The Future of Rendering

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Visual Computing Trends 2011, Vienna
Predictions

In 2061...
Future?

Alan Kay

“The best way to predict the future is to invent it.”
What is Rendering?

Joseph Beuys: “How to Explain Pictures to a Dead Hare”, Galerie Alfred Schmela, December 1965
What is Rendering?

Albrecht Durer, 1471-1528
The graphics pipeline

- viewing frustrum
- viewplane
- viewpoint
A Brief History of Rendering
1960s
1970s
1980s

“Glory Days” of Rendering
1980s
1990s
1990s
1990s
Do we still need pictures in papers?
2000s
2000s
2000

Convincing CG characters
Performance, performance, performance

“Wilber is probably taking this Cloud computing too seriously.”
Lock-In Technologies
The Evil Demon of Images
Seeing

[Diagram of an eye and a camera]
Cartesian Theater
Cartesian Theater
Cartesian Theater
Seeing Without Eyes

Paul Bach y Rota 1934 - 2006
Sensory Substitution

Paul Bach y Rota 1934 - 2006
Seeing With Your Back
Seeing With Your Back

IMAGE IS TRANSMITTED TO BACK VIA A BANK OF 400 VIBRATORS

T.V. CAMERA

OBJECT

MONITOR

COMMUTATOR
Seeing With Your Tongue
Seeing With Your Tongue
Redefining Rendering
Redefining Rendering

Create a visual experience through computation.
What is Seeing?

Real Space          Visual Space
Visual Space (VS)

Herbert Bayer, 1935
Visual Space (VS)

- Three (four) dimensional
- Bounded
- Non-Euclidean
- Unique to each of us
Visual Space (VS)

Curves resulting from Hillebrand’s experiment.  Blumenfeld’s parallel and distance alleys.
Visual Space (VS)

depth
Visual Space (VS)

“Newtonian Oasis” (Rudolph Arnheim)
Journal of the Optical Society of America

Volume 40, Number 10

October, 1950

The Metric of Binocular Visual Space*

RUDOLF K. LUNEBURG†
Knapp Memorial Laboratory of Physiological Optics, College of Physicians and Surgeons, Columbia University, New York, New York
(Received March 3, 1950)
Realism?
Realism = Photorealism?
Photorealism

“A major goal of realistic image synthesis is to create an image that is perceptually indistinguishable from an actual scene”. Cornell Web Page.
Photorealism

“A major goal of realistic image synthesis is to create an image that is perceptually indistinguishable from an actual photograph of a real scene(?)”. Cornell Web Page.
Bad Realism

Leaving Seattle, August 18, 2003... The mountain is out, well not really.
Bad Realism
Good Realism

The mountain is out.
Good Realism

Paul Cézanne, Mont Sainte-Victoire, 1885
Photorealism is boring

Why?
Photorealism is boring

Single Point Perspective
Less is more
Caricatures
Single View
Multiple Views
Multiple Views

Solomon Ruysdael (1600-1670), *River Landscape with Ferry*. 1649.
Multiple Views (space/time)

David Hockney (1937-) Place Furstenberg, Paris, August 7, 8, 9, 1985 #1
Less is More
Less is More
Caricatures
Caricatures
Beyond a Picture
VR displays
VR displays
VR displays
Visual Cortical Implant
Conclusions

Speed
Beyond a Picture
New input devices
All CG movies
...

...
On the App Store: Autodesk Fluid FX