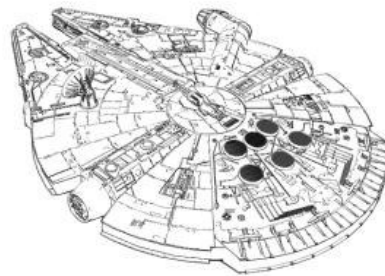
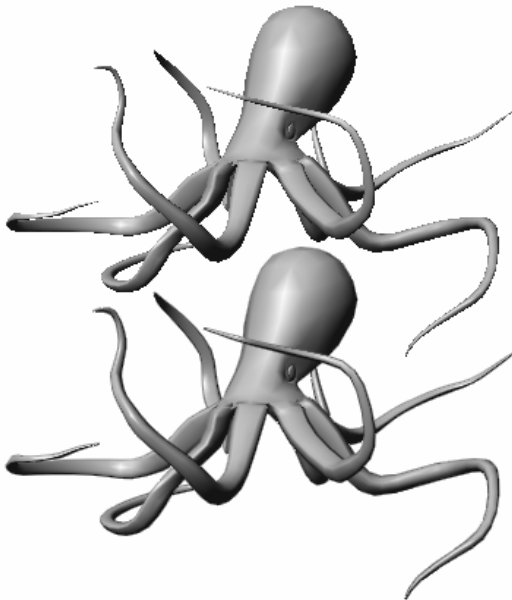


Real time software anti-aliasing/Outline rendering

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One of the applications of silhouette extraction is for outline rendering. Although the outline can be found by using screen space depth information, results are poorly aliased and in some cases can be less efficient than finding the silhouette in world space (with respect to the view point).

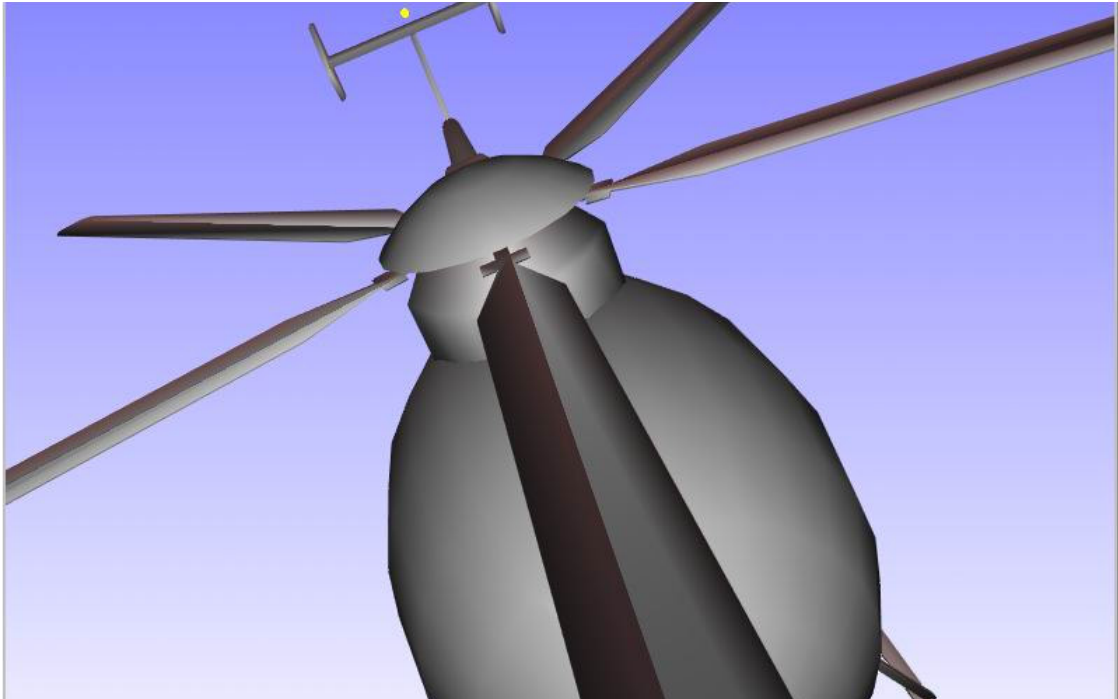
We have found a responsive and easy to implement technique to extracting the silhouette from a model using the Silhouette Tracking method. Using this silhouette information, it is possible to render NPR images or software anti-aliased images in real time with little or no aliasing when using AA lines (which is usually accelerated in the hardware).



