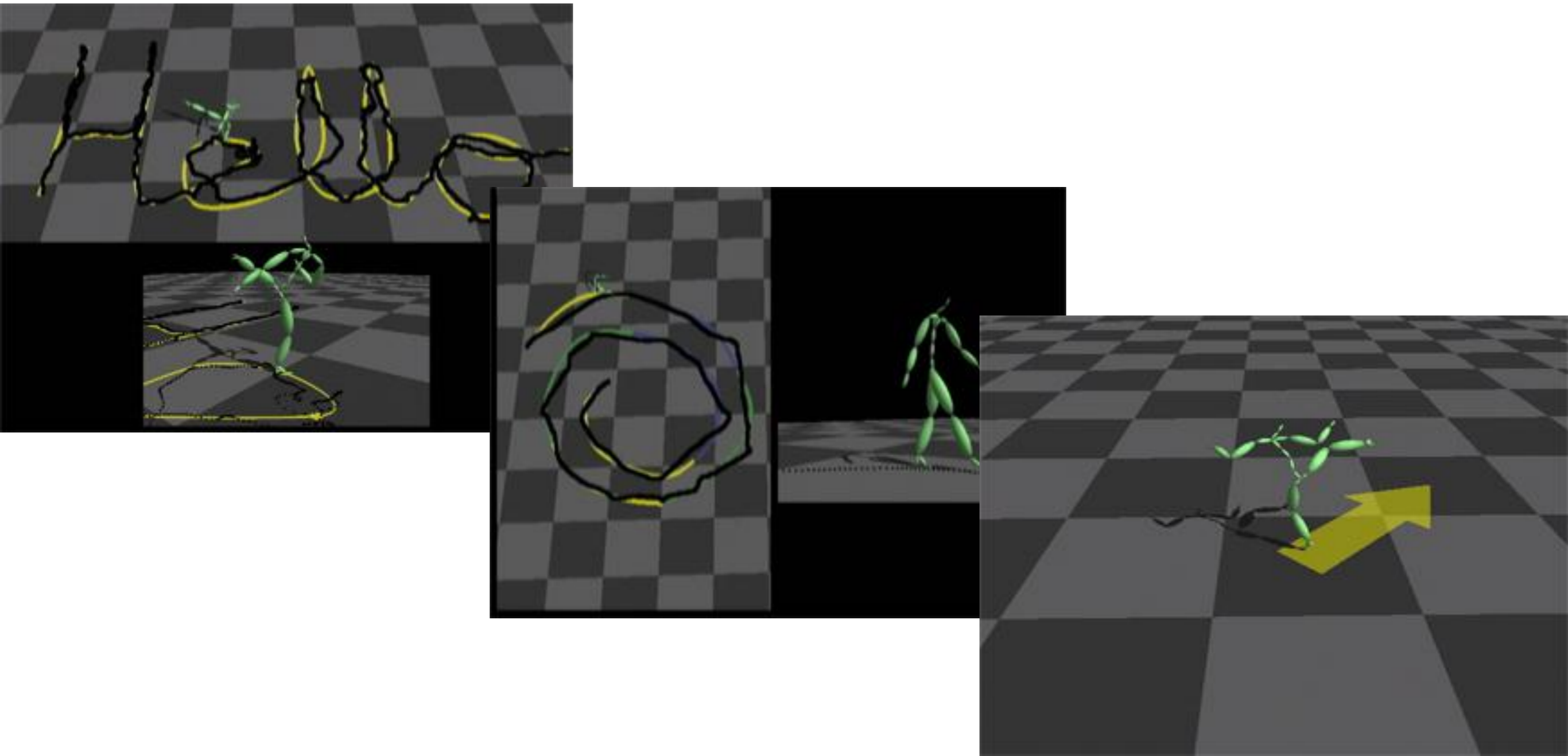
Data-driven Animation



Lab Demo Tues. Jan 22 meet in WeH 1334



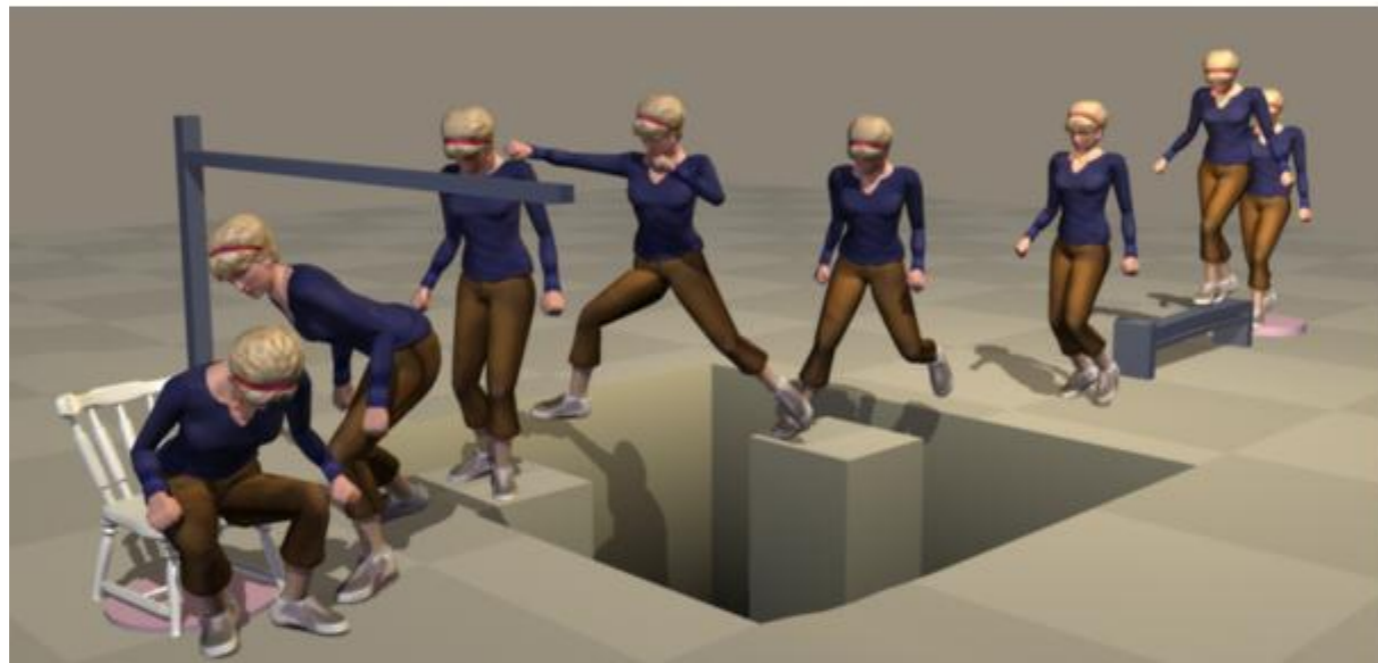
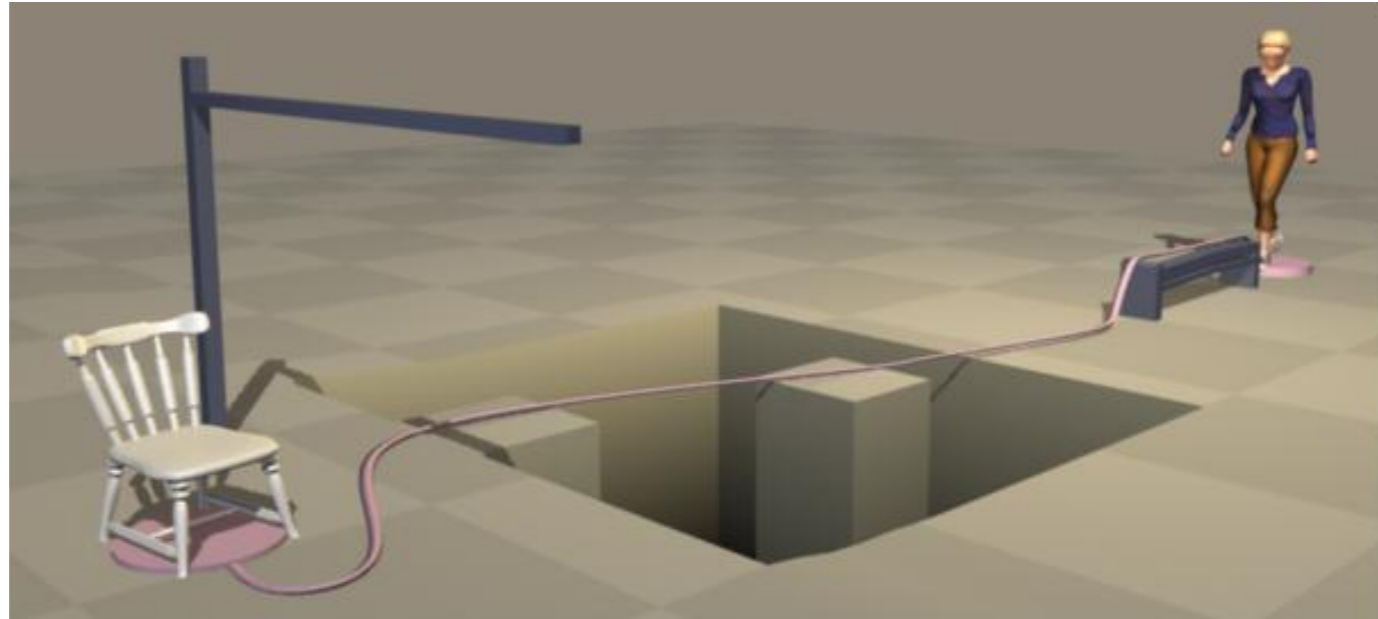
Motion Graphs Videos



