CS174 C - Computer Animation

Discussion 1
Graphics Pipeline

- Data in world coordinate:
  - $\text{XYZ}_w$:
    - world coordinate.

- Data in frame buffer:
  - $\text{hxyz}_c$:
    - device coordinate.

- Modeling Transformation (CTM):
  - $\text{XYZ}_w$

- Viewing Transformation (V):
  - $\text{XYZ}_w$

- Rendering (R):
  - $\text{hxyz}_c$
  - $\text{XYZ}_c$

- Perspective Projection (P):
  - $\text{XYZ}_c$
Animation

Data in world coordinate

Modeling Transformation (CTM)

Viewing Transformation (V)

Data in frame buffer

Rendering (R)

Perspective Projection (P)

$\text{XYZ}_w$: world coordinate.

$\text{XYZ}_e$: eye coordinate.

$\text{XYZ}_c$: clipping coordinate.

$\text{hvyz}_c$: device coordinate.
Computer Animation

3 main types of animation:

• **Key-frame**
  • High level of control
  • A lot of manual work

• **Motion Capture**
  • Realistic
  • Interaction between digital / real objects is tricky
  • Expensive?

• **Physics based**
  • Realistic
  • Automated
  • Computationally intensive
  • Little to no control
Computer Animation

Usually a mixture of the methodologies:

e.g.:

Humanoids: motion capture
Nature: physics
Novel objects: key frame

Activision
http://www.youtube.com/watch?v=l6R6N4Vy0nE

Berjamin Button
http://www.youtube.com/watch?v=eYSXaU6eKm4

Nvidia fluid
http://www.youtube.com/watch?v=UYIPg8TEMmU
Projects

Visual Studio 2010

Windows XP, Windows 7, 8

Use remote.seas.ucla.edu (or seaslab)

REMARKS
• Your code must compile and link correctly
• The project MUST work on Windows on an environment similar to the one provided by SeasNet
• Yes, I want the Visual Studio files as well! Make sure your project compiles and runs correctly in Visual Studio
• The zip tools available in the SeasNet labs are not very good, so make sure that your archive is not corrupted!
• Please make sure you submit a zip file and not some other archive format (e.g. rar, 7z, ace, tar)
Refresher on transformations

**General Form**

\[
M = \begin{bmatrix}
    m_{11} & m_{12} & m_{13} & m_{14} \\
    m_{21} & m_{22} & m_{23} & m_{24} \\
    m_{31} & m_{32} & m_{33} & m_{34} \\
    0 & 0 & 0 & 1
\end{bmatrix}
\]