IMAGINE

Intuitive Modeling and Animation
for Interactive Graphics & Narrative Environments

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A multi-disciplinary team

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Motivation

Major Issue: demand for more and more complex scenes
Armies of Computer Artists during several years?
Or automatic creation … with little control ??

Scientific focus: **Creation tools for animated virtual worlds**
Applications to films & games, engineering, other sciences, general public
Creation of Virtual Worlds
Practice in the film industry

Best research results quickly available but…

Artists do as much as they can **WITHOUT computers**
Shape, motion, stories are drafted on paper, clay, etc.

[Pixar, « Geri’s game », 1997]
Creation of Virtual Worlds
Practice in the industry

Standard software
• Direct editing of DoF (NURBS, subdivision)
• Years of training

Spoils creativity!

Grand challenge?

“Make tools as transparent to the artists as special effects were made transparent to the public!”
[Rob Cook, Technical director Pixar, 2009]
Making tools transparent?

**Methodology**

**User-centered perspective on shapes, motions & stories**
- High-level models embedding a priori knowledge
- Generate details from minimal user input
- Advanced transfer and editing tools

**Creating interactive virtual prototypes**
- Designing & experimenting in the same system
- Natural interaction gestures
- Real-time response

**Long term Vision**

“Magic pen” to seamlessly create shapes, motions & stories
Research objectives for this period

**Shape design:**
- general shapes (3D + 2D +1D parts, distributions)
- shapes with functional features (CAD, anatomy)

**Motion design:**
- real-time physics for complex models
- sketching/acting and sculpting/transferring motion

**Narrative design:**
- learn cameras & film editing rules
- create and edit temporal event sequences
Axis 1 - Shape design

Goal is to develop responsive shape models, i.e. 3D models that respond in the expected way under any user action.
Zoom: Developable surfaces

Sketching Folds: Developable Surfaces from Non-Planar Silhouettes, TOG, Siggraph Asia 2015.
Zoom: Sketching and sculpting virtual worlds


Axis 2 - Motion design

Goal is to enable real-time, coarse-to-fine animation of responsive shapes and expressive characters.
Zoom: Sketching and sculpting animation

The line of action, Siggraph Asia 2013

Space-time sketching of character animation, Siggraph 2015.
Goal is to direct virtual actors and their actions with rule-based cameras enabling to convey a narration.
Zoom: Directing virtual actors

Generative prosodic model for character animation [Barbulescu et al. CGA 2017]
Zoom: Directing virtual cameras

Narrative-driven cameras for cinematic replay [Galvane et al. MIG’2014]

Zoom: Automatic film editing

Continuity editing for 3D animation [Galvane et al, AAAI 2015]
Assessment and perspectives

• Common methodology applied to all topics
• Generalized sketching and sculpting metaphors
• Space-time geometry a common theme
• 20 PhD theses, 40 journals, 40 conferences
• New research challenges: creating story worlds
• A much smaller team
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