<http://www.cs.wisc.edu/graphics/Gallery/kovar.vol/MoGraphs/>

Lucas Kovar (U. Wisconsin / ILM)
with Michael Gleicher

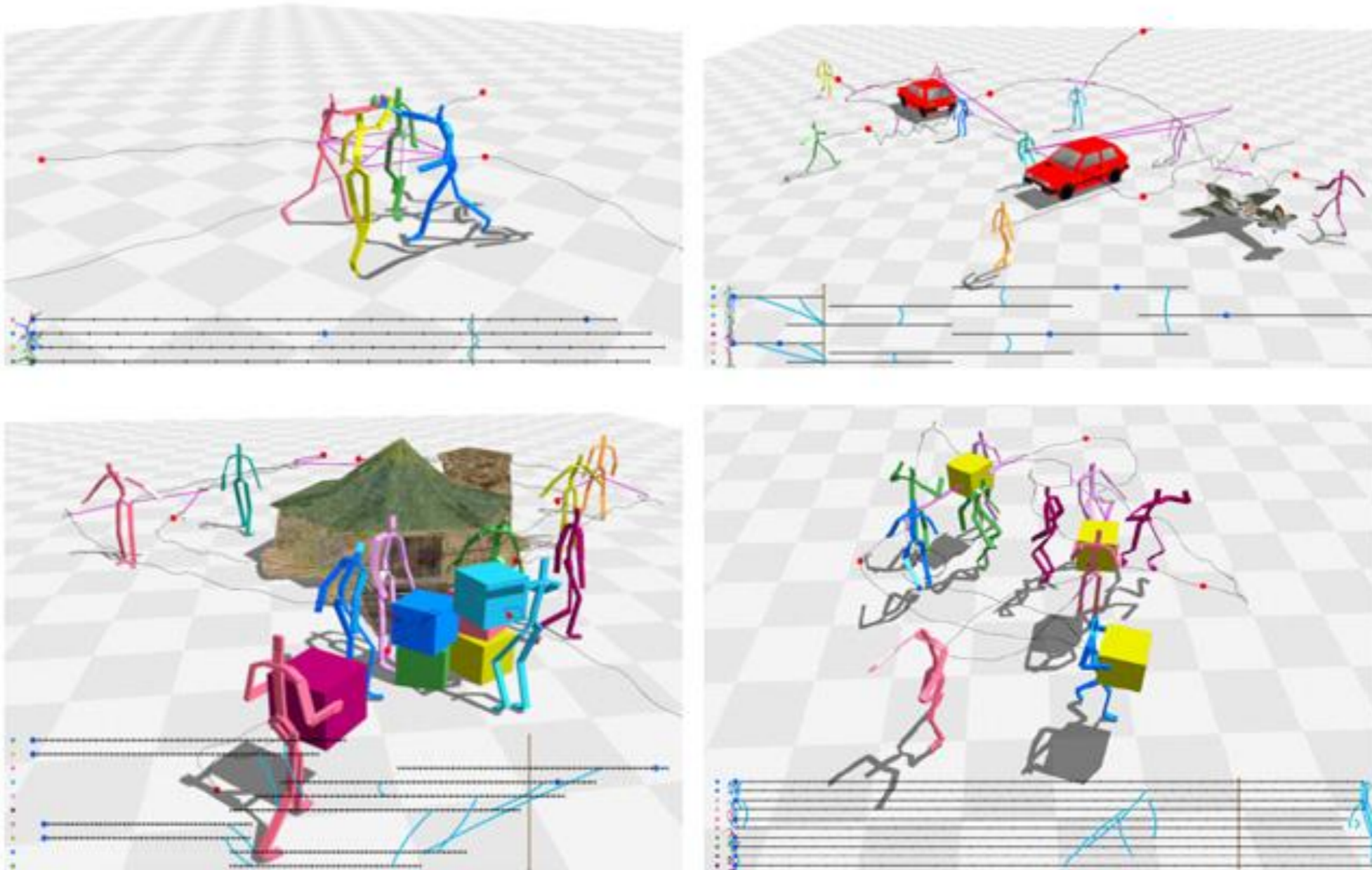
Interpolated Motion Graphs



<http://www.seas.upenn.edu/~alla/>

Alla Safonova (CMU / U. Pennsylvania)
with Jessica Hodgins

Interactive Editing



<http://mrl.snu.ac.kr/~jehee/>

Jehee Lee (Seoul National University)

