STILL PHOTOGRAPHY

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UNIT-I

What is Photography?

Photography (derived from the Greek photos- for "light" and -graphos for "drawing") is the art, science, and practice of creating durable images by recording light or other electromagnetic radiation, either chemically by means of a light-sensitive material such as photographic film, or electronically by means of an image sensor. Typically, a lens is used to focus the light reflected or emitted from objects into a real image on the light-sensitive surface inside a camera during a timed exposure. The result in an

electronic image sensor is an electrical charge at each pixel, which is electronically processed and stored in a digital image file for subsequent display or processing.

Brief History of Photography

Pinhole Camera

Alhazen (Ibn Al-Haytham), a great authority on optics in the Middle Ages who lived around 1000AD, invented the first pinhole camera, (also called the Camera Obscura} and was able to explain why the images were upside down. The first casual reference to the optic laws that made pinhole cameras possible, was observed and noted by Aristotle around 330 BC, who questioned why the sun could make a circular image when it shined through a square hole.

The First Photograph

On a summer day in 1827, Joseph Nicephore Niepce made the first photographic image with a camera obscura. Prior to Niepce people just used the camera obscura for viewing or drawing purposes not for making photographs. Joseph Nicephore Niepce's heliographs or sun prints as they were called were the prototype for the modern photograph, by letting light draw the picture.

Niepce placed an engraving onto a metal plate coated in bitumen, and then exposed it to light. The shadowy areas of the engraving blocked light, but the whiter areas permitted light to react with the chemicals on the plate. When Niepce placed the metal plate in a solvent, gradually an image, until then invisible, appeared. However, Niepce's photograph required eight hours of light exposure to create and after appearing would soon fade away.

Louis Daguerre

Fellow Frenchman, Louis Daguerre was also experimenting to find a way to capture an image, but it would take him another dozen years before Daguerre was able to reduce exposure time to less than 30 minutes and keep the image from disappearing afterwards.

The Birth of Modern Photography

Louis Daguerre was the inventor of the first practical process of photography. In 1829, he formed a partnership with Joseph Nicephore Niepce to improve the process Niepce had developed.

In 1839 after several years of experimentation and Niepce's death, Daguerre developed a more convenient and effective method of photography, naming it after himself - the daguerreotype.

Daguerre's process 'fixed' the images onto a sheet of silver-plated copper. He polished the silver and coated it in iodine, creating a surface that was sensitive to light. Then, he put the plate in a camera and exposed it for a few minutes. After the image was painted by light, Daguerre bathed the plate in a solution of silver chloride. This process created a lasting image, one that would not change if exposed to light.

In 1839, Daguerre and Niepce's son sold the rights for the daguerreotype to the French government and published a booklet describing the process. The daguerreotype gained popularity quickly; by 1850, there were over seventy daguerreotype studios in New York City alone.

Negative to Postive Process

The inventor of the first negative from which multiple postive prints were made was Henry Fox Talbot, an English botanist and mathematician and a contemporary of Daguerre.

Talbot sensitized paper to light with a silver salt solution. He then exposed the paper to light. The background became black, and the subject was rendered in gradations of grey. This was a negative image, and from the paper negative, Talbot made contact prints, reversing the light and shadows to create a detailed picture. In 1841, he perfected this paper-negative process and called it a calotype, Greek for beautiful picture.

Timeline

5th-4th Centuries B.C. -Chinese and Greek philosophers describe the basic principles of optics and the camera.

1664-1666- Isaac Newton discovers that white light is composed of different colors.

1727- Johann Heinrich Schulze discovered that silver nitrate darkened upon exposure to light.

1794- First Panorama opens, the forerunner of the movie house invented by Robert Barker.

1814- Joseph Niepce achieves first photographic image with camera obscura - however, the image required eight hours of light exposure and later faded.

1837- Louis Daguerre's first daguerreotype - the first image that was fixed and did not fade and needed under thirty minutes of light exposure.

1840- First American patent issued in photography to Alexander Wolcott for his camera.

1841- William Henry Talbot patents the Calotype process - the first negative-positive process making possible the first multiple copies.

1843- First advertisement with a photograph made in Philadelphia.

1851- Frederick Scott Archer invented the Collodion process - images required only two or three seconds of light exposure.

1859- Panoramic camera patented - the Sutton.

1861- Oliver Wendell Holmes invents stereoscope viewer.

1865- Photographs and photographic negatives are added to protected works under copyright.

1871- Richard Leach Maddox invented the gelatin dry plate silver bromide process - negatives no longer had to be developed immediately.

1880- Eastman Dry Plate Company founded.

1884- George Eastman invents flexible, paper-based photographic film.

1888- Eastman patents Kodak roll-film camera.

1898- Reverend Hannibal Goodwin patents celluloid photographic film.

1900- First mass-marketed camera—the Brownie.

1913/1914- First 35mm still camera developed.

1927- General Electric invents the modern flash bulb.

1932- First light meter with photoelectric cell introduced.

1935- Eastman Kodak markets Kodachrome film.

1941- Eastman Kodak introduces Kodacolor negative film.

1942- Chester Carlson receives patent for electric photography (xerography).

1948- Edwin Land markets the Polaroid camera.

