

The raw materials

Panicos Georghiades and Gabriel Jacobs take you through a basic list of requirements for making a CD-ROM on a budget.

‘I have been asked by an administrator at a local hospital for the mentally disabled if I could produce a CD-ROM to help the patients with severe learning difficulties to be a bit more independent. We have concluded that the program will have to include video clips and sound samples, and will therefore need to be authored using a multimedia authoring package.

We have access to a video camera and a variety of PCs, ranging from a 386 to a Pentium, and were wondering if you could recommend a reasonably easy-to-use software package.

What other hardware would we need? We want to produce about 30 discs and have only limited financial resources. ’

Dave Sharples
(dave@hudski.demon.co.uk)

Thanks for this letter — we've been waiting for the opportunity to answer a focused question like this for a while now. We'll use the rest of the space in this column to summarise what one needs to develop a "basic" multimedia CD-ROM.

● Hardware

You really do need a powerful authoring machine with lots of RAM and hard-disk space. The amount of power and disk space you need depends on the amount of audio, still-image data and video you want to process. As for the processor (Pentium or whatever) — well, the fastest you can afford. You need at least 16Mb RAM, and 32Mb or more can speed up the editing and processing of graphics files.

Your hard disk should be 2Gb or more. A CD holds about 650Mb, but you may find yourself working with 10 to 50 times as much raw material, especially if you're dealing with video clips. A good, flexible archiving and back-up system, such as a magneto-optical drive or removable hard-disk drives, may be a solution.

The working hard disk should have a

minimum sustained transfer rate of 1.5Mb/second if you wish to grab good video. A higher value is preferable. Accelerator graphics cards, PCI or VL-bus graphics and hard-disk adaptors all help. So at a rough estimate, good basic hardware is going to cost anything between £2,000 and £10,000.

A testing time

Then there are testing machines, of which you need as many as possible. They should preferably be low-end machines (as low as any user might have) so that you don't reduce the potential userbase. They should have varying hardware peripherals such as graphics cards, CD-ROM drives and sound cards of different makes. Most problems stem from incompatibilities between drivers of S-VGA cards, CD-ROM drives and sound cards.

To grab stills for backgrounds, main photorealistic material and screen buttons, you'll need a standard scanner for flat surface reflective material such as photographs and documents, and a film scanner (or transparency adaptor) for photographic negatives or slides.

You can also grab stills off video or live material using a video camera and capture board. Or you may wish to use a digital camera. If you want to retouch, or draw original artwork, then a pressure-sensitive tablet instead of a mouse helps a great deal.

Flatbed scanners range between £300 and £10,000 (average just under £1,000). Digital cameras range between £400 and £15,000. Film scanners start at about £700. Drawing tablets start at £150.

In good voice

To record the human voice for narration or voiceovers you'll need a good microphone — preferably a studio condenser microphone plugged into a microphone pre-amplifier — and a compressor which eliminates variations in the voice signal. Heavy compression can help with sound to be digitised at 8 bits (if you're short of space). Good microphones range from £200 to £1,000. Compressors and microphone pre-amplifiers start at £200. You also need a 16-bit sound card to record and playback sound with the PC. Sound cards cost between £25 and £1,000.

Ulead Media Studio (demo and free software)



On this month's CD there's a demo of Ulead's Media Studio 2.0 software, which we covered in these pages last December. The demo includes the video editing module in its entirety, with examples for you to play with. You can even save files, though the demo program places an X over them so you won't be able to distribute them. Have a look at the competition section too — some copies will be given away free to readers

If recordings need to be made away from the computer, you need a tape recorder, and preferably a DAT (Digital Audio Tape) machine which can record high-quality digital audio. Or you may choose to record the sound in a professional studio. If you do, make sure that a DAT machine is used: you can then import the sound into a PC using a sound card with digital inputs (such as the Digital Audio Labs CardD). This will ensure the best possible quality. It can also be useful if you're grabbing sound effects or music from CDs. DAT recorders start at £500.

