

# A Short Course in Digital Photography

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## A Short Course in Digital Photography Introduction

*All great images, digital or otherwise, start by capturing a great photo and capturing great photos requires an understanding of your camera. It's these aspects of digital photography that this book is all about.*

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Digital cameras are only a few years old and are just now beginning to make serious inroads into photography. They have yet to be fully accepted by some photographers. However, despite some current limitations, digital cameras are the wave of the future and it's only a matter of time before most photographs are taken with these kinds of cameras rather than traditional film-based cameras.

Photographers who don't accept digital cameras generally base their arguments on the fact that the images are not as good as film-based cameras. Yet these same photographers most likely use 35 mm SLR cameras that are not as good as 8 x 10 view cameras. And if they do use 8 x 10 cameras, they don't use the even better mammoth glass plate view cameras used by Jackson and Muybridge after the Civil War. If they really wanted quality, they'd be using mules to carry their equipment. So much for their argument being based on the quality of the image.

The sad truth is that the quality of images has hardly improved at all since the first daguerreotypes of the 1840's and albumen and platinum prints of the late 1800s. What's happened is that both cameras and photographic processes have become easier and more convenient. Digital cameras are just another step along this path. Images captured with these cameras are admittedly different, but you'd be hard pressed to prove they are inferior. Many of the arguments you hear today about digital cameras are but echoes of the sentiments expressed when the 35mm Leica was introduced in 1925. Suddenly there was a camera that was easy to handle in the most difficult situations and with a long roll of motion picture film, capable of

capturing one image after another. It may have used a much smaller negative, and hence been "inferior," but photographers who held onto their big, awkward box cameras were soon bypassed by history.

Another argument against digital cameras is that they are mainly of the point and shoot variety. That means they are fully automatic and don't have the controls that photographers have traditionally used to get great photos. This implies they are used for vacation pictures or photographs are taken as documents of family events. However, there is a certain elitism and snobbishness about this point of view. In general, the photographer brings more to a great photograph than the camera does. The history of photography is replete with stories about photographers who didn't know or care much about cameras. Jaques Henri Lartigue was getting great images before he was 10 years old--and with an old box camera to boot. It's said that Dorothea Lange (or was it Margaret Borke White) used the printed instructions that came with her film to set her camera's setting--"bright sun 1/125 at f/16, cloudy bright 1/125 at f/11, and so on."

But even if objections to image quality and lack of controls were true, these will change over time as more sophisticated, yet still affordable, cameras are introduced. Image quality already rivals or exceeds 35 mm film in high-end cameras. And these cameras also have the same controls as a professional 35 mm SLR. Their only drawback is their price, but prices are falling rapidly now that image sensors are solid state and Moore's Law is at work. In the meantime, you can get good pictures with point and shoot cameras, but to get great ones you still need to understand what the camera is doing for you automatically. If you understand the basic functions of your digital camera, you'll find it easier to expand and improve your photography. It's this understanding that gives you the creative control you need to record a scene realistically, just the way you saw it, or to instead capture the feeling or mood instead of the details making up the scene. Your understanding of a few basic principles makes it possible to take a photograph that best expresses what you want to convey.



*The flowers in the foreground add both depth and interest to what might otherwise be a pretty dull picture.*



*Putting a dead steer in roughly the same position in this image as the flowers are in the previous one has quite a different effect.*

Like artists in other mediums, as a photographer you have a set of "tools" that can make your photographs not only exciting and interesting to others but also unique to your own, very personal view of the world around you. The basic tools you have to work with are the way sharpness, tone, and color interact in the scene being photographed, the vantage point from which to take the picture, and the light under which it's photographed.



You can choose to keep everything in a scene sharp for maximum detail or to blur it all for an impressionistic portrayal. You can keep some parts sharp and dramatic while letting others appear soft and undistracting. You can use black-and-white to emphasize tone, the innumerable shades of light and dark in every scene, or color to capture bright and powerful or soft and romantic colors. You can photograph the same subject at dawn, noon, dusk, or at night, in sun, rain, snow, or fog. Each of these variables will influence the image you get.



