Stencil Buffer Algorithms

CS418 Computer Graphics

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Stencil Buffer

glEnable(GL_STENCIL_TEST)

glDisable(GL_STENCIL_TEST)

glStencilFunc(function,value,mask)

- test function: GL_NEVER, ALWAYS, LESS, LEQUAL, GREATER, GEQUAL, EQUAL, NOTEQUAL
- integer value for comparison: $[0,2^{n-1}]$
- mask controls which bits used/affected

glStencilMask(mask)

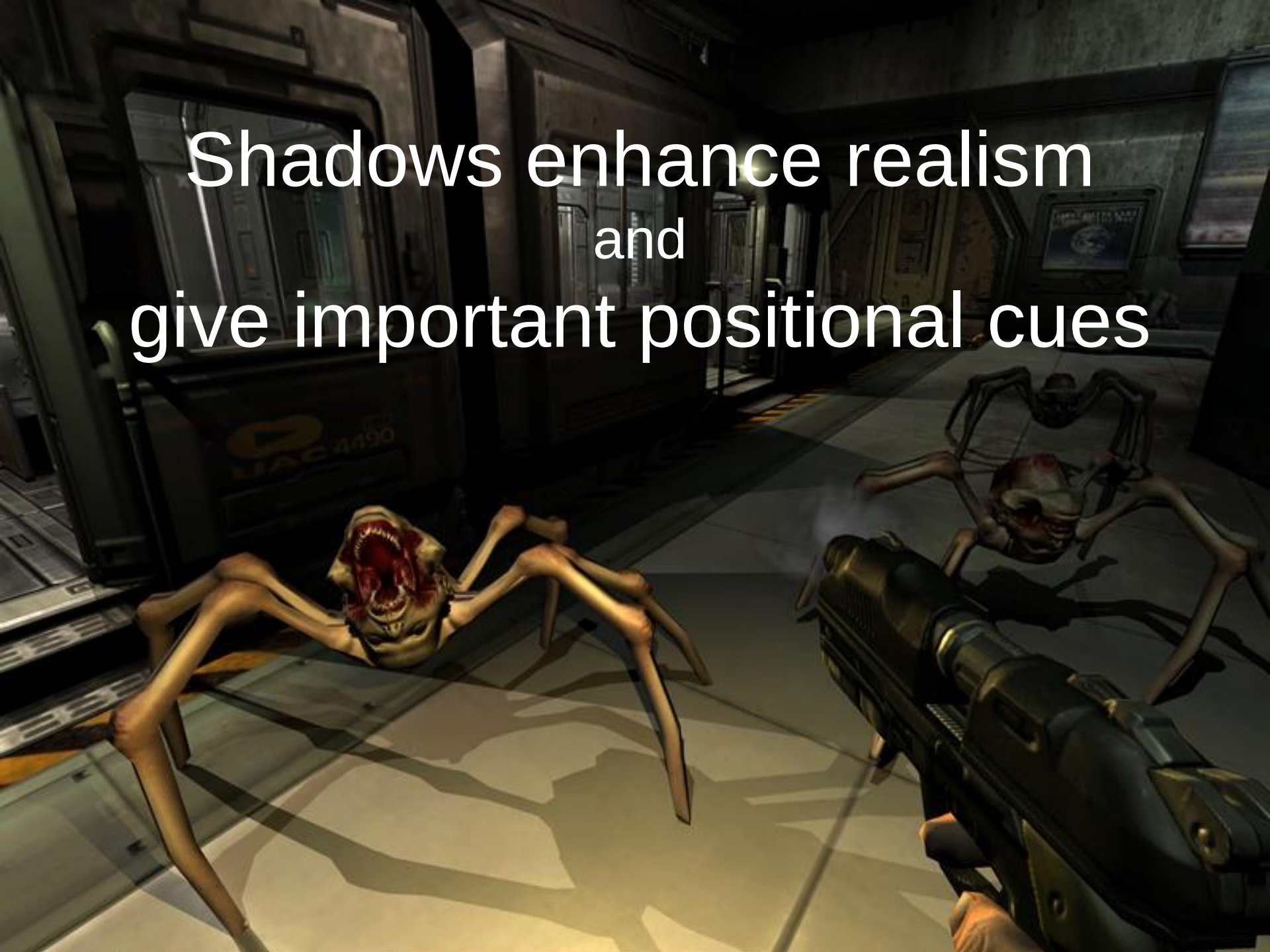
- Changes which stencil bits affected

glStencilOp(sfail,dfail,dpass)

- sfail: stencil test fails
- dfail: stencil test passes, depth test fails
- dpass: both stencil and depth tests pass