Get it on video

To record video, you obviously need a video camera, but preferably one with an S-Video output. Video can be recorded directly from the camera into a video capture card and onto the hard disk — there's no need for it to be recorded to tape first unless your subject/material is away from the computer.

If you do need to record to tape, then a Digital, Hi-8 or S-VHS or S-VHS-C capable recorder will yield better results. Three-CCD cameras give better quality than single CCD. Video camcorders start at £500. A three-CCD model can cost over £2,000. New digital camcorders start at about £3000.

Throw some light on it

Lighting is a major factor in video quality. Diffused natural (day)light can give very good results even with cheap camcorders. But if you're using artificial light, you need lots of it and it has to be white. Ordinary tungsten light bulbs emit an orange/yellow tint, and your video clips will resemble those from a certain Jeremy Beadle TV programme. Studio lighting equipment starts at £50. If you are to record sound with the video, you need either to record the sound separately or use an external microphone with the camcorder.

To grab video from a camcorder or VCR into a computer, you need a video capture card. We recommend any capture card that uses M-JPEG compression. The video can then be edited and recompressed using any other compression method suitable for distribution, even MPEG. M-JPEG video capture cards start at £350, average £700, and professional models cost £2,000 plus.

● Software

All the above is hardware-related. Now to softer matters. You'll probably need image scanning, retouching and editing software, and high-end paint software if you're drawing original material. You

may need to employ the services of a scanning bureau, or use Kodak PhotoCD. And you may need to employ a graphic designer/artist, the cost of which will obviously depend on how good she/he is — but it won't be cheap.

Digitised sound will almost certainly need to be edited (cut and pasted), its amplitude (signal strength) adjusted, and (almost certainly) cleaned of pops, clicks and other background noises. You may need to mix music, sound effects and voice in a single soundtrack, in which case sound levels of the individual tracks have to be adjusted. You'll need a professional sound-editing program, and this will cost you between £100 and £300.

A great deal of video editing can be done using Video for Windows accessories, but if you need to mix and combine video clips or create effects, a more sophisticated video editing package will be needed. This would set you back between £150 and £400.

Going out in style

If you want your multimedia application to have its own style, you may need to get hold of fonts other than those distributed with Windows or other packages. Remember that if you want to distribute these fonts with the application, as opposed to using them on a bitmapped image, you have to get permission from the owners.

You'll also need a word processor, but its power is not that critical. You should save files in RTF (Rich Text Format) or as TXT (text) — most multimedia authoring packages accept both these formats.

Author, author!

Then, of course, there's multimedia authoring software. Depending on the type of application you'll be developing, and your own expertise, you'll decide on either a standard multimedia authoring package or a computer language (such as Visual Basic or Delphi).

For authoring software, you can say that the cost will be between £200 and £1,000 — or more than £3,000 if you go for top of the range.

Mastering the art

When you've completed the development, you have to consider mastering. A CD writer will be a good investment if you'll be developing a number of multimedia applications, not just one.

But in any case, you'll need one-off CDs for testing purposes. They cost between £25 and £150 each at a bureau service. A CD writer and software can cost anything between £900 and £5,000,



Question time: MPG video, multimedia authoring

Could you briefly answer the following — probably naive — question? To view an MPG file, do I need special software, special hardware, or both? I run everything under DOS/Windows (Word for Windows 3.11) on a Gateway P75, 16Mb RAM, an ATI Mach 64 graphics card with 2 meg of VRAM and an Ensoniq sound card.

I can view the movies that come free on the cover disk okay.

Nick Mahoney (nm@nmahoney.demon.co.uk)

You can view MPG video files under DOS or Windows as follows:

1. You can use a special software player program that uses either software decompression (such as XingCD) or works in conjunction with decompression hardware (such as the Media Station accessory that comes with the Showtime MPEG playback card).
2. You can play MPG files using the Windows Media Player:
 - a) if you have special decompression hardware that is installed with an MPEG MCI driver; or
 - b) if you have a virtual MPEG MCI driver, such as one supplied with a number of the latest faster graphics cards (e.g. the Matrox Millennium card).