Dense Body Capture

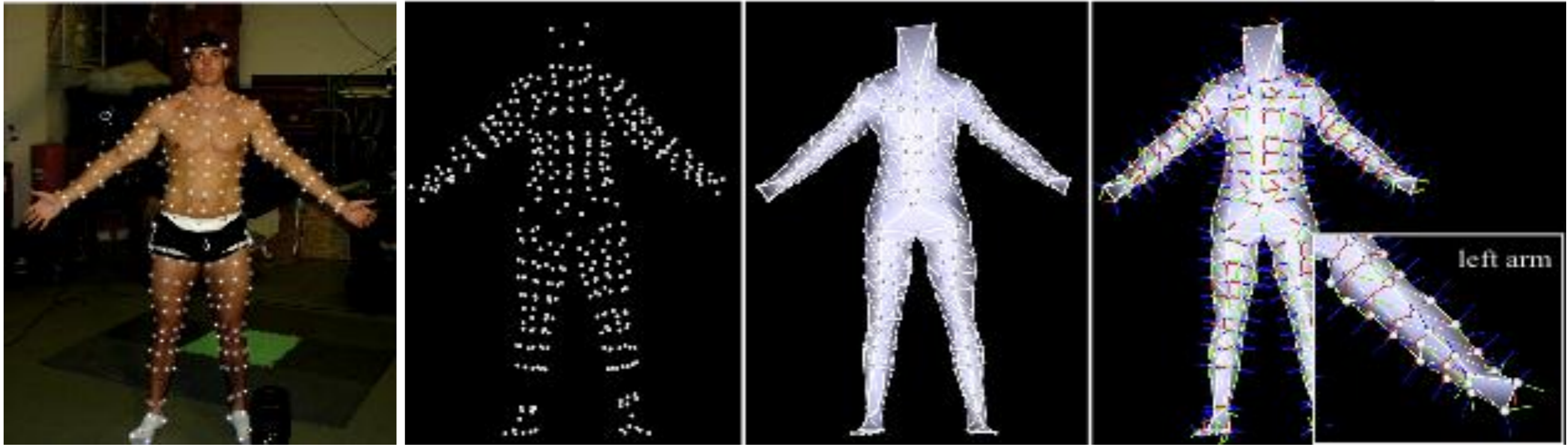


Laser Range Scanning

Performance Capture from