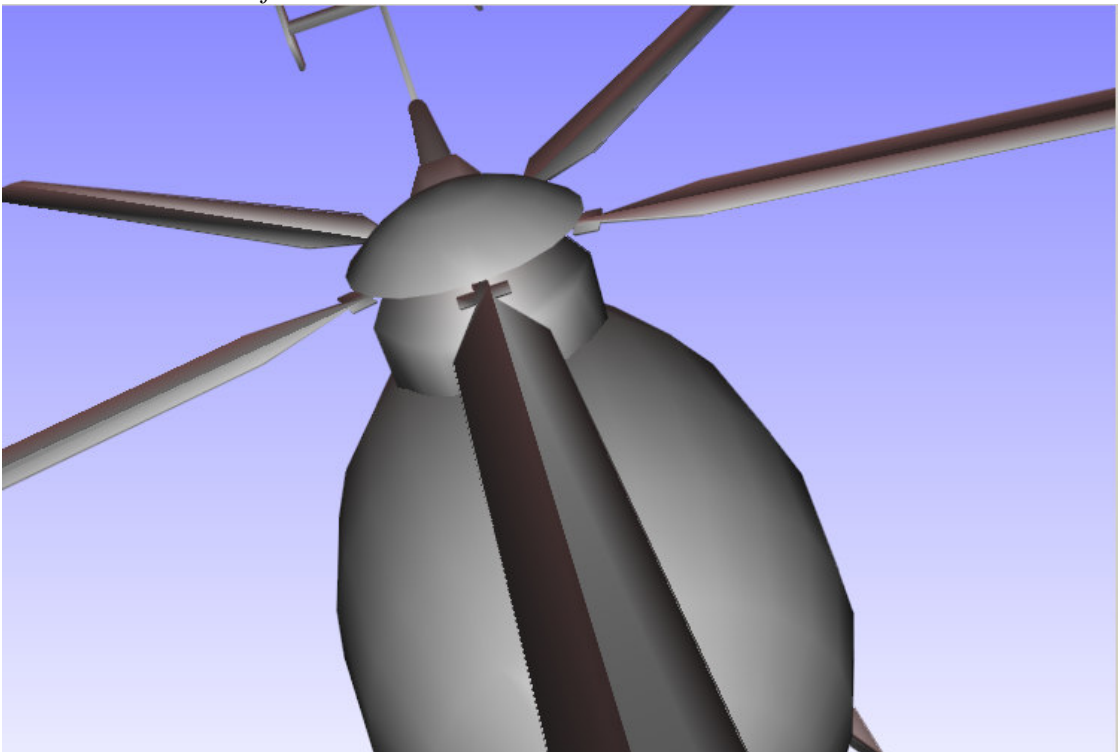
Above left shows an octopus rendered without AA (above) and with real time AA (using Hoppe's Edge Overdraw method). Above right shows an NPR rendering of the Millennium Falcon using the silhouette information.

Setting up the OpenGL state machine to render anti-aliasing and outlining are fairly similar. For each model, firstly draw the model with depth writing enabled. Then, draw the silhouette outline with anti-aliased lines enabled, blending enabled with function (GL_SRC_ALPHA, GL_ONE_MINUS_SRC_ALPHA), and give the correct colour, texture coordinate and normal information for each vertex when drawing the outline. Thus anti-aliased lines are overdrawn on top of the original aliased model.

Significant artefacts have been noted on some ATI cards (for instance 9600 Pro on Via/Athlon platform), with regards to the real time AA method. The two screenshots below show the same model rendered using a 9000 card (top) and the 9600 Pro (bottom). The rotors of the blade rendered by the 9000 card are smooth and anti-aliased but the 9600 renders the rotors with more exaggerated aliasing than as if there was no AA at all.



Real time anti-aliasing using Hoppe's Discontinuity edge overdraw method on an ATI 9000 GPU. Note the front rotor blade silhouette is smoothed.



As above but rendered with an ATI 9600 Pro card. Note the exaggerated jaggies of the front rotor blade.