*This ice-locked marina is in a lake in the Colorado Rockies. The melting ice takes on the look of surrealistic water.*

All of this is possible by adjusting only three controls on your camera: focus, shutter speed, and aperture. These three controls, however, when combined with patience, experience, and your own personal view of the world, lend themselves to an infinite variety of possibilities, which makes photography a life-long interest and challenge for even the most experienced professionals.



*With traditional photography, the final image varies very little from the original scene unless you have some serious darkroom skills.*



*With creative digital photography, the image can be just a starting point. Making photographs look like paintings has been frowned on in photography for the past 80 or so years. Maybe this form of pictorialism will make a comeback.*

When learning and practicing photography, remember that there are no "rules," no "best" way to make a picture. Great photographs come from experimenting and trying new approaches even with old subjects.



*Everything in a scene may not be equally important. When you look at the world your eye focuses sharply on only very small areas at any one time. You can select what is important from an almost infinite number of details. Photographers can use the same technique to isolate the most important part of a scene.*



*Sharpness in an image is one basic effect you can control in your photographs. In this photograph, the photographer chose to convey a feeling of speed and motion in the water rather than freeze it sharply.*



*Exposure choices can be used to portray any scene light or dark as you wish. More exposure to light makes a scene lighter, less exposure makes it darker. You can also adjust these tones as well as colors in a photo editing program.*

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A Short Course in Digital Photography

## 1. The World of Digital Photography

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Digital photography is really only a few years old, but it's already finding wide acceptance in many areas of photography. In this chapter, as we explore what kinds of photos people take, who's taking them, and how the images are used. As you read through this chapter, perhaps you'll find areas in which you might want to adopt digital photography.

### ▲ What Kinds of Digital Photos are being Taken?

People like [David Grenewetzki](#) think nothing of strapping their new digital camera to a remote control airplane, or even a rocket, and launching it into the wild blue yonder to capture photos from a bird's-eye view. Until camera prices come way down, you might want to find other applications for your new camera.



*What could be more fun than strapping your new camera onto a remote control airplane for pictures from hundreds of feet up! Check out David's site for lots more on this and rockets too. Image © 1997-1998 by [David Grenewetzki](#).*

Fine art photography is a broad category that has included everything from the amazing prints of Ansel Adams to fuzzy prints from a pinhole camera. It's not at all surprising that digital cameras have become part of the hardware repertoire that artists work with. Long before Jerry Uelsmann was making montages, this form of photography was going on. Here is a 1905 image by Adelaide Hanscom that has many of the features we see in manipulated digital art.



Adelaide Hanscom did an entire series of manipulated images to illustrate a 1905 edition of the Rubiyat.

Photographs don't always have to be put to work. Most are really just for enjoyment. Capturing memories and strange sights are just a few such uses.



Peggy Curtin took this photo of a miniature St. Paul's Cathedral while leading a tour of Prince Edward Island in Canada.

There is a grand tradition of photographing on the street, capturing the fast action as it unfurls. This style of photography grew out of the freedom first offered by the 35 mm Leica, the first camera to truly allow high quality photography on the fly. Previously, cameras were tethered to tripods, or bulky and obvious. Bring up a one of those big, boxy Graflexs to take a picture and people ducked or fled the scene. Bring up a Leica and no one notices, not even when it makes its muffled "click." Some digital cameras are even smaller than the Leica and make no sound at all.



*These mannequins in a London store window seemed quite willing to be photographed. Overcoming my usual shyness, I fired away.*

**Nature photography** is perhaps one of the most difficult kinds of photography. Subjects are elusive; one reason why so many "nature" photographs are taken in zoos and preserves where it's like shooting fish in a barrel. However, if you do it au natural, nature photography joyfully merges a love of the outdoors with a love of making images. If no good shots appear, you've still had a nice walk.



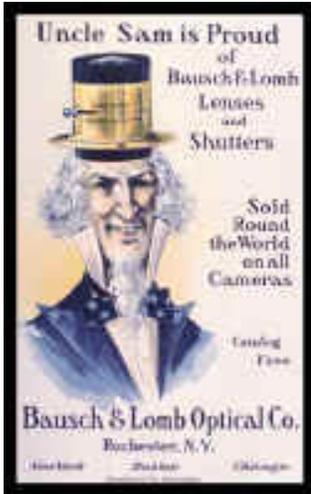
*I stalked these big-horned sheep through the wilds of the London Zoo*

One the first and most lasting applications of photography has been to bring distant worlds home to viewers. Digital photography now makes it possible to put all of your images on the Web and bore the entire world instead of just your friends and family. (I am probably the only photographer who fell asleep while showing his own slides.) One nice thing about digital cameras is that you can show your images on a TV set. You can even select only the best and copy them from you computer back onto the camera's storage device so you can give an edited slide show of just the best images. Some of the issues of digital travel photography are discussed in the section [Travel Photography](#).