Sparse Multi-view Video

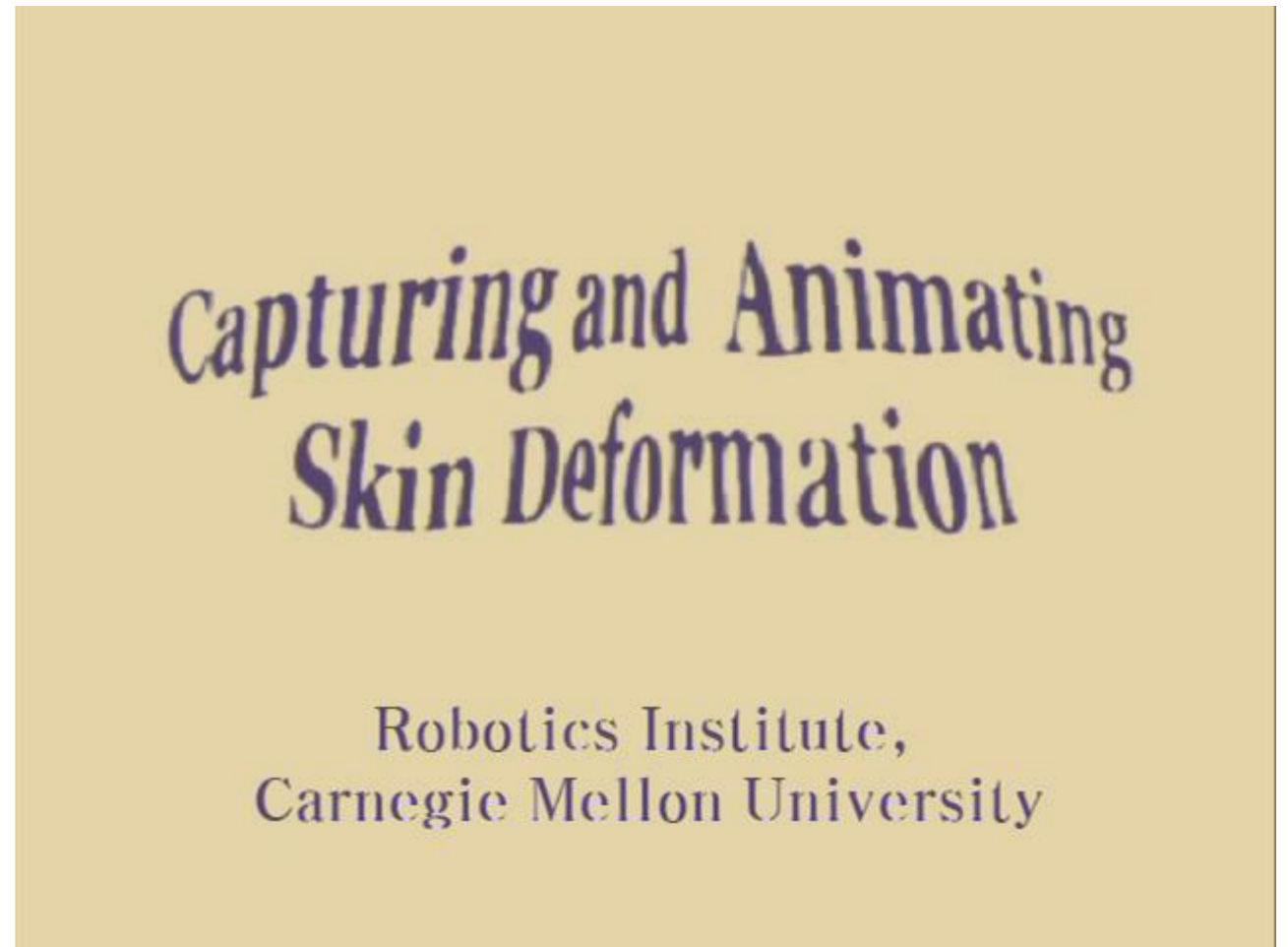
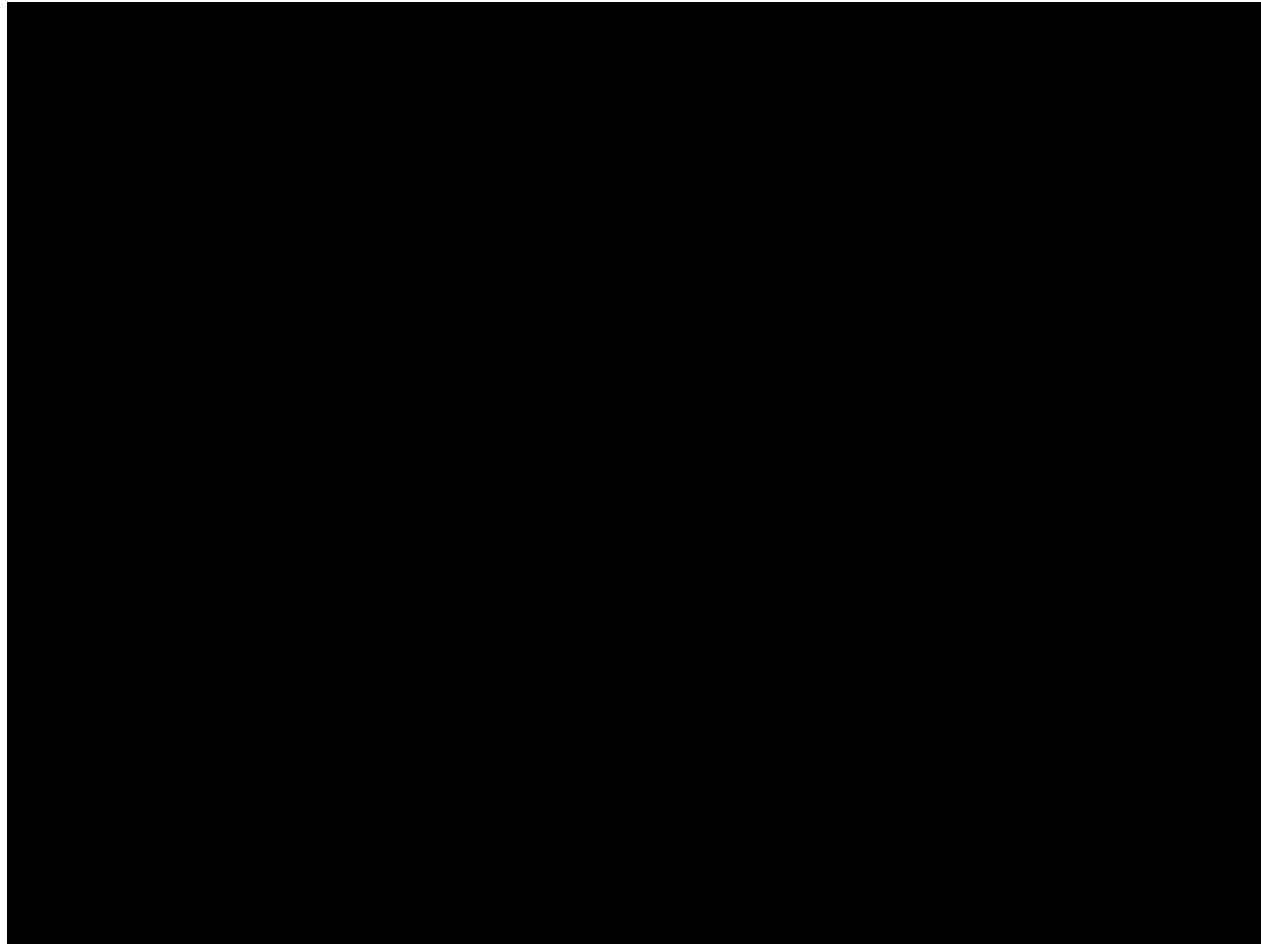