Here's some other useful related information:

Software-only playback methods usually require a Pentium 90 or above to deliver full-screen (640 x 480) full frame-rate playback. Some software requires lots of free memory — under the DOS 640Kb limit — even if it's running under Windows, and even if you do have masses of extended RAM.

Finally, some CD-ROM drives don't provide a sufficient sustained data-transfer rate to give smooth MPEG playback. Problems also exist with some CD-ROM drives (or CD-ROM drivers) not being able to play MPG files from Video-CDs. Sometimes a later driver may be all you need.

I've read your articles in PCW and I need some advice on multimedia authoring. I want to write a dissertation on the impact of multimedia, and I want the document to be interactive (like a cover CD-ROM from a computer mag). For example, a front menu, text, references, video and audio.

I have access to Director 4.0, Toolbook 3.0 and possibly Authorware. I want to use the package which is easiest, without coding etc, and which can easily include hypertext, AVIs, TIFFs and so on.

Also, do you know of any good research material on the subject?
Asif Lakhnopal (allens@allens.demon.co.uk)

You'll be interested to know that PCW's cover disk is done using Macro-media Director. Very briefly — without going into full product reviews of the three programs you mention — the fastest and easiest is Authorware.

Coding is required for the other two, at least for anything decent.

Director is better for applications which have media that need to be placed on a timeline and synchronised so that they happen at a

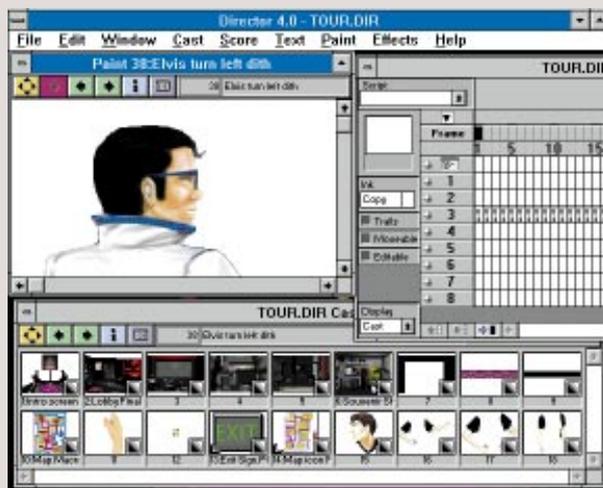


specific time. Toolbook works more like a book. It is easier than Director when it comes to handling hotwords inside text boxes, though they are both

equally easy in handling hotspots on images. For straightforward applications, it really makes no difference which one you use.

What you prefer to work with, and feel most comfortable with, may be more important.

As for research material on multimedia authoring, there's bags and bags of it. A starting point would be to look at some abstracts on the World Wide Web. Use a robotic search engine (any one will do — Lycos, Infotext, Web Crawler ... whatever) and search for, say, "multimedia authoring research" (remembering to AND these, i.e. look for all three keywords in the same document). After that, expect to spend a few hours downloading and reading the masses of stuff you'll get.



and blank CDs cost about £5 each if you buy in bulk (50 plus).

To press a CD in large numbers, you need to pay a mastering charge (about £500), then it depends on how many you press — typical prices are £1.20p each for 250, 60p for 500, 50p for 1,000, and 40p for 10,000. The break-even point (between using a pressing plant or writing your own) is at about 150 to 200 CDs, excluding the cost of the CD writer. Of course, prices are changing all the time. Finally, you also need to consider the cost of packaging,

which may be considerable in relation to the cost of pressing a CD. So, in terms of cost, multimedia could easily stand for multi-spending. However, as with film and music productions, some can cost thousands and others can cost millions — and unless you're involved in the business you can't tell the difference.

It is possible, with the use of imagination, talent and professionalism, to overcome the limitations imposed by a low budget. Keeping things simple always helps in these circumstances.

PCW Contact

If you have any multimedia-related problems or queries, email us at g.c.jacobs@swansea.ac.uk. We're sorry, but we can't answer queries by personal reply — we'd be at it all day! But we're glad to publish queries, with our answers, which we think will interest PCW readers generally.

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