World Of Digital Cameras

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Like Aladdin, right after polishing that grimy brass lamp for the first time, we suddenly realize we're in for more than we expected when we dive into the wonderfully rich world of digital photography. Because the discussion is rife with techno-speak and terms change almost daily, keeping up is a challenge, even for the pros.
Now, not even half a decade into the evolution of the digital camera, the ever-expanding state of the art offers an impressive list of innovations: · 6- and 7-megapixel (MP) cameras with true photographic-quality imaging · 6MP camera models under $600 · High capacity removable memory cards · Dropping prices on digital SLRs with interchangeable lenses · Easy e-mail sharing of images · Myriad Internet-based photo-sharing/printing/storage services

Sometimes all this technology can be enough to give you a Maalox Moment. How do you choose which camera to buy? What do all of these photographic terms mean, and how do you fit it all together to make sure you've got the right equipment for your current and future needs and desires? Film Cameras To Boot Hill?No gun smoke in this scene, pardner. Think instead of the digital camera as an imaging sidekick, one that can take full advantage of your computer's mind-boggling potential to manipulate and disperse digital image files. Today's quality digital photographs can be handled with ever-increasing ease and utility. Besides, film cameras offer the convenience of local photo processing as well as different tonalities and colors compared to digital cameras. In addition, film-based SLRs are still very inexpensive compared to digital SLRs, plus they offer potentially very high image file sizes beyond any standard digital camera.Megapixels B Us
Let's begin with the heart of every digital camera: the electronic sensor that records the image. Most digital cameras today use CCD (charged coupled device) or CMOS (complementary metal oxide semiconductor), light-sensitive microchips for image gathering. Microscopic sensing points built into these sensors ("pix" for picture, "el" for elements = pixel) read the light, assign it a value, then convert it to a digital signal that's collected, processed into an image data file and stored in camera memory.

The most important part of all this is simply that the more pixels you have, the higher the resolution, which determines overall detail, sharpness and—to a point—image quality. Camera processing, sensor type and size do affect final image quality.

When you look at camera specification lists, take time to get familiar with camera features in detail on Websites or in brochures. The first thing to focus on is the total number of pixels. A 1 MP camera means its sensor has one million pixels. The more pixels crammed into a camera, the higher the image quality you'll get.

It plays out like this: Megapixel sizes provide roughly the following inkjet print equivalents to typical film prints:

1 MP = 3x5-inch print
2 MP = 5x7-inch print
3 MP = 8x10-inch print
4 MP = 9x12-inch print

If you're very careful about how you save the image (using TIFF, RAW or lowest compression JPEG files), you can actually print larger images by increasing the size of the file through programs like Altamira's Genuine Fractals (a new home or digital camera version has just been released; it's a plug-in program, meaning that it needs a host program that can handle Photoshop plug-ins).

Let's explore megapixel needs. Say you're absolutely certain you'll never want to print an 8x10, photo-quality image from a digital camera. You're content to use it as a holiday backup, for e-mailing small, compressed images to folks over the Internet or perhaps to drop in small photos into business letters now and then. A 1 or 2 MP camera (many below $200) should fill the bill perfectly.

But say you're an architect or engineer, and you need to take pictures of your building sites for quality presentations, quick printouts, CD-based mailing to clients, public-relations releases and so on. Or you're in a hiking or photography club, and you want to make photos to easily e-mail and print for your friends without the constant expense of film and processing. Then you'll want a 2 or 3 MP camera, maybe even a 4 MP job, to maximize your degree of control over making those images.

Pixel Size, "Noise Happens" And "Fast Film" Equivalents
All pixels are not equal, it turns out. That's one reason why a pro camera will be much more expensive than a low-priced consumer model, even if they both have the same megapixel number. The pro cameras have physically bigger sensors and, therefore, pixels. Larger pixels give the camera a better chance of gathering color and tonal information as well as reducing noise.

All digital cameras reach a point where they develop "noise," which means some pixels drop the ball. Noise happens from long exposures, typically more than a half-second, or when you shoot at lower-light ISO values of 400 or higher. This is one reason why most digital cameras don't allow very long exposure times. Instead of recording a night scene correctly, such as a black sky, some pixels will misinterpret the light and register a wrong value, such as dull orange or gray, which imparts a muddy, grainy look to an area.

According to Canon's technical guru, Chuck Westfall, "The larger the sensor, the less noise it records. It's just like film. As the size of the pixel increases, the amount of light energy it can absorb increases. It's simply more light-sensitive."

A real-world example of a large-sensor digital camera is the SLR-like, professional Canon EOS D30. Its pixels are 10.5 microns on each side. By contrast, Canon's pocket-sized S20 and G1 consumer cameras have pixels that measure 3.45 microns per side. In terms of comparing actual light-sensitive area, the D30 is the champ—by a factor of 10! FAT MemoryLet's take a quick look at removable memory. First off, remember this: As with computers, the more memory, the better. Why? Highest-quality image files from 3 MP cameras, even compressed, are at least 1 MB in size. That 16 MB card that comes with your camera will store a dozen or so photos, then you have to download to a computer. One of the basic upgrades for a digital camera is a bigger memory card.

