

ABSTRACT

Automatic Visible Line Detection and
Rendering using the Frame Buffer

Marlon Mark Raghunanan

To visually model data, a class of algorithms for Hidden Line Removal (HLR) has been developed that takes computer generated three dimensional images, and performs the necessary tasks to display a realistic image on its two dimensional screen. The problem is that the data structures and computational complexity of such algorithms places severe demands on the computers that implement them, thereby precluding their use on many personal computers.

This thesis presents a method of circumventing the above problems by using the Frame Buffer (screen memory) of the computer. Essentially we treat the Frame Buffer as composed of parallel bit-mapped planes, and use one plane to maintain visibility information. If the "facets" of the scene are processed in an "occlusion compatible order" then the interior region (stored in the Frame Buffer) gives us a "mask" that can be used for

visibility determination of the remaining "facets."

The method is of significance because it uses the Frame Buffer for visible line detection thus making it unnecessary to use memory for storing data structures. Also, using a Frame Buffer with pixel depth greater than two, allows automatic and simultaneous display of visible lines, as the image is processed. Finally, since the algorithms used by the method are no more complex than the graphic routines bundled with typical personal computers, they can be easily included as part of the firmware, thereby giving the user the built-in capability to do HLR.