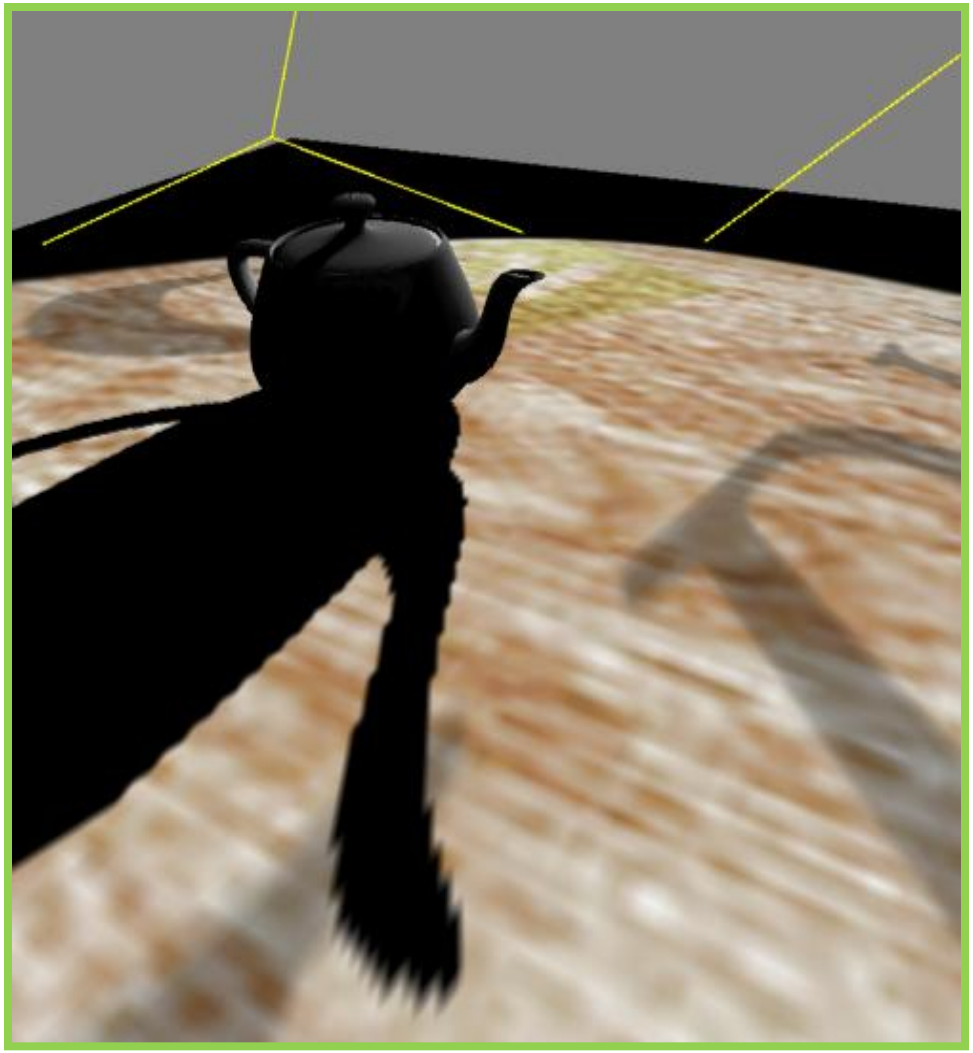
Operations:

- GL_KEEP: Keep current value
- ZERO: Stencil = 0
- REPLACE: Stencil = value
- INCR: Stencil++
- INCR_WRAP: incr mod 2^{n-1}
- DECR: Stencil--
- DECR_WRAP: decr mod 2^{n-1}
- INVERT: Xor w/ 2^{n-1} -1


Shadows enhance realism
and
give important positional cues

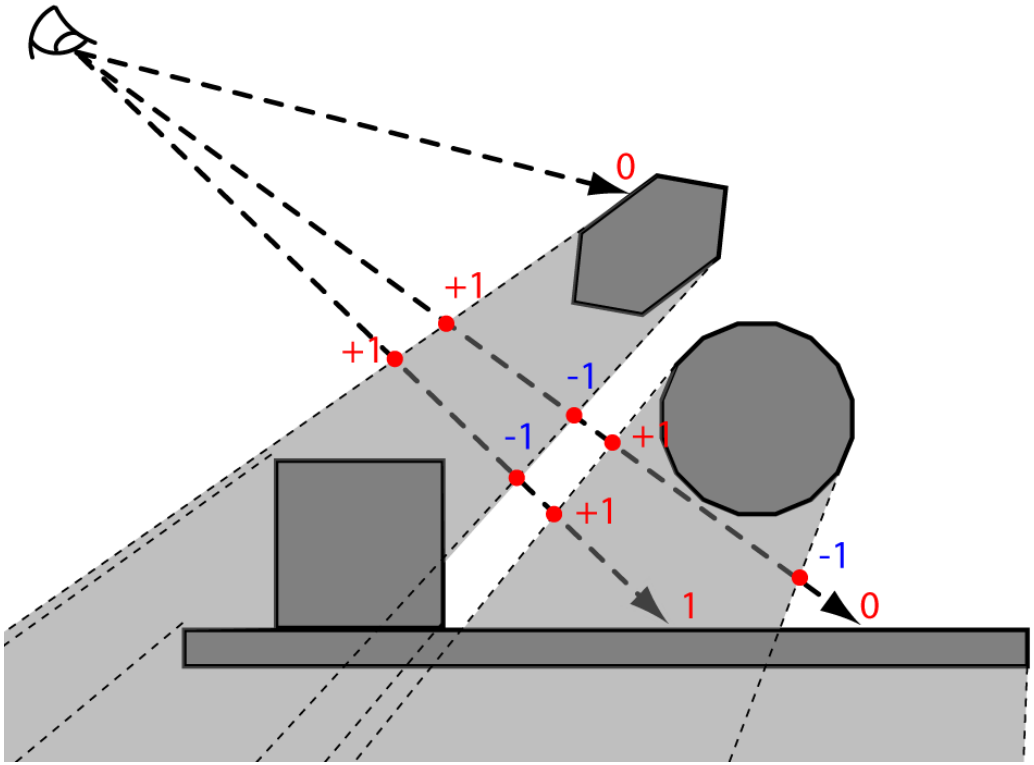
Shadow Buffer Problems

- Shadow maps
  - resolution issues
- Dynamic
  - lights
  - occluders
  - receivers



Stenciled Shadow Volumes

1. Render scene geom. into frame and z-buffer
2. Render front faces of SV, incrementing stencil when they pass the z-test
3. Render back faces of SV, decrementing stencil when they pass the z-test
4. Pixels with stencil = 0 are lit, rest shadowed



Z-pass [Heidmann '91]