

# The foundations of computer graphics

[Science](#), [Computer Science](#)



The “clipping divider” paper first compares about the computer resolution in those years. As the resolution of the screens were less, the drawings drawn by hand looked sharper and clearer as compared to the drawing seen on the screen. They define windowing as removing the parts of the drawing which lie outside the sight of the viewer. The two main methods for windowing are blanking and clipping. The computer developers had started to use some techniques assisting with windowing. But it was still difficult to implement as blanking used to cause flickers in the display and clipping caused delay. The authors talk about a new device which is supposed to solve the problem of windowing. The clipping divider is supposed to remove the parts behind the objects which are not visible to the observer. The clipping divider uses the midpoint algorithm for the windowing problem. The midpoint is calculated by adding and dividing the start and the end points of the line. Depending on the midpoint the following assumptions can be made. If the midpoint lies inside the window, then we can say that we have two-line segments. If the midpoint lies outside the window, then we can say that only one of the parts of the line lies in the window. For the lines with only one end of it in the view, we can say that if the midpoint is out of the window then the other half can be removed on the other hand if the midpoint is inside the window, then we can say that the line is inside the window.

For the hardware part of the device, it has eight adders in groups of four. One group is used to check if the line enters the field of view and one group is used to check if the line exists the field of view. It also has one register which stores information like the edges and coordinates. The authors

conclude that using a clipping divider in the display can enable to display a portion of a very large picture with a proper resolution.

The second paper talks about the problems the authors were facing regards to the processing of 3D data. The common steps for the processing include Polygon Clipping. It is a process of clipping off those parts of the polygon that lie outside the volume. Earlier this process was done with respect to the edges of the polygon and cause problems doing so. The authors now describe a technique in which the polygon is defined by its vertices. The authors claim that this algorithm can be applied to any polygon may it be concave or convex or planar or non-planar. The authors describe the algorithm by first talking about the perspective projection which is done by using depth perception to check if how close are the objects to the observer. This assumes that the coordinates of the origin are not the observer's eyes but the center of the screen. The advantage of doing so is that we can move the observer's eyes can be moved far away from the screen. This algorithm considers input vertices for polygon in a single clipping plane. A new set of vertices is created depending on the how the vertices are placed according to the plane. This algorithm can also be applied to clipping lines with some minor modifications. The algorithm just needs to differentiate between the starting points and the ending points of the line. This algorithm can also be used with modifications to clip the polygon into 2 parts. The planes that divide the polygon into two parts should not be considered as clipping the polygon.

The authors have taken great efforts in explaining each and every bit of the algorithm in detail. This paper is a good read and does explain the concepts up to the mark.