1954- Eastman Kodak introduces high speed Tri-X film.

1960- EG&G develops extreme depth underwater camera for U.S. Navy.

1963- Polaroid introduces instant color film.

1968- Photograph of the Earth from the moon.

1973- Polaroid introduces one-step instant photography with the SX-70 camera.

1977- George Eastman and Edwin Land inducted into the National Inventors Hall of Fame.

1978- Konica introduces first point-and-shoot, autofocus camera.

1980- Sony demonstrates first consumer camcorder.

1984- Canon demonstrates first digital electronic still camera.

1985- Pixar introduces digital imaging processor.

1990- Eastman Kodak announces Photo CD as a digital image storage medium.

How Camera Works

The most popular type of general-purpose camera for enthusiasts and professionals is the single lens reflex (SLR).

This type of camera has a moveable mirror behind the lens which reflects an image through a five-sided prism (pentaprism) or pair of mirrors, onto a glass screen (the viewfinder). This means the photographer sees exactly the same image that will be exposed on the recording medium (film or digital CCD).

When you press the shutter button, the main mirror is flipped out of the way so the light passes straight through to the recording medium as pictured below. As you do this, you notice the image briefly disappear from the viewfinder. There is also the familiar sound of the "camera click" as the whole mechanism works.

The obvious advantage of this system is accuracy. If the image you see through the viewfinder is not exactly the same as the image on the recording medium (as inviewfinder cameras), the composition of the resulting photograph may be noticeably different to what you expected. The SLR camera makes sure this doesn't happen.

SLR cameras also work well with different lenses. Since you are seeing exactly what the lens sees, you can swap lenses as required and always be confident of what you are capturing.

There are also some disadvantages of this system:

- SLR cameras tend to be bulkier and heavier than viewfinder cameras.
- SLR cameras tend to be noisier than other types because of the physical mechanism. This isn't usually an issue but it can be a problem if you are trying to shoot discreetly (e.g. wildlife photography).
- SLR cameras are relatively complex so there is more chance of them breaking down.

These disadvantages do not normally present a major concern. For most people the SLR is an excellent choice for taking consistent high-quality photographs.

Role and Importance of Photography

1. **Advertising photography:** photographs made to illustrate and usually sell a service or product. These images, such as packshots, are generally done with an advertising agency, design firm or with an in-house corporate design team.
2. **Fashion and glamour photography** usually incorporates models. Photographers here are paid more because of the demand for good photographers to shoot the item being sold and incorporate the models beauty in the image. Fashion photography like the work featured in Harper's Bazaar emphasizes clothes and other products; glamour emphasizes the model and body form. Glamour photography is popular in advertising and men's magazines which means these pictures are more revealing than editorial fashion photography. Models in glamour photography sometimes work nude.
3. **Crime scene photography** consists of photographing scenes of crime such as robberies and murders. A black and white camera or an infrared camera may be used to capture specific details.
4. Still life photography usually depicts inanimate subject matter, typically commonplace objects which may be either natural or man-made.
5. **Food photography** can be used for editorial, packaging or advertising use. Food photography is similar to still life photography, but requires some special skills.
6. **Editorial photography** illustrates a story or idea within the context of a magazine. These are usually assigned by the magazine.
7. **Photojournalism** can be considered a subset of editorial photography. Photographs made in this context are accepted as a documentation of a news story.
8. **Portrait and wedding photography:** photographs made and sold directly to the end user of the images.
9. **Landscape photography** depicts locations.
10. **Wildlife photography** demonstrates the life of animals.
11. **Paparazzi**

Camera Obsecura

The camera obscura (Latin; "camera" is a "vaulted chamber/room" + "obscura" means "dark"= "darkened chamber/room") is an optical device that projects an image of its surroundings on a screen. It

is used in drawing and for entertainment, and was one of the inventions that led to photography. The device consists of a box or room with a hole in one side. Light from an external scene passes through the hole and strikes a surface inside where it is reproduced, upside-down, but with color and perspective preserved. The image can be projected onto paper, and can then be traced to produce a highly accurate representation.

Using mirrors, as in the 18th century overhead version (illustrated in the History section below), it is possible to project a right-side-up image. Another more portable type is a box with an angled mirror projecting onto tracing paper placed on the glass top, the image being upright as viewed from the back.

As a pinhole is made smaller, the image gets sharper, but the projected image becomes dimmer. With too small a pinhole the sharpness again becomes worse due to diffraction. Some practical camera obscuras use a lens rather than a pinhole because it allows a larger aperture, giving a usable brightness while maintaining **focus.**

Unit-II

What is camera

A **camera** is an optical instrument that records images that can be stored directly, transmitted to another location, or both. These images may be still photographs or moving images such as videos or movies. The term *camera* comes from the word *camera obscura* (Latin for "dark chamber"), an early mechanism for projecting images. The modern camera evolved from the camera obscura.

Basic parts of SLR Camera

If we understand the part and the term of our camera, we will be much easier to use our camera, both to create landscape picture, portraits, wedding, indoor photo, or when we capture musical performances, birthday party, documentation for family or office. Even for those of you who are serious about selling stock photos online on the Internet.

