Getting it on video

Benjamin Woolley shows how to distribute digital animations on analogue video.

Last month, I wrote about getting video into your system, to use in 3D scenes. This month, I want to take a look at what is, perhaps, a more important application of a video interface — getting it out again.

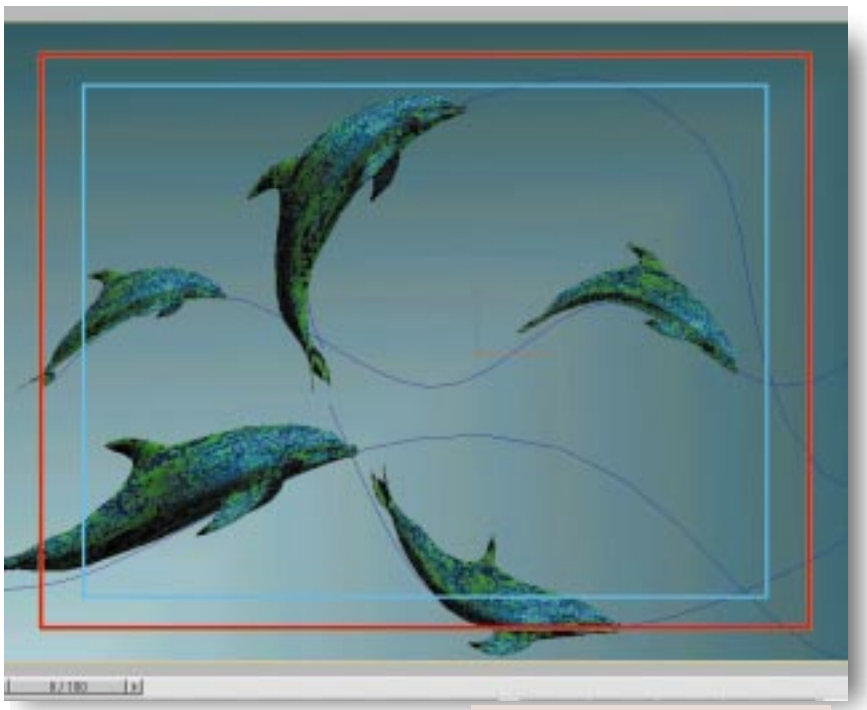
Many years ago, working on an edition of BBC TV's Horizon on artificial life, the director and I decided to feature several screenshots. When we consulted various TV engineers about this, you would have thought we had asked them to achieve nuclear fusion! They all said it was impossible. And they seemed to be right: every screen we tried produced a new variant of epilepsy-inducing flicker.

Eventually, we managed to get hold of a device called a 'scan converter'; a box of electronics the size of a chest freezer — or so it seemed when we had to haul it around the science labs of California and New Mexico! This box turned the nice sharp images we saw on workstation screens into a muddy stew of smudgy colours.

How things have changed. Well, some things at least. As I mentioned in last month's column, you can now buy a Video In/Out card for little more than £100. Some graphics display boards now have some form of 'video out' built into them, or allow for the facility to be added via a daughterboard. Some PCs — my new Sony VAIO laptop, for instance — actually have a video output socket at the back.

If your colours are too bright, they may actually be illegal

If you are planning to use 3D software to create animations, and want to use analogue video to distribute them, you will need some video conversion hardware of this kind. The sort of thing you get for between £100 and £200, or in a laptop, will be very basic. The results will look fine but there will inevitably be some flicker and some colour drift. Part of the reason is to do with the quality of the digital-to-analogue conversion circuitry.



▲ FIG 1 A VIEWPORT SHOWING AN ANIMATION OF LEAPING DOLPHINS. THE RED LINE — ARTIFICIALLY THICKENED BY ME TO MAKE IT MORE VISIBLE — SHOWS THE 'VIDEO' SAFE FRAME, THE BLUE LINE SHOWS THE 'TITLE' SAFE FRAME I.E. WITHIN WHICH THERE IS NO RISK OF TEXT BEING CLIPPED BY THE EDGES OF THE SCREEN

A lot is also to do with the type of output, which is likely to be composite video — i.e. a single phono, or possibly BNC output — or at best S-Video.

If you want to achieve broadcast-quality output, you need component video output. This separates the signal into luminance, colour and synch — component is not the same as RGB video output, which is not encoded as a broadcast signal. Component video output systems have professional-grade pricing and are generally only to be found in specialist digital effects facilities.

For most non-professional or semi-professional purposes — creating a demonstration reel on VHS, for instance — it is best to aim to get a video output board with S-Video. But do bear in mind that you will only be able to take advantage of it if you have a video recorder with an S-Video input — either through a mini DIN-type connector, or a SCART interface.

Once you have the hardware set up to output to video, you have to begin considering the software implications. These are many and complex. Turning 3D animations into successful videos is by no means easy, however sophisticated your video output hardware.

The most important consideration is the nature of the video image itself. It will be encoded into one of three forms, depending on where it is to be shown: PAL for most of Europe, SECAM for France, Russia and some Eastern European countries, and NTSC for the US and Japan.