The two most popular memory card types are CompactFlash (CF, including miniature hard drives called Microdrives from IBM and others) and SmartMedia (SM). Sony is pushing its Memory Stick concept as well as a recordable 31/2-inch CD-R mini-disk, which is recorded right inside the camera. Once you buy a camera, you're generally stuck with one memory card type—you just need to know what kind when buying new ones.

For sheer size capacity, the winner is the Microdrive, in current or projected storage capacities of 250, 340, 500 and 1,000 MB (1 GB). This marvelous technology puts a quarter-sized hard drive disk inside a matchbook-shaped holder. But it's mechanical, thus more prone to shock damage than solid-state memory like CF, SM or Memory Stick, which are fairly indestructible.

In the solid-state group, the most popular is CompactFlash (Types I and II). The largest CF Type II card (sub-matchbook size, but slightly thicker) holds a 300 MB card. SmartMedia is physically smaller and currently maxes out at 128 MB. Caution: Older CF cameras don't take the CF Type II card. And some CF Type II cameras don't have the software to run the Microdrives. Make sure before you buy.

Most cameras ship with pathetically inadequate memory cards, so expect to spend $100 or more for just one of the bigger chips. This isn't bad news when you realize this: It's your "film," and it can be reused again and again, so you don't need to buy film again. Why Are Lens Focal Lengths Different?35mm cameras capture light in a frame measuring roughly 1x1 1/2-inches. But CCD sensors are smaller than that, on the order of a half- to two-thirds of an inch on the long side.

This, in turn, means 35mm film camera focal lengths you may be familiar with—such as 28mm for a good wide-angle, 100mm for a portrait telephoto and 300mm for a big, six-power telephoto—change with a digital camera. The actual focal lengths are smaller, just as the lenses themselves are smaller, but you get viewing angles equivalent to film cameras.

The Pentax EI-200 2.1 MP camera, for example, has a built-in, 5.2-16.5mm zoom lens. In 35mm film photography, that would be one killer of a wide-angle zoom. But the numbers are misleading: Since the area the lens is focusing on is also smaller than a 35mm film frame, the viewing angle is equivalent to the 34-108mm zoom range of a film camera lens.

So here's a helpful hint: When you look at the spec list, always check for the phrase, "35mm film equivalent," to make sure you'll be making decisions based on familiar information.

Our pet rant: Beware attention-grabbing claims of "6x digital zoom!" Unless image quality is of absolutely no concern to you, you'll only want to pay attention to optical zoom numbers, such as "3x optical zoom." Digital zoom means the camera's computer brain crops away the image and discards pixels! We've yet to think of one good reason to use a digital zoom or base a purchase decision on it.

The more esoteric flip side of the discussion comes as work progresses feverishly at several camera companies to develop a true 24x36mm CCD or CMOS sensor. Currently, professional-level digital cameras marry common film camera lenses to camera bodies with smaller digital imaging sensors. That skews the equivalent focal length of the lens, typically multiplying focal lengths by a factor of 1.5/1.6x.

For many pro-level shooters, losing the most dramatic lower end of wide-angle is just as unwelcome as more telephoto power is welcome. So, coupling lenses you already own with an actual 35mm film-sized sensor is the only way to have full use of the focal length values you bought in the first place. Unfortunately, such sensors are astronomically expensive right now.

But that's not the only path open to manufacturers, opines Canon's Westfall. By developing less-expensive, more powerful sensors in the smaller size, manufacturers could perhaps afford to also design a new professional lens line to maximize the full potential of the smaller chips.

Frills Or Essential Features?
Whether you're a newbie or digital diehard looking to upgrade, you may be confused by the constant flux of innovation. Some features are real boons, some are plain superfluous and much of it is a judgment call. Here's a quick jog through the Digital Tech Lexicon Jungle.

Highly Desirable Features (look for these)
Flash Versatility. Many models offer red-eye reduction, manual on/off (great for filling in shadows during the day), slow shutter-speed sync, rear-curtain sync and flash zoom.

Rotating LCD Monitors. Great for places where you can't see the viewfinder. Very handy for macro shooting or in crowds (hold the camera over the crowd and still see your shot).

Memory Card Reader. An add-on purchase. Readers are inexpensive, read all major memory formats and free you from the need to attach your camera to the computer. Just pop in your camera's memory chip and make a quick image transfer. Get USB connectivity for plug-and-play ease and speed of transfer.

Controllable Exposure Modes. Aperture- and shutter-priority shooting are wonderful tools for refining your ability to make precisely exposed images or to create effects such as deliberate motion blur (slow shutter speed), freezing action (fast shutter) or increasing or decreasing depth of field (intentionally blurring background). Manual exposure helps for those situations that you just can't make work for auto exposure.