Dense Marker Capture



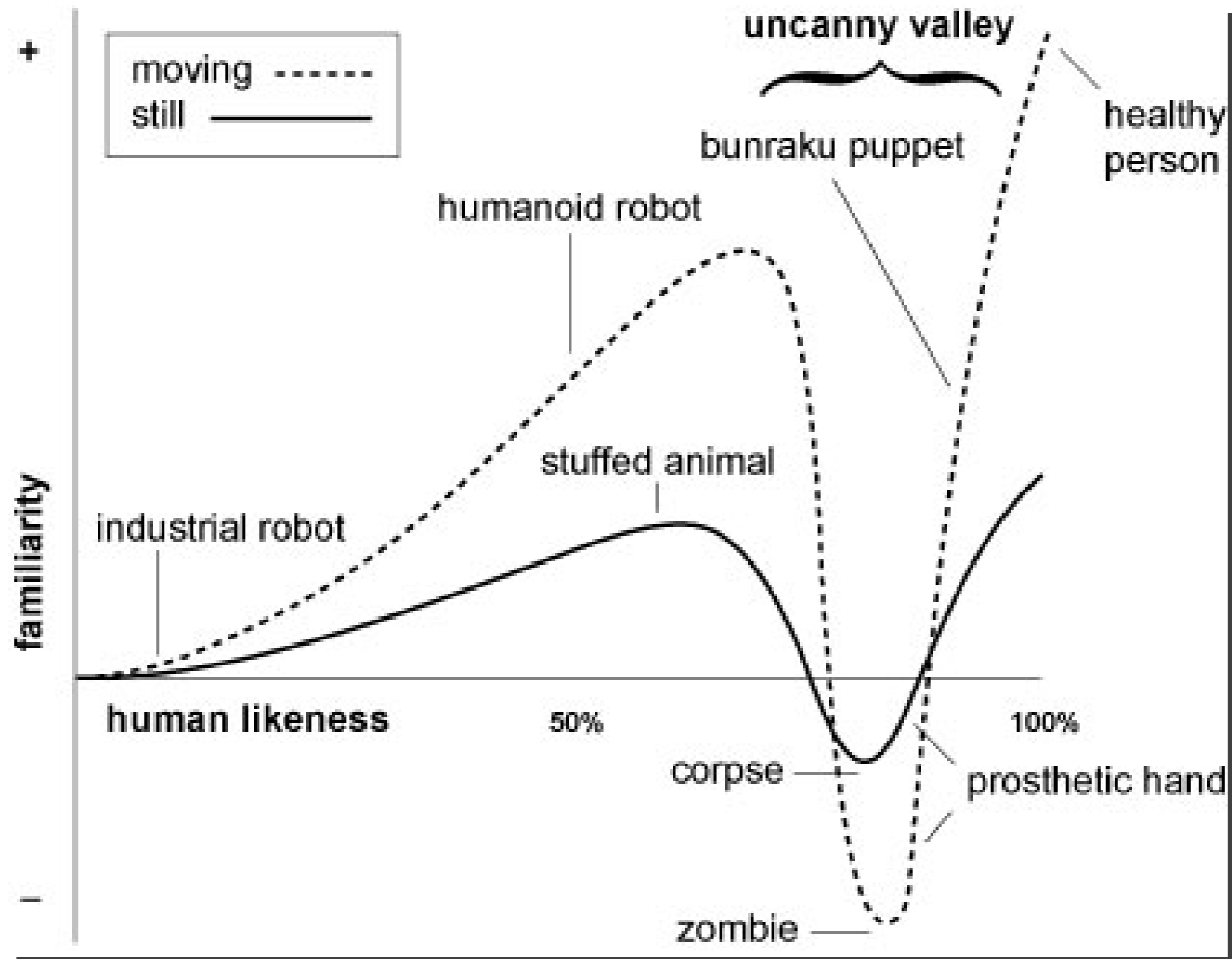
Sang Il Park (CMU / Sejong University)
with Jessica Hodgins

