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History of Computer Graphics

CS535 - Interactive Computer Graphics
Fall 2007

(slides courtesy of Marc Levoy)

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Ivan Sutherland (1963) - SKETCHPAD

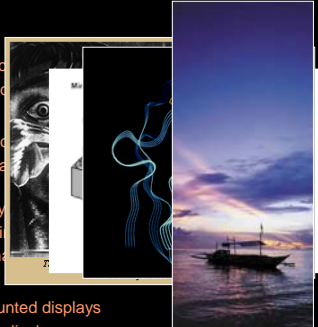


- pop-up menus
- constraint-based drawing
- hierarchical modeling

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Display hardware

- vector displays
 - 1963 - modified CRT
 - 1974 - Evans and Sutherland
- raster displays
 - 1975 - Evans and Sutherland
 - 1980s - cheap frame buffers on desktop computers
 - 1990s - liquid-crystal displays
 - 2000s - micro-mirrors
 - 2010s - high dynamic range displays
- other
 - stereo, head-mounted displays
 - autostereoscopic displays



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Input hardware

- 2D
 - light pen, tablet, mouse, joystick, track ball, touch panel, etc.
 - 1970s & 80s - CCD analog image sensor + frame grabber

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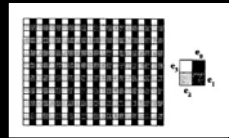


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Input hardware

- 2D
 - light pen, tablet, mouse, joystick, track ball, touch panel, etc.
 - 1970s & 80s - CCD analog image sensor + frame grabber
 - 1990s & 2000's - CMOS digital sensor + in-camera processing

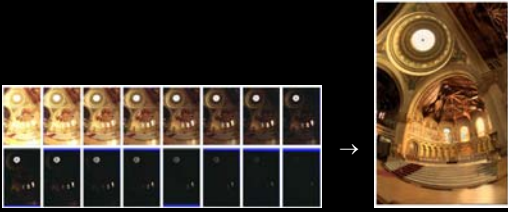
→ high-dynamic range (HDR) imaging



[Nayar00]

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- negative film = 130:1 (7 stops)
- paper prints = 46:1
- [Debevec97] = 250,000:1 (18 stops)



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Input hardware


- 2D
 - light pen, tablet, mouse
 - 1970s & 80s - CC
 - 1990s & 2000's - (CC) → high-dynamic range
- 3D
 - 1980s - 3D tracker
 - 1990s - active range
- 4D and higher
 - multiple cameras
 - multi-arm gantries



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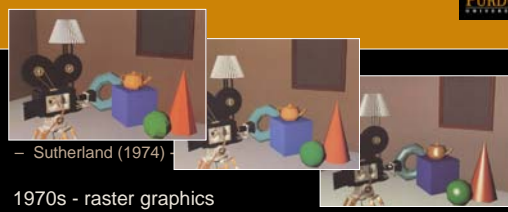
Rendering

- 1960s - the visibility problem
 - Roberts (1963), Appel (1967) - hidden-line algorithms
 - Warnock (1969), Watkins (1970) - hidden-surface algorithms
 - Sutherland (1974) - visibility = sorting



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- 1970s - raster graphics
 - Gouraud (1971) - diffuse lighting
 - Phong (1974) - specular lighting
 - Blinn (1974) - curved surfaces, texture
 - Crow (1977) - anti-aliasing



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- 1970s - raster
 - Gouraud (1971) - diffuse lighting
 - Phong (1974) - specular lighting
 - Blinn (1974) - curved surfaces, texture
 - Catmull (1974) - Z-buffer hidden-surface algorithm
 - Crow (1977) - anti-aliasing



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- early 1980s - global illumination
 - Whitted (1980) - ray tracing
 - Goral, Torrance et al. (1984), Cohen (1985) - radiosity
 - Kajjiya (1986) - the rendering equation



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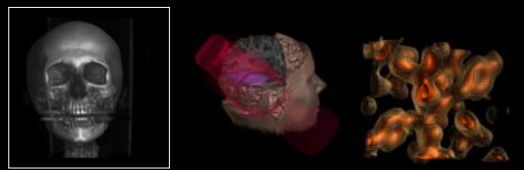
- Kajjya (1986) - the rendering of a road
- late 1980s - photorealistic rendering
 - Cook (1984) - shaded spheres
 - Perlin (1985) - shading languages
 - Hanrahan and Lawson (1990) - RenderMan

→ shaders



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- early 1990s - non-photorealistic rendering
 - Drebin et al. (1988), Levoy (1988) - volume rendering
 - Haeberli (1990) - impressionistic paint programs
 - Salesin et al. (1994-) - automatic pen-and-ink illustration
 - Meier (1996) - painterly rendering



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