1. **DSLR** is a digital single lens reflex, which is a camera with a digital system (using the processor, chip, memory, and technological sophistication in capturing the image) which uses a single lens mounted on the camera body. Reflex mirror inside the camera will go up when you press the shutter button and at the time the image sensor in the camera will record an image.

2. **Eyepiece** = holder to our eyes when look into the viewfinder.

3. **Viewfinder (viewfinder)** = viewfinders pentaprism method (pentagon shape) is placed over the optical path through the lens onto the image sensor plate. Incoming light then reflected upward by mirror (mirror reflection) and about pentaprism. Pentaprism then reflect light several times through the viewfinder (viewfinder). When the shutter button is released, the glass opens the way for the light so that light can directly on the image sensor.

4. **Image sensors (sensors capture images)** = a sensor that is used to process and capture an image contained within a camera. Size there are a variety of sensors, i.e. APS-C sized 15x23mm, 19x29mm APS-H size, and FULL-FRAME 24x36mm (equal to the large size of the movie).

5. **Flash** = flash is usually used to help us in taking pictures in the dark.

6. **Hotshoe (flash external holder)** = a holder for an external flash that is usually located in the middle of the camera body.

7. **Lens (lens)** = a lens mount that is embedded in the camera body (lens body can be removed and replaced) that serves to light up focus capable captured by the image sensor. On the outside of the lens usually there are three rings, namely ring focal length (for variable type lenses), aperture ring and focus ring. There are 5 characters that lens, wide (wide), macro (enlarge), telephoto (zoom), tilt & shift and fish eye. And there are 2 types of lens fix (can not be changed such as, 50mm) and zoom (range like, 17-85mm). Lens will also have features is (image stabilizer) to reduce vibration from hand and USM (ultrasonic motor) to accelerate and quiet in the search focusing. * IS USM code DSLR canon camera types? These features in any other DSLR camera lens are also available, but the code name of the other but with the same functionality.

8. **Lens hood** = an extra on the lens to reduce excess light, the impact of flares and a protective front surface of the lens, and also as an addition to the display lens to look more frightening. * Remember: the use of hood that does not comply with a series of lenses will cause vignetting (vignetting = black spots on the sides of the tip of the picture)

9. **LCD monitor (LCD display)** = to see the image and monitor modes that we use to take pictures.

10. **Focus points** = if you look into the viewfinder, then you will see a small dots scattered (the number of points depending on the type and model of camera), at which point the focus is to help you find focus images would be taken.

A **single-lens reflex** (SLR) camera is a camera that typically uses a mirror & prism system (hence "reflex", from the mirror's reflection) that permits the photographer to view through the lens and hence see exactly what will be captured, as opposed to viewfinder cameras where the image could be significantly different from what will be captured.

Prior to the development of SLR, all cameras with viewfinders had two optical light paths: one path through the lens to the film, and another path positioned above (TLR or twin-lens reflex) or to the side (rangefinder). Because the viewfinder and the film lens cannot share the same optical path, the viewing lens is aimed to intersect with the film lens at a fixed point somewhere in front of the camera. This is not problematic for pictures taken at a middle or longer distance, but parallax causes framing errors in close-up shots. Moreover, focusing the lens of a fast reflex camera when it is opened to wider apertures (such as in low light or while using low-speed film) is not easy.

Most SLR cameras permit upright and laterally correct viewing through use of a roof pentaprism situated in the optical path between the reflex mirror and viewfinder. Light, which comes both horizontally and vertically inverted after passing through the lens, is reflected upwards by the reflex mirror, into the pentaprism where it is reflected several times to correct the inversions caused by the lens, and align the image with the viewfinder. When the shutter is released, the mirror moves out of the light path, and the light shines directly onto the film (or in the case of a DSLR, the CCD or CMOS imaging sensor). The Canon Pellix film camera was an exception to the moving mirror system, wherein the mirror was a fixed beamsplitting pellicle.

Focus can be adjusted manually by the photographer or automatically by an autofocus system. The viewfinder can include a matte focusing screen located just above the mirror system to diffuse the light. This permits accurate viewing, composing and focusing, especially useful with interchangeable lenses.

Up until the 1990s, SLR was the most advanced photographic preview system available, but the recent development and refinement of digital imaging technology with an on-camera live LCD preview screen has overshadowed SLR's popularity. Nearly all inexpensive compact digital cameras now include an

LCD preview screen allowing the photographer to see what the CCD is capturing. However, SLR is still popular in high-end and professional cameras because they are system cameras with interchangeable parts, allowing customization. They also have far less shutter lag, allowing photographs to be timed more precisely. Also the pixel resolution, contrast ratio, refresh rate, and color gamut of an LCD preview screen cannot compete with the clarity and shadow detail of a direct-viewed optical SLR viewfinder.

Optical components

Cross-section view of SLR system:

1: Front-mount lens (four-element Tessar design)

2: Reflex mirror at 45-degree angle

3: Focal plane shutter

4: Film or sensor

5: Focusing screen

6: Condenser lens

7: Optical glass pentaprism (or pentamirror)

8: Eyepiece (can have diopter correction ability)

A cross-section (*or* 'side-view') of the optical components of a typical SLR camera shows how the light passes through the lens assembly

(1) is reflected by the mirror

(2) placed at a 45-degree angle, and is projected on the matte focusing screen

(3) opens, and the image is projected onto the film or sensor

(4) in exactly the same manner as on the focusing screen.