Image Preview. A terrific innovation. Many cameras flash a quick display of one or two seconds of the image you just shot, but some also have a preview button. It saves switching from record to playback mode, which wastes time and battery life. Nikon's 880 inserts a small review image inside the current LCD view image, useful for comparing with the prospective shot.

Rechargeable Batteries. A couple or more sets of NiMH (they avoid NiCd-type charge memory problems) or Lithium Ion (more expensive but even more reliable) can save you tons of money over the life of your camera.

Frills Or Essential Features?
Frills (interesting, but not for everyone)
Movie Mode. Several cameras can record short, highly compressed digital movies for playback on TV or your computer. Don't expect the same quality you get from a video camcorder, so consider it a fun frill. Some movie modes also record sound.

Sound Recording. Kodak ran early and strong with this feature, basically a built-in microphone/speaker to link sounds, such as music or spoken notes, with individual photos.

Wireless Controllers. Some cameras have remotes to trigger the shutter when you're ready, instead of racing to beat the timer.

Crop, Trim And Resize. If you don't have a computer, well, okay. But how much twiddling do we really want to do when we're taking pictures?

Infrared Data Transfer: You need to have the right connections on your computer, but this can be a cool way of wirelessly transferring your images.

LCD Viewfinders. Not the screen on the camera back, but a tiny LCD inside the optical viewfinder. Advantage: You see exactly what the sensor sees. Disadvantage: Low-res, small viewing, difficult to determine sharp focus, etc. We like the promise of SLR-like TTL viewfinding without the battery drain of camera-back LCD viewfinding.

Digital Zoom, The Sequel. In case you missed it above, we say "pass." Useful Features (good to have)ISO Choices. Higher-end models give you a broader range of equivalent ISO values, or light sensitivity. It's like being able to shoot with slow (ISO 100) or fast (ISO 400, 800 and higher) film.

Autobracketing. A carry-over from SLR photography, autobracketing brings exposure insurance. Push and hold the shutter button down and get three different exposures automatically.

Stitch Mode. A neat feature to help you shoot multiple images for building a panorama later. Some models actually display a ghost edge of the previous shot on the LCD screen to help you align the next shot, which is a big help.

Automatic Shooting Modes. These simplify and enhance quality shooting on the fly. Look for selectable modes such as: · Landscape (increases sharpening effect) · Portrait (minimizes depth of field to make soft backgrounds) · Night Light (maximum ISO speed) · Sunrise (inhibits color balancing that robs rich, warm color) · Party (balances the flash to the scene's ambient light level)

Photo Quality
Viewing Vs. Printing
Why talk about printers in a camera discussion? Simple: If photo-quality printing is on your digital photography agenda, you need to make sure your camera can deliver. Simply put, for anything beyond that small 3x5-inch print, you're not going to be happy with less than a 2 MP camera.

For the best photographic quality your printer can provide, always shoot the highest resolution/quality your camera can provide. Then, when you print, set the resolution (in your image-processing software) to 240 to 300 dpi/ppi for the image (not the printer). We find people still get confused by this. Printer resolution and image resolution are two entirely different things.

Back to the camera: A 3.3 MP camera gives you a raw image file that measures about 7x11-inches at 200 dpi. By resetting the image resolution (in your editing software) to 300 dpi, that original file shrinks to exactly 4.8x7.2-inches. But you might not be able to tell the difference between a 200 dpi print and a 300 dpi print—you have to test your printer/paper combination. If you can't see appreciable difference between lower and higher dpi settings, go with the lower resolution of the original file size.

Additional Digital Rules To Live By · Always shoot at the highest quality and lowest compression available. In the grand tradition of GIGO (garbage in, garbage out), the better your original, the higher the quality of your final image. · Lenses with lower f-stop values (f/2.0 vs. f/2.8 or f/3.2) have better low-light capacity. The lower number means the lens gathers more light to the sensor, which translates into shooting with less noise in darker conditions as well as more control over depth of field. · "Class glass" means class imagery. Brand-name lenses such as those from Canon, Nikon, Zeiss, Olympus and Sony, among others, means you can count on superior sharpness, color accuracy and faithful rendition of your chosen subject.

Imaging In The RAW
JPEG is the image format most common to digital cameras. It gives us dramatically smaller file sizes than the full photo file by compressing the information in the file. The other format common to digital cameras is TIFF, which stores image information in full-sized, uncompressed files. A common JPEG of a 3 MP image might be a little over 1 MB in size. An equivalent-size TIFF is about 9 MB per image. We do lose some image quality at any level of JPEG compression, although at low compression, high quality, the loss is minimal.

A third option offered by recent cameras is RAW, simply the raw data directly read from the image sensor, with no in-camera processing. The advantages are most appreciated by image perfectionists: smaller file size than TIFF, a more accurate representation of image data and image data is recorded over a wider bit range for "deeper" color. RAW doesn't come without a convenience price, however. Recording a RAW image typically takes 20 to 40 seconds. Your computer's editing software will need a TWAIN-type plug-in to open RAW images. And there's no RAW standard format.