Dense Marker Capture



Sang Il Park (CMU / Sejong University)
with Jessica Hodgins

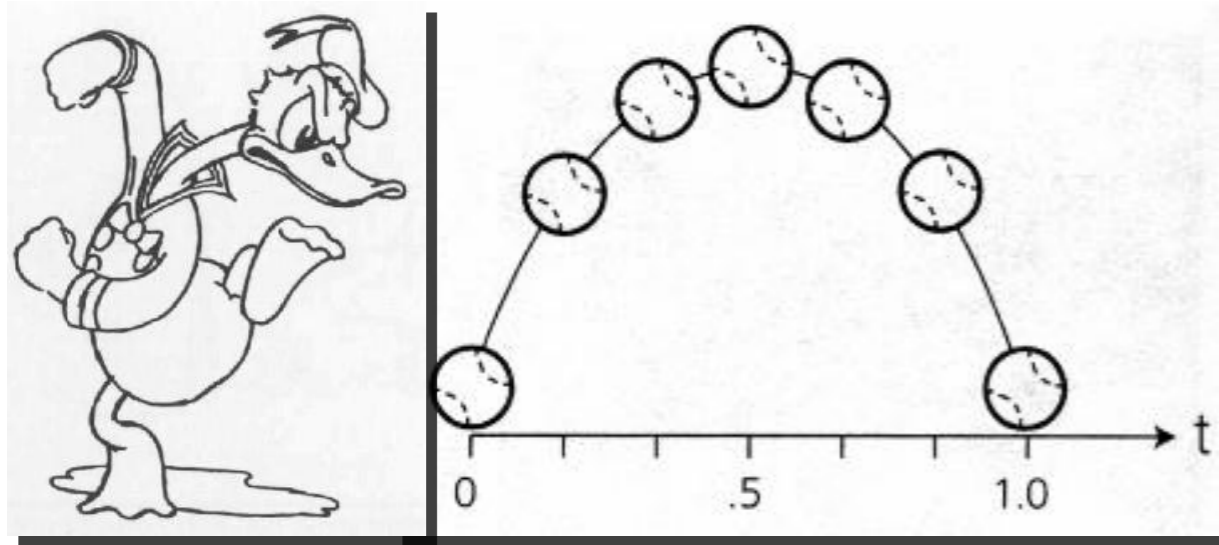
Uncanny Valley



Match Character Geometry to Animation Capabilities



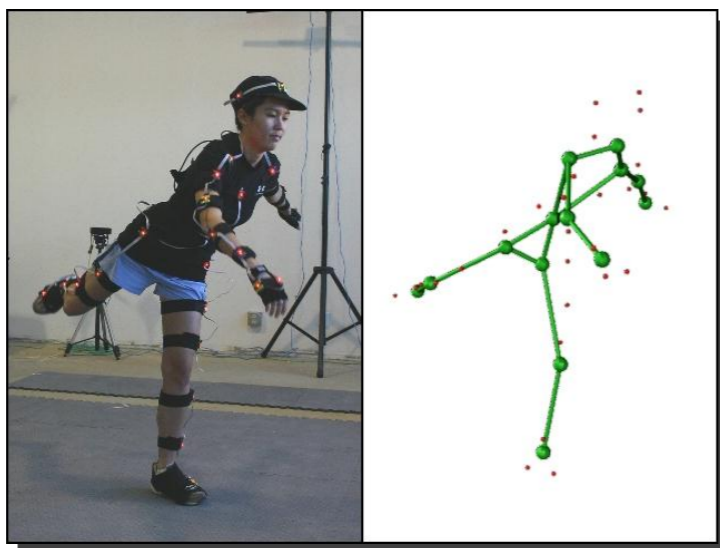
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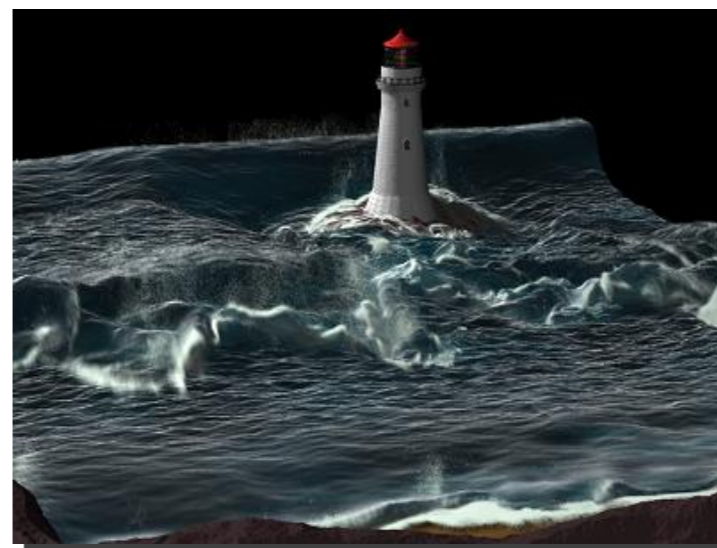
Keyframing



Procedural Animation

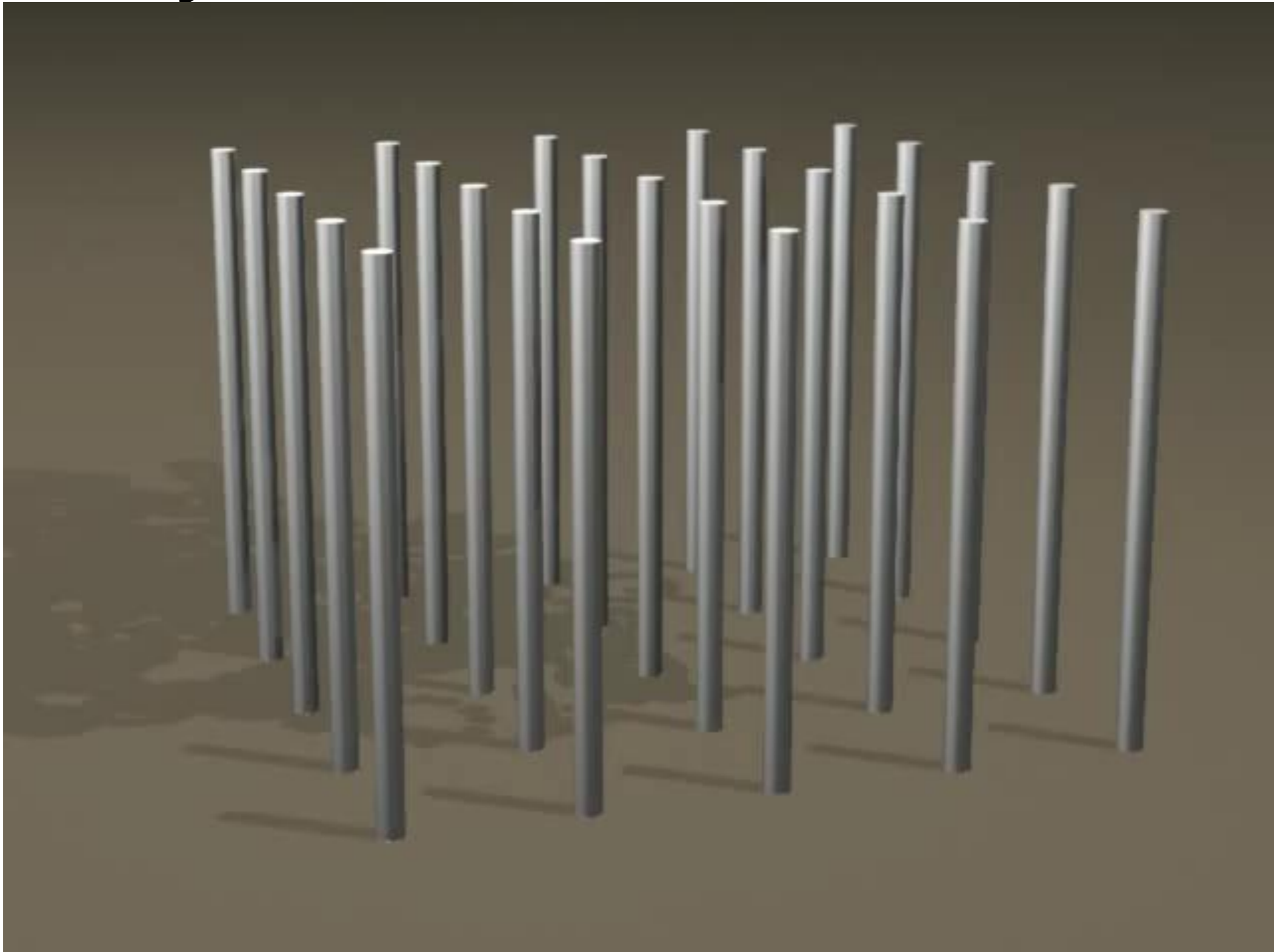


Data-driven Animation



Physical Simulation

Physics-based Animation



Now for some details...

