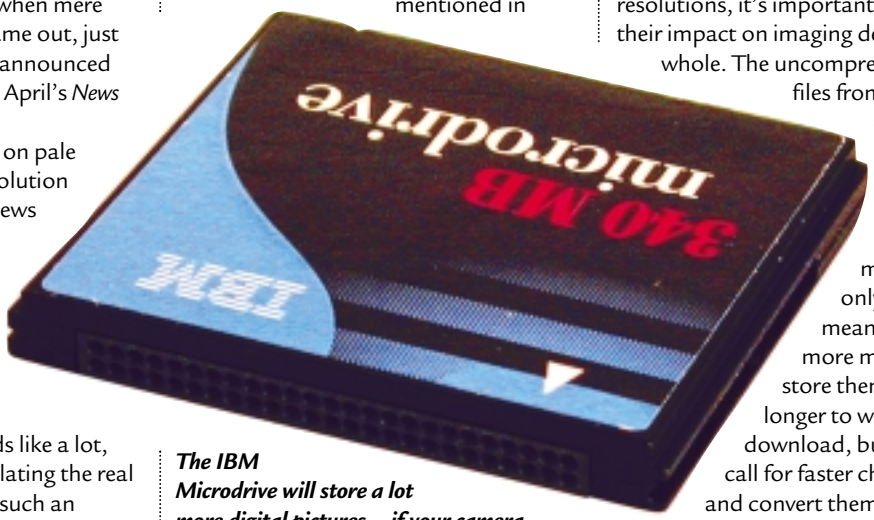
A pixel paradise

Gordon Laing has the low-down on the latest pixel breakthrough, Fujifilm's Super CCD and more.

I can control the weather with my trousers you know. Well, I can guarantee that when I wear my white jeans, it'll rain heavily. Fashion mistakes aside, it's called tempting fate, and wouldn't you know it, I did it again a couple of months back. There I was in March's *Hands On*, *Hardware*, commenting that it seemed like digital camera resolutions had reached a plateau at 2.1megapixels, when mere moments after the issue came out, just about every manufacturer announced 3.3megapixel models – see April's *News* (page 22).

Unlike muddy splashes on pale pants, however, higher-resolution digital cameras are good news for everyone. But what precisely does 3.3megapixels mean to the end user, and does it supply a significant boost over the 2.1 models which came before?

Millions of pixels sounds like a lot, but it's always worth calculating the real CCD matrix that results in such an impressive number. A 2.1 megapixel camera, for example, produces a bitmap measuring 1,600 x 1,200 pixels, and uncompressed file sizes of just over 6MB. A 3.3 megapixel model, in comparison, produces a bitmap measuring 2,048 x 1,536 pixels, resulting in uncompressed file sizes of around 10MB.



The IBM Microdrive will store a lot more digital pictures – if your camera has a CF Type II slot

March's *Hands On*, *Hardware* that for smaller, snap-sized prints, 2.1megapixel is more than sufficient to match an average APS or even 35mm compact, but it's the big prints that separate the men from the boys – or the analog from the digital.

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Back in March's *Hands On*, *Hardware* we showed how most inkjet printers are happy being supplied around 200 pixels per printed inch, resulting in an 8 x 6in print from a 2.1megapixel camera. I personally have found that you can still get good-looking results at 150 pixels per inch, especially if you're not holding the print to your nose, but it's all a case of personal preference and expectation.

With 200 pixels per printed inch, a 3.3megapixel camera would be able to produce a 10 x 8in print, approximately 2in bigger in each direction than a 2.1megapixel camera. Okay, it's not a massive difference, but sufficient to give you bigger enlargements, or more breathing space to crop down.

The long-term, digital-quality goal for me, however, is to match 35mm, or at least the resolution of film scanners. I mentioned in

Most film scanners boast optical resolutions of 2,700dpi, and for a 35mm frame, that produces a bitmap measuring around 3,800 x 2,500 pixels. Playing the digital camera numbers game, that would be described as a 10megapixel model, with 30MB uncompressed files. Admittedly, it's unlikely we'll see 10megapixel digital cameras in the near future, or ever, and probably no amount of tempting fate in print will bring them any closer, but it does put the numbers game into perspective. If you're into poster-sized prints, then there's plenty of life left in 35mm and larger film formats.

Number crunching

While I can dream about higher resolutions, it's important to consider their impact on imaging devices as a whole. The uncompressed 10MB files from 3.3megapixel cameras are almost twice the size of those from 2.1megapixel models. Not only does this mean you need more memory to store them and have longer to wait as they download, but they also call for faster chips to process and convert them into JPEGs.

