

SAN ANTONIO  
**SIGGRAPH**  
2002

Real-Time Shading Languages

Marc Olano

John Hart

Wolfgang Heidrich

Bill Mark

Ken Perlin

# Overview

## 8:30 – 10:15 Background & Building Blocks

- 8:30 Introduction — Marc Olano
- 8:50 Noise Hardware — Ken Perlin
- 9:30 Hardware Shading Effects — Wolfgang Heidrich

## 10:15 – 10:30 Break

## 10:30 – 12:15 Shading Language Systems

## 12:15 – 1:30 Lunch

## 1:30 – 3:15 Shading Language Systems (cont)

## 3:15 – 3:30 Break

## 3:30 – 5:15 Future

# What is Shading

Ultimate control of appearance

Programmable

- Arbitrary computation

Procedural

- Simple procedures
- High-level language



# Shader Types

## Compute what?

- Surface color
- Light color and direction
- Fog density and attenuation
- Surface displacement

# Non-Real Time / Real Time

## Not Real-Time

- Seconds to hours per frame

## Real-Time

- Tens of frames per second

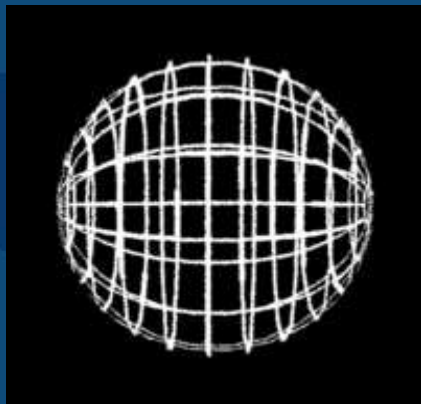
# Interactive Rendering

## Illusion of Presence

- 10 – 30 – 60 frames per second
- Immediate response
- Simple appearance



# Interactive Rendering



Vector



Flat



Gouraud



Texture



+Fragment  
Lighting



Shading

# Uses for Real-Time Shading

## More realistic appearance

- Automotive styling

## Visualization

- Data fields on surfaces

## Non-realistic appearance

- Games, Illustration



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- 10:30 In the Beginning: The Pixel Stream Editor — Ken Perlin
- 11:00 PixelFlow Shading — Marc Olano
- 11:40 Procedural Solid Texturing — John Hart

12:15 – 1:30 Lunch

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- 1:30 Shading through Multi-pass Rendering — Marc Olano
- 2:05 Complex Single and Multi-Pass Shading — Bill Mark
- 2:45 Sampling Procedural Shaders — Wolfgang Heidrich

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- 3:30 Multi-Pass RenderMan — Marc Olano
- 4:10 Analysis of Shading Pipelines — John Hart
- 4:45 Panel Discussion and Q & A — All