Keyframing: setup

What is accomplished?

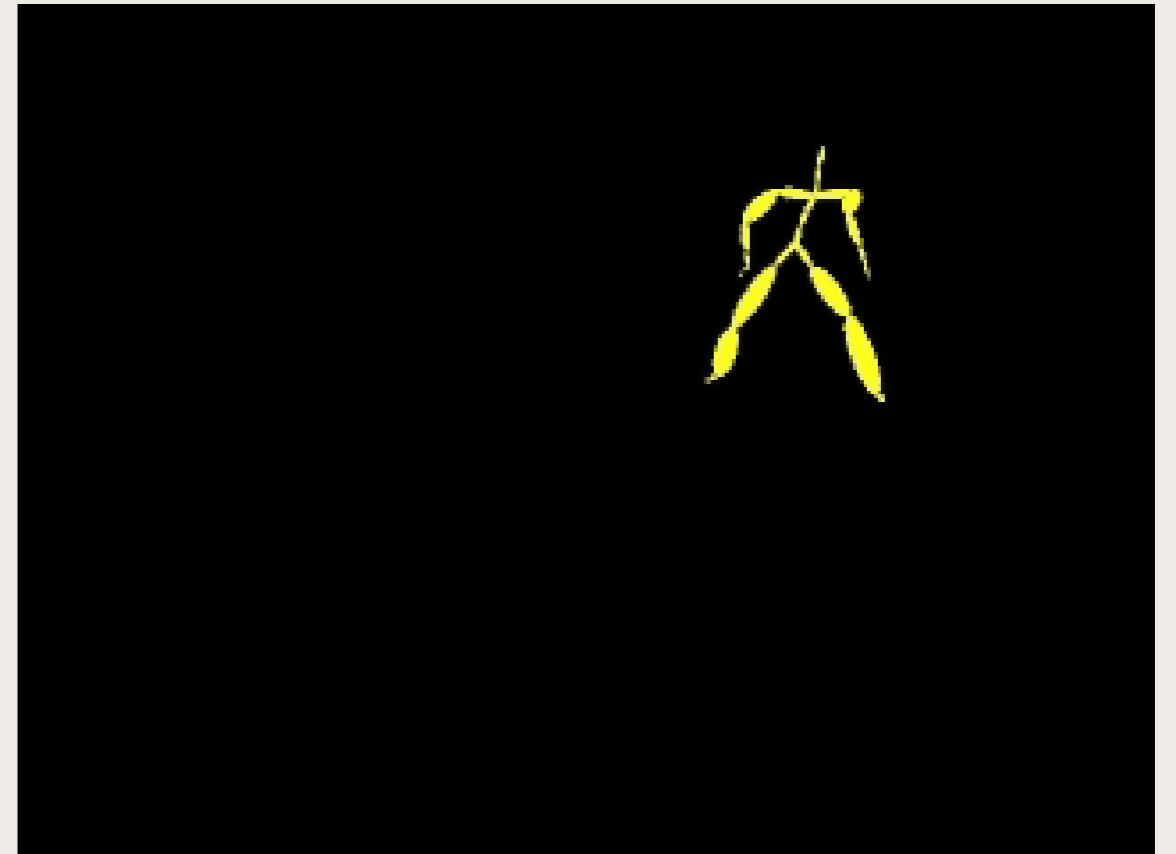
- Define joint locations and bone heirarchy using a point and click interface
- Define joint limits
- Set up Inverse Kinematics handles
- Bind skeleton to its “skin”

Walk Cycle Variations



<http://www.amazon.com/Animators-Survival-Kit-Richard-Williams/dp/0571202284>

Working with Motion Capture is Quite Different...



<http://mocap.cs.cmu.edu/>

CMU Mocap Database

To define a motion, we need:

The skeleton file: ASF format

The motion file: AMC format

Let's look at these...

Editing Motion Capture Data

How might you edit motions in such a format?

Retiming

Displacement curves

Motion “filtering”