(5). Via a condensing lens

(6) and internal reflections in the roof pentaprism

(7) the image appears in the eyepiece

(8). When an image is taken, the mirror moves upwards from its resting position in the direction of the arrow, the focal plane shutter This feature distinguishes SLRs from other cameras as the photographer sees the image composed exactly as it will be captured on the film or sensor (see Advantages below).

Shutter mechanisms

Focal-plane shutters

Almost all contemporary SLRs use a focal-plane shutter located in front of the film plane, which prevents the light from reaching the film even if the lens is removed, except when the shutter is actually released during the exposure. There are various designs for focal plane shutters. Early focal-plane shutters designed from the 1930s onwards usually consisted of two curtains that travelled horizontally across the film gate: an opening shutter curtain followed by a closing shutter curtain. During fast shutter speeds, the focal-plane shutter would form a 'slit' whereby the second shutter curtain was closely following the first opening shutter curtain to produce a narrow, vertical opening, with the shutter slit moving horizontally. The slit would get narrower as shutter speeds were increased.

Rotary focal-plane shutter

One unusual design, the Olympus Pen half-frame 35 mm SLR system, manufactured by Olympus in Japan, used a rotary focal-plane shutter mechanism that was extremely simple and elegant in design. This shutter used titanium foil but consisted of one piece of metal with a fixed opening, which allowed electronic flash synchronisation up to and including its maximum speed of 1/500 of a second – rivalling the capabilities of leaf-shutter systems

Another 35 mm camera system that used a rotary shutter was the Robot Royal cameras, most of which were rangefinder 35 mm cameras. Some of these cameras were full-frame; some were half-frame, and at least one Robot camera produced an unusual square-sized image on the 35 mm frame. The Mercury II, produced in 1946, also used a rotary shutter. This was a half-frame 35mm camera.

Leaf shutters

Another shutter system is the leaf shutter, whereby the shutter is constructed of diaphragm-like blades and can be situated either between the lens or behind the lens. If the shutter is part of a lens assembly some other mechanism is required to ensure that no light reaches the film between exposures.

Because leaf shutters synchronized electronic flash at all shutter speeds especially at fast shutter speeds of 1/500 of a second or faster, cameras using leaf shutters were more desirable to studio photographers who used sophisticated studio electronic flash systems.

Parts

Since the technology became widespread in the 1970s, SLRs have become the main photographic instrument used by dedicated amateur photographers and professionals. Some photographers of static subjects (such as architecture, landscape, and some commercial subjects), however, prefer view cameras because of the capability to control perspective. Perspective correction lenses are available in the 35 mm and medium formats to correct this distortion with film cameras, and it can also be corrected after the fact with photo software when using digital cameras. The photographer can also extend the bellows to its full length, tilt the front standard and perform photomacrography (commonly known as 'macro photography'), producing a sharp image with depth-of-field without stopping down the lens diaphgram.

Camera Formats

Large format- refers to any imaging format of 4×5 inches (102×127 mm) or larger. Large format is larger than "medium format", the 6×6 cm (2¼×2¼ inch) or 6×9 cm (2¼×3½ inch) size of Hasselblad, Rollei, Kowa, Pentax etc cameras (using 120 and 220 roll film), and much larger than the 24×36 mm (~ 1.0 x 1.5 inch) frame of 35 mm format.

The main advantage of large format, film or digital, is higher resolution. A 4×5 inch image has about 16 times the area, and thus 16× the total resolution, of a 35 mm frame. In early photography, large format was all there was, and before enlargers were common, it was normal to just make 1:1 contact prints from a 4×5, 5×7, or 8×10 inch negative.

The most common large format is 4×5 inches, which was the size of common cameras used in the 1930s-1950's, like the Speed Graphic, Crown Graphic, Graphlex, and many others. Above 8×10 inches, the formats are often referred to as Ultra Large Format (ULF) and may be 11×14, 16×20, 20×24 inches, or as large as film, plates, sensors, or cameras are available; many large formats, 24×24, 36x36, 48x48 inches etc., are horizontal cameras designed to make big negatives for contact printing onto press printing plates.

The Polaroid 20×24 camera is one of the largest format instant cameras currently in common usage, and can be hired from Polaroid agents in various countries.[1] Many well-known photographers have used the 235 pounds (107 kg), wheeled-chassis Polaroid.

Medium format - has traditionally referred to a film format in still photography and the related cameras and equipment that use that film. Generally, the term applies to film and digital cameras that record

images on media larger than 24 by 36 mm (full-frame) (used in 35 mm photography), but smaller than 4 by 5 inches (which is considered to be large-format photography).

In digital photography, medium format refers either to cameras adapted from medium format film photography uses, or to cameras making use of sensors larger than that of a 35 mm film frame. Often, medium format film cameras can be fitted with digital camera backs, converting them to digital cameras, but some of these digital backs, especially early models, use sensors smaller than a 35 mm film frame. As of 2006, medium format digital photography sensors were available in sizes of up to 36 by 48 mm, with 39 million pixels for use with commonly available professional medium format cameras. Sensors used in special applications such as spy satellites can be even larger, but are not necessarily described as medium format equipment.