As every TV aficionado knows, the PAL signal — and the SECAM one, which only differs in detail, although enough detail to be incompatible — comprises a sequence of frames made up of 625 lines displayed for one 25th of a second. Of course, it is not as simple as that, and you need to know why to ensure you get the best quality output.

Firstly, video does not comprise frames, but fields. In one second's-worth of video, what you are actually watching is 25 pairs of interleaved fields displayed one after the other.

The first field scans the odd lines of the first 625-line frame across the screen, the second field scans the even lines and a third field scans the odd lines of the second frame, and so on. When it comes to rendering your animation, if you — or, more likely, your software — produce 25 frames rather than 50 fields, the result will inevitably look flickery, and fast movements will not appear smooth.

On decent renderers you will find a parameter which asks if you want to render to fields or frames. If you are creating a video, then make sure to choose 'fields' because you cannot convert from frames to fields once the animation has been rendered.

The second feature of the video frame which raises complications is that a domestic TV displays, and domestic VCR records, only about 90 percent of the picture. The remainder, the 'overscan', is invisible which is why it is used for non-video information such as teletext.

To compensate for the overscan you have to make sure, when you are composing your scene prior to rendering it, that the action you want to show falls within the 90 percent of the picture which will be displayed. This is known as the video safe area. More advanced 3D software will insert a video safe frame in the form of a border within the 3D software's camera viewport [Fig 1].

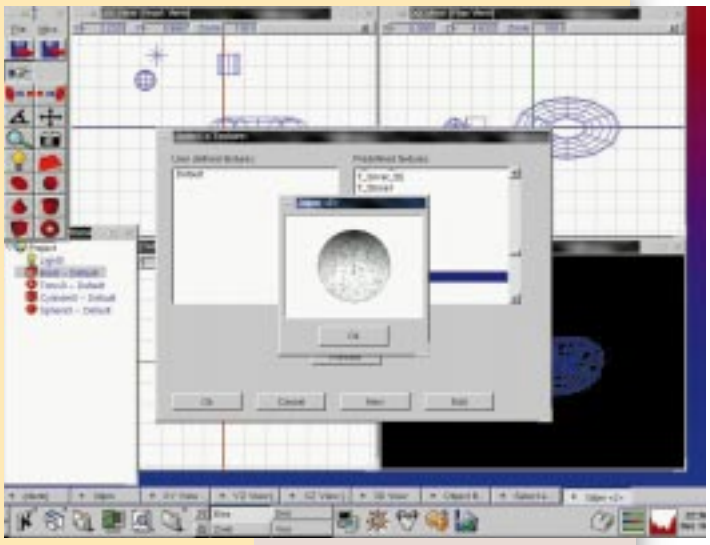
You have to bear in mind that some colours work better on video than others

Then, you must consider colour. PAL deals with colour much better than NTSC — which Europhile wags say stands for Never The Same Colour — but you still have to bear in mind that some colours work better on video than others. Red, for instance, is particularly tricky and you cannot get pure black; it tends to come out a noisy grey. Also, if your colours are too bright, they may actually be illegal (there is a theoretical possibility that they would blow up a hapless viewer's TV set).

Professional 3D packages will automatically check for unsafe colours as they render, and then make the necessary adjustments. In practice, you do not have to worry about this unless your video is intended for broadcast.

Having considered all this, you are now ready to start rendering your animation. But don't think this means the fiddling is over. There is plenty left to do, and I will outline just what in next month's column.

WEB WATCH



▲ FIG 2
ONE OF THE MANY 3D APPLICATIONS TO BE FOUND AT LINUXBERG. THIS ONE, CALLED 3DPM, IS FROM GERMANY AND IS A SIMPLE BUT POWERFUL MODELLER FOR THE POVRAY RENDERER. LINUXBERG GIVES IT A TOP RATING: FIVE PENGUINS, NO LESS. 3DPM IS DISTRIBUTED FREE UNDER THE GNU GPL. BUT BEWARE, AT THE TIME OF WRITING, THE INSTALLATION INSTRUCTIONS WERE IN GERMAN AND ONLY THE SOURCE CODE WAS AVAILABLE, WHICH MEANS YOU WILL HAVE TO COMPILE IT YOURSELF

As most readers will be aware, events are now moving fast on the Linux front and, since having written about Linux as a 3D platform in the April column, the number of 3D tools that run under Linux has exploded. Furthermore, nearly all these are available as either open source or shareware and some of them are really very good [Fig 2].

For a comprehensive, well-organised listing of available 3D Linux software which runs under the X Window System, go to hensa.linuxberg.com/x11html/gra_3d.html. It lists hundreds of applications and utilities, and gives each a rating of 0-5 penguins.

Thanks to Dr David England, of John Moores University School of Computing and Mathematical Studies at Liverpool for pointing me in the direction of this site.

Dr England, incidentally, agreed with me that it took far more than the 30 minutes which SuSE optimistically gave as the time needed for the quick installation of its distribution of Linux. He also pointed out that it had taken him a couple of hours just to read the hardware-compatibility list.

PCW CONTACTS

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