*Stonehenge sits alone on England's Salisbury Plain looking much like it must have to those who built it thousands of years ago.*

It's often necessary to make photographic copies of documents and objects. For example, a museum might want an illustrated inventory of everything in its possession. Digital cameras are ideal for this application.



*Here an old advertisement for camera lenses has been copied.*

## ▲ Who's Taking Digital Photos?

Some of the early adopters of high-end digital cameras were photographers doing studio photographs for catalogs and other publications. They were able to quickly adopt these cameras for a variety of reasons. To begin with, objects such as birdhouses or dinner plates don't move. This makes it possible to get the long exposures required by some high-resolution cameras that take three exposures to get a full color image. Another reason is that the images are usually reproduced small enough so their faults don't show. Finally, the production houses that prepare the catalogs prefer to receive digital images so they can avoid the time and cost of scanning them.



*This studio image was taken with Sound Vision's CMOS-PRO—the first CMOS digital camera specifically designed for the graphic arts professional. Image courtesy of [Sound Vision Inc.](#)*

**Commercial photographers** were amongst the first to adopt digital photography. Using expensive digital backs to large format cameras, these photographers are turning out images that rival those from film-based cameras.



*Mike Berceanu shot this image on the Agfa StudioCam scanning digital camera.  
Courtesy of [Mike Berceanu](#).*

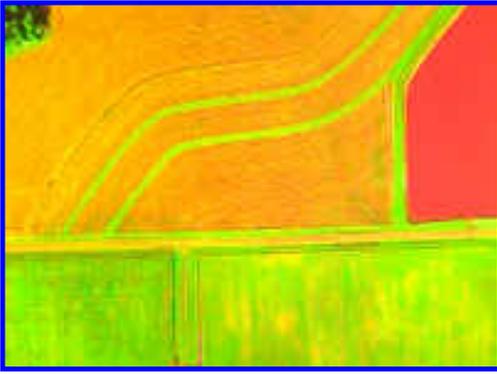
**Reporters** and news organizations such as the Associated Press have adopted digital cameras because the photos can be immediately transmitted from the site where they're taken over telephone lines or even a wireless connection. And once received, they are ready to use, no lab processing is required. A photo of the winning touchdown at a Super Bowl game can appear in a paper across the country within minutes. The low-resolution of digital cameras (compared to silver-based film) doesn't matter because newspaper printing is also low-resolution. Good sites on digital photojournalism are [Rob Galbraith's](#) and [Dirck Halstead's](#).



*A rescue helicopter approaches the cliffs of Dover, England and rescues a man stranded by the incoming tide.*

[Weegee](#) may not have put down his flash-bulb equipped [Grapflex](#) for a digital camera, but law enforcement agencies sure have. Like others, they are attracted to the speed of processing and the ability to easily enhance images and distribute them on-line.

Digital photography is ideal for many scientific applications. Here a special digital camera has captured the spectral reflectance properties of plants so their status can be determined. Using photographs such as these, farmers are better able to manage their crops.



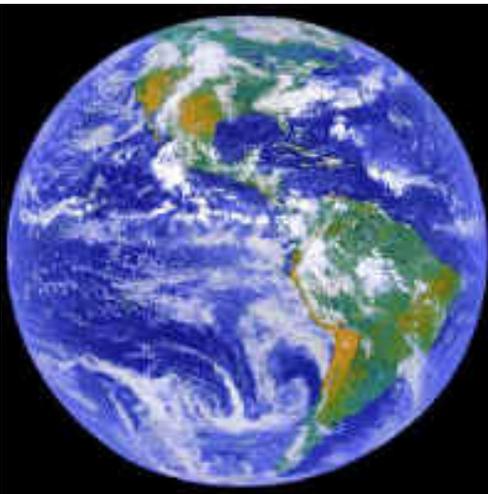
Digital cameras can also be used for special purposes. Here's an image taken with the Dycam ADC camera. And who ever said there wasn't art in science? I'd love to see what creative photographers could do with this camera. Courtesy of [Dycam](#).