35 mm film

35 mm film print frames. At far left and far right, outside the perforations, is the SDDS soundtrack as an image of a digital signal. Between the perforations is the Dolby Digital soundtrack (note the tiny Dolby "Double D" logo in the center of each area between the perforations). Just inside the perforations, on the left side of the image, is the analog optical soundtrack, with two channels encoded using Dolby SR noise reduction that can be dematrixed into four channels using Dolby Stereo aka Dolby Analog. The consumer equivalent of this cinema audio decoding system is known as Dolby ProLogic. The optical timecode used to synchronize a DTS soundtrack, which sits between the optical soundtrack and the image, is not pictured. Finally, the image here is an anamorphic image used to create a 2.39:1 aspect ratio when projected through an anamorphic lens. Note the thin frame lines of anamorphic prints.

35 mm film is the film gauge most commonly used for chemical still photography (see 135 film) and motion pictures. The name of the gauge refers to the width of the photographic film, which consists of strips 35 millimeters (about 1 3/8 inches) in width. The standard negative pull down for movies ("single-frame" format) is four perforations per frame along both edges, which results in 16 frames per foot of film. For still photography, the standard frame has eight perforations on each side. To print an 80-minute feature film on 35 mm film stock can cost US$1,500 to $2,500.

A variety of largely proprietary gauges were devised for the numerous camera and projection systems being developed independently in the late 19th century and early 20th century, ranging from 13 mm to 75 mm (0.51–2.95 in),[5] as well as a variety of film feeding systems. This resulted in cameras,

projectors and other equipment having to be calibrated to each gauge. The 35 mm width was first used in 1892 by William Dickson and Thomas Edison, using film stock supplied by George Eastman. The 35 mm width with 4 perforations per frame became accepted as the international standard gauge in 1909,[6] and has remained by far the dominant film gauge for image origination and projection despite challenges from smaller and larger gauges, and from novel formats, because its size allowed for a relatively good tradeoff between the cost of the film stock and the quality of the images captured. The ubiquity of 35 mm movie projectors in commercial movie theaters makes it the only motion picture format, film or video, that can be played in almost any cinema in the world.

Common Components

Cameras can be divided into several major types. Although most cameras operate in roughly the same way, there are a few notable differences. It helps to know what type of camera you are using, and what its strengths and weaknesses are.

Firstly, let's look at what cameras have in common. Except for some specialist types of camera, all cameras have the following basic components:

1. **Body**: A light-tight compartment to house the recording medium (film or CCD).
2. **Lens**: A transparent element to focus light rays onto the recording medium.
3. **Aperture**: A method of controlling how much light reaches the recording medium.
4. **Shutter**: A method of controlling how long the recording medium is exposed to the incoming light.
5. **Viewfinder**: A way to see the image that is to be captured.
6. **Transport**: In film cameras, a method of moving the film and holding it in the correct position.

Types of Camera

1. **RANGEFINDER CAMERA:-** is a camera fitted with a rangefinder: a range-finding focusing mechanism allowing the photographer to measure the subject distance and take photographs that are in sharp focus. Most varieties of rangefinder show two images of the same subject, one of which moves when a calibrated wheel is turned; when the two images coincide and fuse into one, the distance can be read off the wheel. Older, non-coupled rangefinder cameras display the focusing distance and require the photographer to transfer the value to the lens focus ring; cameras without built-in rangefinders could have an external rangefinder fitted into the accessory shoe. Earlier cameras of this type had separate viewfinder and rangefinder windows; later the rangefinder was incorporated into the viewfinder. More modern designs have rangefinders coupled to the focusing mechanism, so that the lens is focused correctly when the rangefinder images fuse; compare with the focusing screen in non-autofocus SLRs.

2. **POLOROID** :- The instant camera is a type of camera that generates a developed film image. The most popular types to use self-developing film were formerly made by Polaroid Corporation. The invention of modern instant cameras is generally credited to American scientist Edwin Land, who unveiled the first commercial instant camera, the Land Camera, in 1948, a year after unveiling instant film in New York City. The earliest instant camera, which consisted of a camera and portable darkroom in a single compartment, was invented in 1923 by Samuel Shlafrock. In February 2008, Polaroid announced it would discontinue production of film, shut down three factories and lay off 450 workers. Sales of chemical film by all makers have dropped by at least 25% per year in the first decade of the 21st century. Fujifilm is now the only remaining supplier of instant film in the United States. However, in October 2009, Polaroid announced it would bring back its classic instant film cameras, after announcing the year before that production was to be stopped.

3. **SLR (SINGLE LENS REFLEX):** The viewfinder sees the same image as the main lens, i.e. what you see is what you get. SLRs also allow you to change lenses for different purposes. This is a hugely popular type of camera, pretty much the standard for enthusiasts and professionals.

4. **VIEWFINDER (OR RANGE FINDER):** In this type of camera the viewfinder is separate to the lens. This is common in cheap cameras, although some professional cameras also use this configuration.

The main problem with a separate viewfinder is that the image you see may not be quite the same as the image that gets recorded. This limitation is overcome in professional cameras by using viewfinders that compensate for the different positions. Viewfinder cameras do have some advantages; for example, lower noise and higher light levels to the viewfinder.

