



The MipMapper Shader

for CARRARA 4,5 &6

Version 0.5

Mip Mapping is a technique seen in 3D games to reduce moire patterns and sparkling or twinklies. Use this shader extension with bricks and other repeating, tiled texture patterns to improve your renders and animations.

To install the plugin extract the contents of the compressed zip package into the Carrara\Extensions sub-folder. The plugin must also be installed into the ..\Extensions folder of all render nodes. To remove the MipMapper Carrara 4 users must delete the MipMapper.mcx and MipMapper.dta files from the ..\Extensions\ folder. Carrara 5 and 6 users must delete the MipMapper.mcx, MipMapper.dat and MipMapper.txt files.

Macintosh users should open the Carrara installation folder (typically /Applications/Carrara). Right-click on the Carrara or Carrara Pro application and then choose "Show Package Content". Navigate to "Contents/MacOS/Extensions" then copy the MipMapper.mcx, MipMapper.dat and MipMapper.txt files into that folder.

Once installed the MipMapper shader can be found in the main shader list or under the Sparrowhawk3D submenu.

Using The MipMapper

Select the MipMapper sub-shader into any channel as you would a mixer. Fill the 3 sub-shaders with the mip-maps.

The MipMapper uses the selected Rendering Camera, typically Camera 1, not the Director's Camera in the assembly room.

Use the highest resolution texture in the 'Up Close' sub-channel and set the 'Up Close Distance' such that when the camera is that far from the surface artefacts start to appear.

Use a lower resolution texture in the 'Nearby' sub-channel and set the 'Nearby Distance' to a higher value than the 'Up Close Distance' and so that when the camera is farther than the 'Up Close Distance' it will switch to the 'Nearby' shader.

Use a very low resolution texture or colour in the 'Far Away' sub-channel and set the 'Far Away Distance' so that when the camera is very far away from the surface it only uses this texture.

The MipMapper also switches to the next lower resolution texture when the surface normal is at an acute angle to the camera.

Adjust the 'Distance Falloff Rate' to a lower value to make the transition from close to far slower. Setting 0 will turn off the distance mip-mapping.

Adjust the 'Acuteness Falloff Rate' to a lower value (0.1) so that only when the surface is very acute will the next mip-map be applied. Setting a value of 0 will turn off acute mip-mapping.

To create the mip-maps load a high resolution image into your favourite 2D paint or photo editor then do a high quality resize operation down to a lower resolution (try 25-50%) and save the file with a different name. Resize the original image again down to a very low resolution (try 10%) and save that with a different name to use as the 'Far Away' shader.

Higher resolution textures with more tile repeats create worse patterns as the distance and acute angle increase. When using lower resolution textures or higher quality renders you can set higher distance values.

With the right application of lower resolution texture maps and by adjusting the parameters you can eliminate moire pattern artefacts and twinklies even with no anti-aliasing and texture sub-sampling and filtering off.

To see the mip-mapper at work try setting the 'Up Close' sub-shader as the colour red, 'Nearby' as green and 'Far Away' as blue then in the preview window scroll the mouse wheel or track the camera back and forth and watch the colours change.

MipMapped objects seen in reflective or through refractive surfaces will render with inconsistent results. The MipMapper uses a direct measure of the angle and distance from the camera to the shaded surface.

Tips and Tricks

- For a wire fence or grill texture in the alpha channel apply one mip-map and set the 'Far Away' shader to 0% value.
- Use it with fractal shaders and set a lower contrast setting or turn the fractal quality off for the far distances.

Planned Improvements

- Auto-MipMapper supersedes the MipMapper in most applications.

Support

Sparrowhawke3D is an amateur project so I can't make any promises regarding support, however I'm keen to improve my simple practical plug-ins and share them with the Carrara community.

Special thanks to Untoldwind for the Carrara 6 builds for the Macintosh.

The MipMapper plug-in is absolutely free, you can use it in any project, commercial or otherwise. You may not repackage and sell the MipMapper.

For comments, feedback and suggestions email me, Jeremy@Sparrowhawke3D.com.