Digital image sensors have been used in astronomy for years. They are now widely used in place of film, even on the orbiting Hubble Space Telescope.



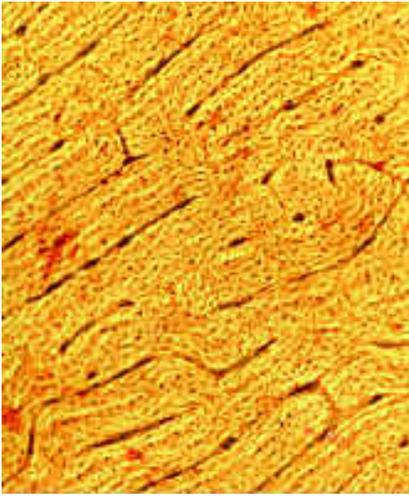
This NASA Hubble Space Telescope image shows one of the most complex planetary nebulae ever seen, NGC 6543, nicknamed the "Cat's Eye Nebula." Hubble reveals surprisingly intricate structures including concentric gas shells, jets of high-speed gas and unusual shock-induced knots of gas. Estimated to be 1,000 years old, the nebula is a visual "fossil record" of the dynamics and late evolution of a dying star. This image was created with support to Space Telescope Science Institute, operated by the Association of Universities for Research in Astronomy, Inc., from NASA contract NAS5-26555 and is reproduced with permission from [AURA/STScI](#).

When you fly a camera through space or land it on another planet, getting film back to Earth is a big problem. The solution, of course, is to use a digital camera and send the image back digitally by radio transmission. That's exactly what was done on the Mars Rover mission where a small vehicle crawled across the surface of the planet sending back images—some of them in stereo.



Full view of the Earth, taken by GOES-8 (Geostationary Operational Environmental Satellite) on 2 September 1994 at 18:00 UT. Courtesy of [Public Use of Remote Data](#).

It's common practice to take videos or photographs of what's revealed by a microscope. One of the masters of this was [Roman Vishniac](#) who was a true scientific artist. Digital cameras are ideal for this situation because the images can be immediately displayed.



Normal human bone captured through a Nikon microscope with SoundVision's CMOS-PRO. Image courtesy of [Sound Vision, Inc.](#)

Kids are getting into digital photography in a big way. With the recent development of low-cost image sensors that are used in cameras, companies are developing more products that include vision. Cameras can now go into products in which they were previously too expensive or bulky.



Mattel and Intel have jointly created the Intel Play X3™ Microscope.

[Mattel Media](#) has the Barbie Digital Camera that's inexpensive and, surprise—it's PINK. It holds only 6 images at 240 x 320 resolution but costs \$64. It comes with software that lets kids use their photographs to create cards and place their photos into Barbie scenes. Mattel is also exploring digital cameras for boys

(camouflage maybe?).



*The Barbie Photo Designer Digital Camera brings low-cost digital imaging to kids. Courtesy of Mattel media.*

## ▲ How are Digital Photos Used?

Most of us take lots of photos and then chuck them in a drawer. If we care enough about some, we may even put them in an album. The problem is, we rarely share them with others and after awhile forget a lot about the circumstances under which we took them. Digital images change all of that. They are easy to insert into documents or Web pages along with captions or text. This makes it easy to create journals for personal memories or to share with others. You can post them on the Web for anyone to see, or print copies and give them to people who shared the experiences with you. Everyone can now be a publisher.

Lots of us have old family photographs that have been tossed in drawers and not well cared for over the years. As our families grow and spread out, it's harder and harder to organize and share these images that recall so much. However having them scanned, or even just photographing them with a digital camera, makes them easy to insert into documents or e-mail. You can even give someone a [digital picture frame](#) and feed photos to it over the Internet from anywhere in the world.