5. **TWIN LENS REFLEX(TLR):** The camera has two lenses — one for the photograph and one for the viewfinder. This type of camera has certain advantages in some professional situations.

6. **VIEW CAMERA:** A flexible bellows joins two standards — one with the lens and the other with the viewfinder or film. This allows for unusual types of composition; for example, distorting the shape of the image by skewing the film plane.

7. **PINHOLE CAMERA:** A very simple camera without a lens.

8. **SIMPLE USE CAMERAS**:- Simple Use Cameras are the simplest cameras. They contain a roll of color film encased in a recyclable cardboard box. They have a single shutter speed and a fixed-focus lens. These cameras can be bought with a variety of features, including built-in flash and water resistance. The whole camera has to be taken to the photo finisher so the film can be processed. The camera is recycled. These cameras cost around $15 and should not be used for serious photography. They are convenient for vacations and times when you find that the other camera has been forgotten.

9. **COMPACT LENS-SHUTTER CAMERAS** Compact Lens-Shutter Cameras come in three varieties: single focal length, dual focal length, and zoom. Some have fixed focus, meaning that the focus is fixed at a point that produces sharp images starting from about 5 ft. away and continuing to infinity. Other cameras offer infrared auto focusing. Some models offer features like red-eye reduction flash and several automatic shooting modes. More serious photographers usually prefer to have more control over the pictures they take.

10. **UNDERWATER CAMERA**:- It is a type of camera which is used for underwater photography.

11. **Digital Camera:-** (or **digicam**) is a camera that takes video or still photographs by recording images on an electronic image sensor. Most cameras sold today are digital,[1] and digital cameras are incorporated into many devices ranging from PDAs and mobile phones (called camera phones) to vehicles. Digital and film cameras share an optical system, typically using a lens with a variable diaphragm to focus light onto an image pickup device. The diaphragm and shutter admit the correct amount of light to the imager, just as with film but the image pickup device is electronic rather than chemical. However, unlike film cameras, digital cameras can display images on a screen immediately after being recorded, and store and delete images from memory. Many digital cameras can also record moving video with sound. Some digital cameras can crop and stitch pictures and perform other elementary image editing.

Different kinds of camera lenses, including wide angle, telephoto and specialty

A **camera lens** (also known as **photographic lens** or **photographic objective**) is an optical lens or assembly of lenses used in conjunction with a camera body and mechanism to make images of objects either on photographic film or on other media capable of storing an image chemically or electronically.

While in principle a simple convex lens will suffice, in practice a compound lens made up of a number of optical lens elements is required to correct (as much as possible) the many optical aberrations that arise. Some aberrations will be present in any lens system. It is the job of the lens designer to balance these out and produce a design that is suitable for photographic use and possibly mass production.

There is no major difference in principle between a lens used for a still camera, a video camera, a telescope, a microscope, or other apparatus, but the detailed design and construction are different.

A lens may be permanently fixed to a camera, or it may be interchangeable with lenses of different focal lengths, apertures, and other properties.

Types of Camera Lenses

Understanding Various Lenses and Their Functions

Camera lenses come in either fixed (prime) focal lengths, or zooms, which cover a range of focal lengths. The different focal lengths are grouped into categories for different types of lenses.

This article looks at the different types of camera lenses and their functions.

1. Wide Angle Lenses

Traditionally, a super wide-angle lens is classified as anything under 20mm. Wide-angle is 21-35mm. With the advent of digital cameras, and the APS-C format, camera manufacturers have also started producing specific lenses for this format. Wide-angle lenses for crop frame DSLRs range from 10-24mm, with a few going down to a super wide 8mm.

Wide-angle lenses are most commonly used for photographing landscapes and architecture, although they are often also used for photographing large groups of people.

The Tokina AT-X 116 Pro DX lens (pictured here) is an example of a wide-angle lens (11-16mm).

2. Standard Lenses

A standard lens has a focal length range of 35-70mm. The most common standard lens is a fixed 50mm lens.

Standard lenses are most commonly used for documentary and street photography, where photographers need to move quickly and capture an interesting point of action. Pioneers of modern street photography, such as Henri Cartier-Bresson, always used a 50mm lens, choosing to move themselves around so as to best frame an image.

The Nikon 50mm f1.8D lens (pictured here) is an example of a standard, fixed lens.

3. Medium Telephoto / Portrait Lens

The focal range between 80-135mm is nearly always used by portrait photographers. Fixed lenses at these lengths produce ideal framing for head and shoulders shots. These are specialist lenses, but can be surprisingly reasonably priced.

The Canon EF 100mm F/2.8 Macro USM lens is an example of a one of these types of lenses.

4. Telephoto

Any lens with a focal length of between 135mm and 300mm is a true telephoto lens. Manufacturers make a huge range of lenses in this range ... at an equally large range of prices!

Telephoto lenses are traditionally used for sports and wildlife photography, but their essential function is to bring distant objects closer.

One example of a telephoto lens is the Canon EF 200mm f/2L IS USM telephoto lens pictured here.