Keyframe extraction / edit keyframes

Retiming

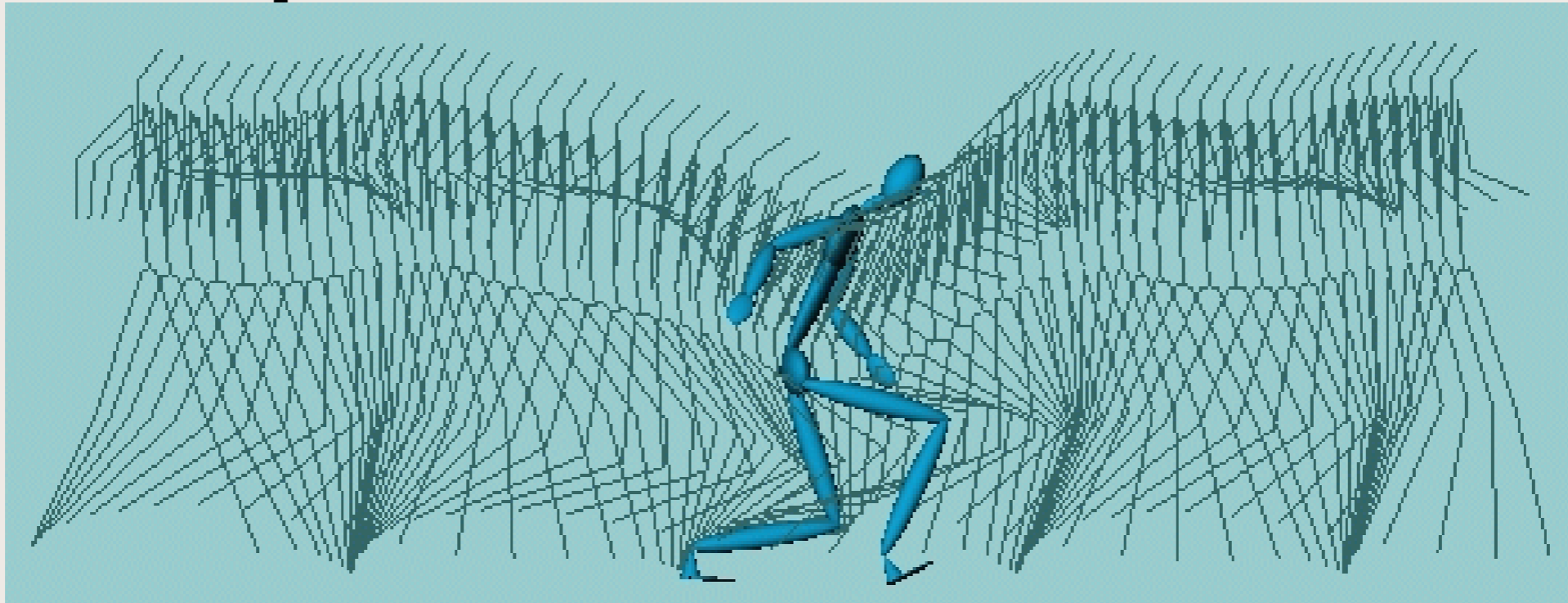


System outline:

- Beat extraction
- Dynamics extraction (louds and softs)
- User script file determines motions
- System controls timing, dynamic range of movements

Danielle Sauer and Yee-Hong Yang, Music-driven character animation, ACM Transactions on Multimedia Computing, Communications, and Applications (TOMCCAP), Volume 5 Issue 4, October 2009

Displacement Curves

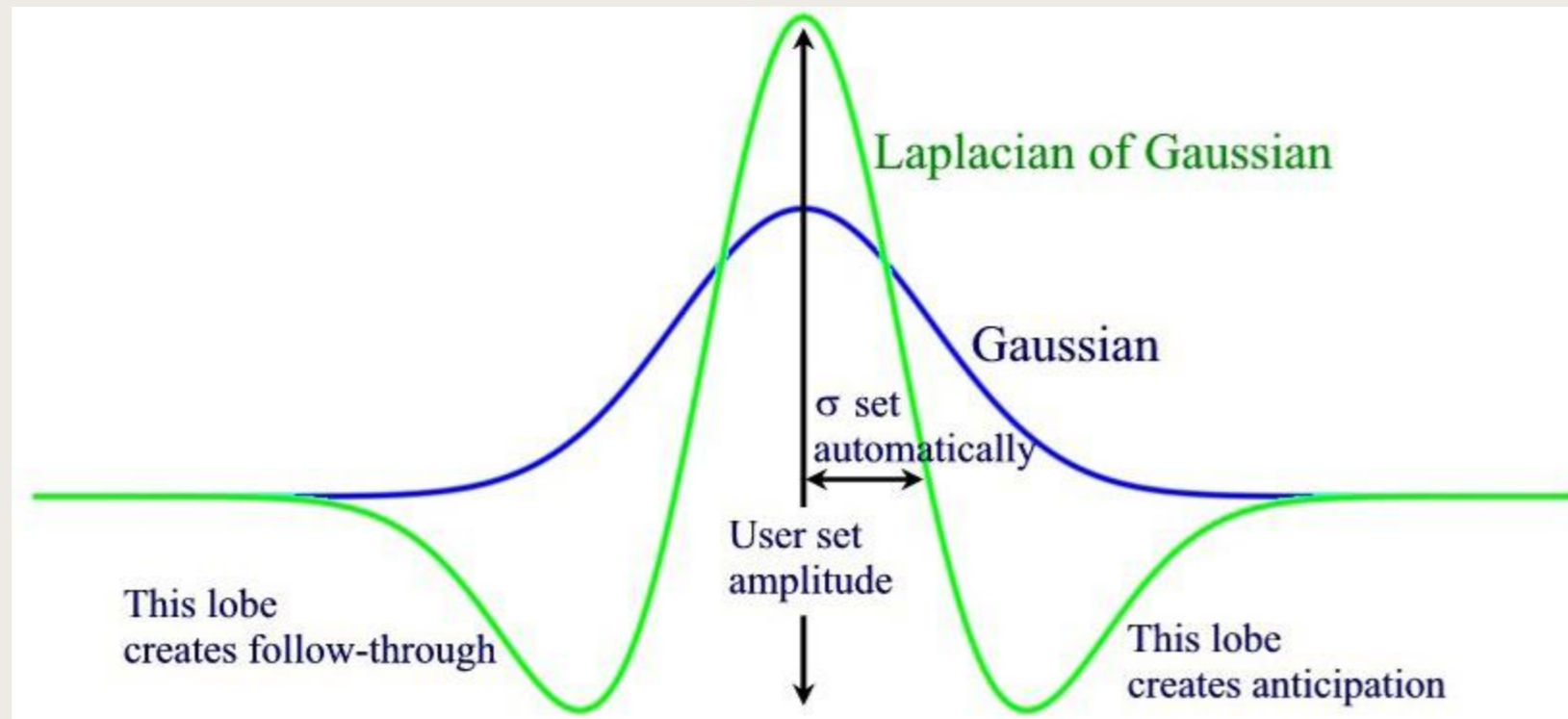


Main ideas:

- User edits \rightarrow displacements to the original motion
- Displacements can be made at different resolutions in a hierarchical scheme

Jehee Lee and Sung Yong Shin, A Hierarchical Approach to Interactive Motion Editing for Human-like Characters, SIGGRAPH 99, 39-48, August 1999.

Motion Filtering



Main idea:

- A simple filter applied to a motion sequence can create squash and stretch effects and cartoon like exaggeration

The Cartoon Animation Filter

Jue Wang, Steve Drucker, Maneesh Agrawala, Michael Cohen
SIGGRAPH 2006, July 2006. pp. 1169-1173.

Keyframe Extraction



Main idea:

- Keyframes are local extrema of an embedding of the motion into a low-dimensional space

Jackie Assa, Yaron Caspi, and Daniel Cohen-Or
Action Synopsis: Pose Selection and Illustration
SIGGRAPH 2005