*The Digi-Frame™ Model DF-560 comes complete with three interchangeable decorator frames - change them to match your decor, or your mood.*



In the old days of film photography, you had to physically deliver photos to people you wanted to share them with. Today, that's not necessary. You can quickly send photos as e-mail attachments, post them on a Web site, or upload them to one of the many [free photo sharing sites](#) such as ofoto. Once your images are uploaded, you can even [order prints](#), or lots of other products with your photos on them.



*Who needs a gallery show when you can put your own photos on mugs?*

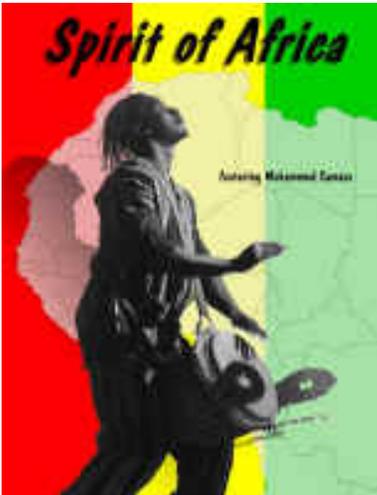
Once images are in digital form, you can start to take pieces from various images and paste them into other images. These composite images can be tame or wild. In fact, compositing is done so often on television

and in print advertisement that we're growing used to it.



*Here the moon has been cut out of one image and pasted into another. You can't even tell the image has been altered.*

Posters, books, magazines, journals, reports, and other kinds of other documents are illustrated with photographs and other images. Since these publications are increasingly desktop published, digital photos are just another part of the stew.



*Rick Ashley took a digital photograph of the drummer Mohammed Camara and merged it with some clip art to create a stunning poster used to announce classes and performances. Image courtesy of [Rick Ashley](#).*

Some big users of digital images are multimedia developers. Since multimedia is always displayed on a computer screen, or projected from it, digital images are a necessary ingredient. Whether originally taken with a digital camera or with a film camera and then scanned, the final image has to be in a digital format.



*The PACE program was produced by Kim Foley to accompany a college computer text written by herself, Kunal Sen, Cathy Morin and myself. The text and program are published by Irwin/McGraw-Hill.*

Anyone who is taking photographs for the Web prefers digital cameras because the images are ready to post as soon as they are taken. The images don't have to be first processed and then scanned as film has to

be. This saves both time and money. Since most screens display only low-resolution images, the low-resolution of some cameras is no drawback. In fact, higher resolution images would be too big to post on most Web sites and would have to be reduced anyway.



*The author of this site has a number of Web sites all well illustrated with digital images. The site shown here is one for kids on [bulldozers](#) and other construction equipment. If you click the link to check it out, please come back.*

Once images are in a digital format, you can include them in desktop published documents created with programs such as Microsoft Word, PageMaker, or QuarkXPress.



*Images have been placed in a PageMaker document to prepare them for publishing.*

Once the almost exclusive domain of Polaroid instant cameras, photos for IDs are increasingly taken in digital form. Once captured, they can be immediately printed right on the ID cards, making counterfeiting more difficult. You can also use the images to create buttons or illustrated business cards.



*Fargo printers are used to make full-color ID cards complete with photographs. Courtesy of [Fargo](#).*

Newsletters from companies and organizations are often full of images. Employees and members are honored when promoted, retired, or when they reach some milestone, and events are documented. As the publishing process has become digital and moved to the desktop, so have the photographs used to illustrate these newsletters.

Realtors are big consumers of photography. Exterior shots are taken for newspaper ads and interior shots for brochures and Web sites. The ease and immediacy of digital cameras makes them widely used in this field.



*A typical interior view such as those taken for real estate brochures.*

If your house or office burns down, or blows or floats away, how do you prove you lost that velvet painting of Elvis? The best way is to photograph your belongings and store the image files on a disk. Then, hope you'll be able to open the images a decade from now when you need them and file formats and devices have changed (remember the 5 1/4-inch floppy?) To be on the safe side, display the images on the TV and tape them then store the tape in a safe place.



*If you don't have some items insured, you may have to make do if anything goes wrong. It helps if you have photos that show the "before." The insurance company will photograph the "after."*

If you are like millions of other people, you may have things around the house you want to sell. It's easier than ever now with on-line auction such as e-bay. It's been proven over and over again that items

accompanied by a good photo bring much higher prices.

*A clear crisp digital image can make all of the difference when selling an item in and on-line auction.*



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