5. Specialist Lenses

There are a variety of specialist lenses available. Some of the more common are:

- **Super Telephoto.** These have a focal length of more than 300mm, and are used by dedicated sports and wildlife photographers. The Nikon AF-S Nikkor 400mm f/2.8G super telephoto lens (pictured here) is an example.
- **Macro.** These lenses are able to focus closer to an object than normal lenses, offering a 1:1 ratio. They are used for still-life photography of small objects.
- **Fisheye.** These are on the edge of wide-angle lenses, and give a distorted view of the subject matter. The center of the image is magnified, and objects diminish in size in all directions around it.

Aperture and focal length

How focal length affects photograph composition: adjusting the camera's distance from the main subject while changing focal length, the main subject can remain the same size, while the other at a different distance changes size.

Large (top) and small (bottom) apertures on the same lens.

The two fundamental parameters of an optical lens are the focal length and the maximum aperture. The lens' focal length determines the magnification of the image projected onto the image plane, and the aperture the light intensity of that image. For a given photographic system the focal length determines the angle of view, short focal lengths giving a wider field of view than longer focal length lenses. The wider the aperture, identified by a smaller f-number, allows using a faster shutter speed for the same exposure.[8]

The maximum usable aperture of a lens is specified as the focal ratio or f-number, defined as the lens' focal length divided by the effective aperture (or entrance pupil), a dimensionless number. The lower the f-number, the higher light intensity at the focal plane. Larger apertures (smaller f-numbers) provide a much shallower depth of field than smaller apertures, other conditions being equal. Practical lens assemblies may also contain mechanisms to deal with measuring light, secondary apertures for flare reduction,[9] and mechanisms to hold the aperture open until the instant of exposure to allow SLR cameras to focus with a brighter image with shallower depth of field, theoretically allowing better focus accuracy.

Focal lengths are usually specified in millimetres (mm), but older lenses might be marked in centimetres (cm) or inches. For a given film or sensor size, specified by the length of the diagonal, a lens may be classified as a:

Normal lens: angle of view of the diagonal about 50° and a focal length approximately equal to the image diagonal.

1. Wide-angle lens: angle of view wider than 60° and focal length shorter than normal.
2. Long-focus lens: any lens with a focal length longer than the diagonal measure of the film or sensor.[10] Angle of view is narrower. The most common type of long-focus lens is the telephoto lens, a design that uses special optical configurations to make the lens shorter than its focal length.

Lens mounts

Many Single-lens reflex cameras, and some rangefinder cameras have detachable lenses. A few other types do as well, notably the Mamiya TLR cameras. The lenses attach to the camera using a **lens mount**, which often also contains mechanical or electrical linkages between the lens and camera body. The lens mount is an important issue for compatibility between cameras and lenses; each major camera manufacturer typically has their own lens mount which is incompatible with others; notable exceptions are the Leica M39 lens mount for rangefinders, M42 lens mount for early SLRs, the later Pentax K mount, and the Four Thirds System mount for dSLRs, all of which are used by multiple camera brands. Most large-format cameras take interchangeable lenses as well, which are usually mounted in a lensboard or on the front standard.

Types of lens

"Close-up" or macro

A macro lens used in macro or "close-up" photography (not to be confused with the compositional term "Close up") is any lens that produces an image on the focal plane (i.e., film or a digital sensor) that is the same size or larger than the subject being imaged. This configuration is generally used to image *close-up*

very small subjects. A macro lens may be of any focal length, the actual focus length being determined by its practical use, considering magnification, the required ratio, access to the subject, and illumination considerations. They can be special lens corrected optically for close up work or they can be any lens modified (with adapters or spacers) to bring the focal plane "forward" for very close photography. The depth-of-field is very narrow, limiting their usefulness. Lenses are usually stopped down to give a greater depth-of-field.

Zoom

Some lenses, called **zoom lenses**, have a focal length that varies as internal elements are moved, typically by rotating the barrel or pressing a button which activates an electric motor. Commonly, the lens may zoom from moderate wide-angle, through normal, to moderate telephoto; or from normal to extreme telephoto. The zoom range is limited by manufacturing constraints; the ideal of a lens of large maximum aperture which will zoom from extreme wideangle to extreme telephoto is not attainable. Zoom lenses are widely used for small-format cameras of all types: still and cine cameras with fixed or interchangeable lenses. Bulk and price limit their use for larger film sizes. Motorized zoom lenses may also have the focus, iris, and other functions motorized.

Special-purpose

A tilt/shift lens, set to its maximum degree of tilt relative to the camera body.

1. Apochromat (APO) lenses have added correction for chromatic aberration.
2. Process lenses have extreme correction for aberrations of geometry (pincushion distortion, barrel distortion) and are generally intended for use at a specific distance.

1. *Process and apochromat lenses are normally of small aperture, and are used for extremely accurate photographs of static objects. Generally their performance is optimized for subjects a few inches from the front of the lens, and suffers outside this narrow range.*

1. Enlarger lenses are made to be used with photographic enlargers (specialised projectors), rather than cameras.
2. Lenses for aerial photography.
3. Fisheye lenses: extreme wide-angle lenses with an angle of view of up to 180 degrees or more, with very noticeable (and intended) distortion.

4. Stereoscopic lenses, to produce pairs of photographs which give a 3-dimensional effect when viewed with an appropriate viewer.