On the memory front it's worth clearing up a little ambiguity in March's column. I mentioned IBM's tiny Compact Flash hard disk, and how the 170 or 340MB versions would be a boon to digital photographers. The important note, however, is compatibility, as you can't just insert this drive into any old Compact Flash slot.

The IBM Microdrive is a CF+ Type II card, which requires a Type II slot, and rather disappointingly, these are few and far between in the digital camera world. Nikon is a backer of Compact Flash, but its CoolPIX models, including the brand new CoolPIX 990, unforgivably do not feature Type II CF slots. In fact, a little searching later, and it would appear that about the only manufacturer to fully embrace CFII is Canon, which has been using it on models as old as the PowerShot Pro70; it even has CFII slots on the snappy S10 and new 3.3megapixel S20 compacts.

Not having had the chance to try out the Microdrive, I'm unsure about the

Still life: Different cameras produce varying file sizes for this picture

Manufacturer	Name	File size
Canon	PowerShot S10	1.53MB
Epson	PhotoPC 850Z	562KB
Fujifilm	MX2900	864KB
Kodak	DC280 Zoom	532KB
Kodak	DC290 Zoom	500KB
Nikon	CoolPIX 800	876KB
Nikon	CoolPIX 950	724KB
Olympus	Camedia C2000ZOOM	648KB
Olympus	Camedia C-2500L	1.7MB
Ricoh	RDC-5300	640KB
Sony	Cybershot DSC-F505	492KB
Toshiba	PDR-M5	712KB

impact it has on battery life or how it handles being shaken around, but certainly anyone who fancies giving it a shot should ensure their camera is CFII compatible.

Are all JPEGs created equal?

Something occurred to me the other day while testing digital cameras, and that's their implementation of JPEG compression. It's well known that different images will produce different file sizes, depending on their complexity – without changing the settings, you may find a camera producing file sizes ranging from 400 to 800KB, which obviously has an impact on the number of images you can fit in a memory card.

Most digital cameras offer a variety of compression and resolution settings, but I reckon it's fair to say that the vast majority of users leave theirs at the highest optical resolution and best-quality JPEG setting. The big question, though, is what happens if you take the same picture at these settings, but with a range of different cameras? Will they all produce JPEGs approximately the same size, or is there in fact considerable variance? Well, recently I tested a dozen 2.1megapixel cameras and was more than surprised by the results.

How big is that fruit bowl?

It's traditional to break out the fruit and veg when testing digital cameras, so I set up an array of nature's finest, and placed marks to ensure each camera was capturing the same composition. Once again, all cameras were set at their highest optical resolution (all 2.1megapixel), and their highest-quality JPEG compression.

I expected slight differences, but not the factor of more than three that came

Super CCD helps Fujifilm leap tall orders

As reported in last month's News section, Canon, Nikon, Sony and Fujifilm were the first manufacturers to announce new, high-resolution digital cameras. However, while Canon, Nikon and Sony announced 3.3megapixel models, Fujifilm stole the show with two new cameras boasting 4.3 and 6.1megapixel resolution.

Fujifilm has fitted its forthcoming FinePix4700 and FinePix S1Pro cameras with its new Super CCD imaging chip, a considerably different technology from the conventional CCDs on other cameras, including the new 3.3megapixel models.

Here's the theory: If the resolution of a CCD is increased, without making the overall chip any larger, then the actual pixel size is reduced. This results in lower sensitivity and lower signal-to-noise ratio. The diagonal distance between adjacent pixels on a conventional CCD array is also shorter than their vertical and horizontal distance. Fujifilm believes this is not an optimal arrangement to achieve the desired high resolutions in horizontal and vertical directions.

Fujifilm's answer is Super CCD, which employs octagonal photodiodes arranged in a honeycombed pattern. Ineffective space between pixels is reduced, and the photodiode areas made bigger, which in turn increases sensitivity and signal-to-noise ratio. Fujifilm nominally rates the Super CCD as equivalent to 200 ASA, compared to 100 ASA on conventional CCDs. So not only is noise reduced, but there are faster shutter speeds and longer flash range in low light.

By turning the pixels through 45 degrees and arranging them in a honeycomb pattern, the Super CCD has a shorter vertical and horizontal distance between adjacent pixels than a conventional CCD array. Fujifilm reckons this results in an effective resolution increase of 1.6 to two times, and claims it can describe one of its 1.9megapixel Super CCDs as being equivalent to a 3megapixel conventional CCD. Is it another numbers game? Divide the FinePix4700's 4.3megapixel resolution by two, and you've got a much less exciting-sounding camera. While the Super CCD sensitivity argument is sound, we'll have to wait until we get one to see if the claims of high resolution stand up to real-life testing.
www.fujifilm.co.uk/di/newproducts.htm

Finding DTS on DVD

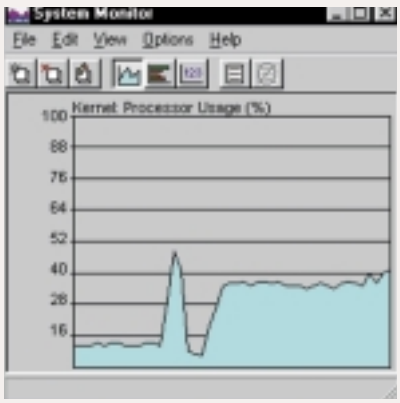
Regular readers of this column know I'm a sucker for the DTS digital surround sound system, which boasts better quality than Dolby Digital by essentially not compressing the signal as severely.

