Environment mapping


About 1982 or 1983

Image courtesy of Michael Chou and Lance Williams

Image courtesy of Gene Miller and Ken Perlin
Interface by NYIT
(Lance Williams)

SIGGRAPH 1985

10” gazing ball
Environment Mapping

- Spherical co-ordinates are obtained with the following equations:
  - \( \theta = \arctan \left( \frac{y}{x} \right) \).
  - \( \rho = \arccos \left( \frac{z}{R} \right) \).
  - \( R = \sqrt{x^2 + y^2 + z^2} \).

Figure 7. Environment Mapping

Images courtesy of Paul Haeberli
Cube Mapping

• Simple math:
  – Compute reflection vector $r$
  – Largest abs-value of component determines which cube face
    • Example: $r = (5, -1, 2)$ give POS_X face
    • Divide $r$ by 5 gives $(u,v) = -1/5, 2/5$)
  – Hardware often does all the work
Image-based Illumination


http://athens.ict.usc.edu/Probes/
Acquiring the Reflectance Field of a Human Face
Paul Debevec, Tim Hawkins, Chris Tchou, Haarm-Pieter Duiker, Westley Sarokin, and Mark Sagar
SIGGRAPH 2000 Conference Proceedings

Figure 15: Matching to Real-World Illumination. (a,b) Actual photographs of the subject in two different environments. (c,d) Images of a light probe placed in the position of the subject’s head in the same environments. (e,f) Synthetic renderings of the face matched to the photographed viewpoints and illuminated by the captured lighting. (g,h) Renderings of the synthetic faces (e,f) composited over the original faces (a,b); the hair and shoulders come from the original photographs and are not produced using our techniques. The first environment is outdoors in sunlight; the second is indoors with mixed lighting coming from windows, incandescent lamps, and fluorescent ceiling fixtures.

http://www.debevec.org/Research/LS/

Credits

- http://www.debevec.org/
- http://www.debevec.org/ReflectionMapping
- Rosalee Wolfe