Gestural and Cinematic Interfaces – DX11

“Making an emotional connection with users”
Unlimited Realities / Fingertapps

About Us
- Company started in 1996
- Fingertapps in 2006
- 2008 We created for Dell the first Windows multi-touch software on the market.
- 2010 Our software was launched on all Dell consumer PC's
The “casual software” trend

- Purpose delivered with a minimum of features  
- Art design and effects enhance the experience  
- Interaction in large areas - using physics

Function  
Cinematic  
Gestural

These concepts apply across all types of applications. We are utilising Fusion and DX11 to raise the bar on the cinematic and gestural experience for users.
Presentation Overview

- Gestural
- Cinematic
- DX11
Gestural

Broad motions

- Full screen compound interfaces are not *imposing* like atomic ones
- Sweeping movements are more *forgiving* and *friendly*
- Intention based recognition is more *receptive*
Atomic vs. Compound interface
Gestural

Tactile

- Physical simulation appears more *authentic*
- Direct Manipulation feels *tangible*
Physical Simulation
Gestural

Rich Input is more *immersive*

- Mouse, Keyboard input
- Touch input
- Near Touch input
- Full body input
- Audio input
Mouse and Keyboard input
Input Methods

Touch input
Input Methods

Near Touch

1 foot
Full Body Input

9 foot
Input Methods

Audio Input

9+ foot
Gestural

User interaction

- Device types determine how people feel *connected*
- Ergonomics make the user’s experience more *comfortable*
Input Methods

**Device types**

- **Up close and personal**: Smart phones and Tablets
- **Multi user**: Laptops and All-in-one
- **Televisions**

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**Fusion**

DEVELOPER SUMMIT
Ergonomics

Un-answer questions...

- How do people use large form factor systems?
- How long do they use these devices for?
- Do they stand or sit?
- What angle is their arm, wrist, hand?
- What % of interaction is touch vs. keyboard vs. mouse?
- How do the ratios change depending on task?

Lots of publicly available research and recommendations

Very little publicly available research and no industry guidelines
Cinematic

Performance

- 30 fps (minimum) keeps the experience *smooth*
- Low latency inputs feel *responsive*
30 fps vs input latency
Cinematic

Visually Rich

- Previewing an action is more *intuitive*
- Showing an actions behavior is more *playful* and *satisfying*
- Consistent visual metaphors are *empowering*
- Rich content is *appealing*
Cinematic Worlds

- 3D layouts containing 2D workspaces improve a user’s spatial model and make navigating seem familiar.
- Transitions help spatial awareness and make the experience cohesive.
2D workspaces in 3D worlds
3D worlds and transitions
Cinematic

Effects are wide ranging – some examples of how they can be used include:

- Providing visual cues to focus the users attention is **helpful**
- Clear feedback on actions is **comfortable**
- Find models which are less abstract and feel more **natural**
- Provide users feedback on progress or success making outcomes **clearer**
Visual cues on active elements
DX11 case study 1

MLAA over MSAA
- Morphological Anti-aliasing
- Speed and quality
- DirectCompute
- RGB vs Depth vs Depth + Normals
MLAA

RGB

Causes thinning and smoothing of text
MLAA

Interfaces DX11

Unlimited Realities

Depth

Misses edges
MLAA

Unlimited Realities

Depth + Normals

Great edges

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DX11 case study 2

**Particle system**
- DirectCompute
- Low thermal and CPU overhead
DirectCompute particles

1. Load XML particle system definition created in editor
2. Load particle PNG resources
3. CPU emit's particles with random seed values
4. DirectCompute manages particle lifetime and generates lookup textures for the class of particle
5. Geometry shader animates and displays particles using the generated look up textures
Particle lookup textures

- These textures are simulated and output by the GPU when they are first spawned.

- Because the random seed data is provided by the CPU this information is constant for each class of particle – hence this pre-computed data is quite small.
DirectCompute particles
DirectCompute particles
DirectCompute particles
DirectCompute particles
DX11 case study 3

SSAO

• DirectCompute Screen Space Ambient Occlusion
• Half res to speed up the effect
• Bilateral dilate to increase shadow ‘depth’
• Looks great when geometry is animated and warped

Code thanks: HDAO sample from AMD
SSAO

Full Res  |  Half Res - Dilated  |  Final
DX11 case study 4

Warping for transitions / selection

- Warps can be applied to arbitrary combinations of 3D geometry and 2D user interface elements
- The resulting geometry is tessellated and warped using a selection of parameterized warping effects
- These include bulge, shear, squeeze and stretch
Warp examples

Bulge

Cloth

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**DX11 case study 5**

*Depth of Field*

- Use depth of field to highlight areas of interest
- Does not necessarily require ‘real’ DoF solution
  - Separate focussed and blurred regions for modal dialogs
  - Iteratively blur background over n frames using gaussian blur
    *(bear in mind crossfire setups)*
- Separable Gaussian blur using compute shader provides great performance.

*Code thanks : Jon Story : AMD*
Depth of Field
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