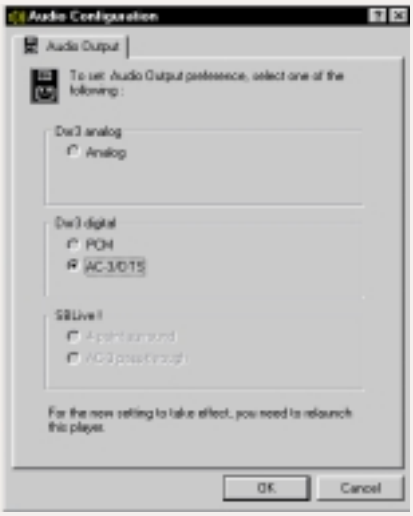
Like Dolby Digital, DTS requires a separate decoder to take the compressed digital bitstream and convert it into 5.1 channels of full-range analog surround sound; fortunately most home decoders now feature both Dolby Digital and DTS compatibility. You'll also need a DVD player that knows where to find the DTS bitstream. While most new domestic DVD players are DTS-savvy, what about PCs?

Well the good news is that while recently trawling for driver updates on the web, I discovered downloads for both Creative Labs' Dxr3 and VideoLogic's DVD-player decoder cards, which allowed them to recognise the DTS signal on suitable DVDs and squirt it out their SPDIF sockets.

Software players

A couple of months ago I reported a couple of software DVD players which could reroute the compressed Dolby Digital AC-3 bitstream out of SPDIF sockets on supported sound cards, and while this is becoming happily more common, sadly none I've seen so far will squirt out a raw DTS signal. It's all going the right way though, so fingers crossed. In the meantime, expect to see more PC, surround-sound speaker packages begin to include support for DTS along with Dolby Digital.





Above: Switching to two-channel Dolby on Creative's Dxr3 card
Left: The spike shows the CPU usage of the software DVD player

One final aside for the fellow anoraks out there. While testing Creative's Dxr3 card, I switched to the optional two-channel Dolby soundtrack of the DTS Apollo 13. After a short while I closed the Dxr3 player and fired up InterVideo WinDVD, the software player which Creative throws in with its SoundBlaster Live cards, and played the same sequence. Out of interest, I was running System Monitor, and as you can see, the CPU hit from the hardware player was around eight per cent compared to 35 per cent on the software player; the spike and trough were when I fired up WinDVD. The software player was always going to draw more resources, but it's interesting to measure the difference – my system was a PIII 550MHz with 128MB RAM and an ATi Rage 128 graphics card.

www.europe.creative.com
www.videologic.co.uk
www.dtstech.com

out. Sony's Cybershot DSC-F505 turned out the smallest file size of 492KB, while Canon's diminutive PowerShot S10 gobbled up 1.53MB. The Olympus Camedia C-2500L was hungriest of all, consuming 1.7MB. Most others fell between 500 and 800KB.

Now I looked at these images very closely to try and spot some differences in quality, but sadly came up missing. All, quite evidently, suffered from slight JPEG artifacts, but to be perfectly honest I couldn't rate one as being that much better than any other – in terms of compression quality anyway.

Uncompressed TIFFs, where available, certainly looked smoother and eliminated the patchy edges that JPEGs suffer from, but 6MB files are a large price to pay. Overall, I was impressed by the quality that JPEG can turn out, but also surprised by the minimal apparent difference that the hugely varying file sizes made on my fruity composition.

Cam and get it

Before wrapping up, I'd like to mention a quick tip my mate Gain Lee mentioned to me recently. He took the composite video output from his Sony F505 digital camera and connected it to his VCR. In 'still capture' mode, the camera actually fed a live PAL signal out of the composite socket, which essentially turned it and a connected VCR into a basic camcorder. Certainly there was some lag, particularly under poor light, and there was no audio to accompany the video, but it's quite a fun trick to try out nonetheless.

I'd be really interested to hear how you've got on with digital photography and any quality, performance or handling issues you've come across. Please don't send us any pictures though, or you'll bring our network to a halt!

CONTACTS

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