5. Soft-focus lenses which give a soft, but not out-of-focus, image and have an imperfection-removing effect popular among portrait and fashion photographers.

6. Infrared lenses

7. Ultraviolet lenses

8. Swivel lenses rotate while attached to a camera body to give unique perspectives and camera angles.

9. Shift lenses and tilt/shift lenses (collectively perspective control lenses) allow special control of perspective on SLR cameras by mimicking view camera movements.

Aperture An **aperture** is a hole or an opening through which light travels. More specifically, the aperture of an optical system is the opening that determines the cone angle of a bundle of rays that come to a focus in the image plane. The aperture determines how collimated the admitted rays are, which is of great importance for the appearance at the image plane.[2] If an aperture is narrow, then highly collimated rays are admitted, resulting in a sharp focus at the image plane. If an aperture is wide, then uncollimated rays are admitted, resulting in a sharp focus only for rays with a certain focal length. This means that a wide aperture results in an image that is sharp around what the lens is focusing on and blurred otherwise. The aperture also determines how many of the incoming rays are actually admitted and thus how much light reaches the image plane (the narrower the aperture, the darker the image for a given exposure time).

The **focal length** of an optical system is a measure of how strongly the system converges or diverges light. For an optical system in air, it is the distance over which initially collimated rays are brought to a focus. A system with a shorter focal length has greater optical power than one with a long focal length; that is, it bends the rays more strongly, bringing them to a focus in a shorter distance.

The **f-number** (sometimes called **focal ratio, f-ratio, f-stop, or relative aperture**) of an optical system is the ratio of the lens's focal length to the diameter of the entrance pupil. It is a dimensionless number that is a quantitative measure of lens speed, and an important concept in photography.

Depth of focus is a lens optics concept that measures the tolerance of placement of the image plane (the film plane in a camera) in relation to the lens. In a camera, depth of focus indicates the tolerance of the film's displacement within the camera, and is therefore sometimes referred to as "lens-to-film tolerance."

Depth of field (DOF) is the distance between the nearest and farthest objects in a scene that appear acceptably sharp in an image. Although a lens can precisely focus at only one distance at a time, the decrease in sharpness is gradual on each side of the focused distance, so that within the DOF, the unsharpness is imperceptible under normal viewing conditions.

In some cases, it may be desirable to have the entire image sharp, and a large DOF is appropriate. In other cases, a small DOF may be more effective, emphasizing the subject while de-emphasizing the foreground and background. In cinematography, a large DOF is often called deep focus, and a small DOF is often called shallow focus.

Camera Lens Care

Dirt

Dirt is a daily challenge for your lens. Dust and other dirt on the surface of your lens will create horrible images. One stray spec of dust is probably not going to be noticed but if your lens is obviously dusty it can cause problems. Dirt causes even more problems as it is more difficult to remove from your lens surface.

Removing Dust and Dirt

For dust and lint, a simple microfiber lens cloth will remove the problem. Simply use light strokes working towards the outside of the lens. For mud or other stubborn dirt, you will need to use a cleaning solution designed for photographic lenses. If you use ammonia or another household cleaning solution you could permanently damage the lens. Most photographic lenses have a fine coat of oil on their surfaces. Eventually, this coating will wear off with repeated cleanings of any kind. Using a filter (see scratches) will help prolong the life of your lens.

Scratches

Scratches are a killer of your lens. There is no good way to repair them yourself. The best thing you can do is prevent scratches. The easiest thing you can do to protect your lens against scratches is to use a

filter. A filter is a small piece of glass that fits in front of your lens. The original purpose of filters was to change the look of an image. However, many people use a polarizing filter or an UV filter as protection for their lenses. These filters have generally mild effects and are useful for general photography. Keep in mind that you are putting a relatively inexpensive piece of glass on a rather expensive piece of glass. Use high quality filters to avoid compromising your lens quality.

Shock

Shock is when your camera lens is hit or hits something else with considerable force. If you drop your lens or if someone slams a car door on your lens it will probably cause damage. Sometimes this damage can be repaired by an professional repair shop but it is almost always very expensive. The best way to protect your lens is to carry it (and your camera) in a padded camera bag, and to be aware of your surroundings. If you have your lens (and camera) out of the bag, pay attention to what is around you and be prepared to move your camera, and yourself, out of harm's way.

Water

Water is a mortal enemy to your lens. The electronic circuits and motors inside most of today's lenses can be destroyed by water. Also, Most lenses actually have several elements, or other lenses, inside them. If water gets on these internal lenses and drys it leaves water spots that you cannot clean yourself. To protect your lens from water damage there are several things to remember.

If shooting in the rain, use a rain hood.

When moving between temperature extremes, carry your lens (and camera) in a camera bag before changing temperatures to help prevent condensation inside the lens. Once moved to the new temperature, slowly introduce the new air into the bag.

1. Be careful to avoid dropping your lens (and camera) into water.
2. If your camera lens does get water inside of it follow these steps.
3. Turn the lens so that the lens mount is down to help water drain from the lens.
4. Wrap the lens in a very absorbent towel.
5. Take the lens to the nearest professional repair shop immediately.

Lens Perspective :- In photography, a **perspective control lens** allows the photographer to control the appearance of perspective in the image; the lens can be moved parallel to the film or sensor, providing the equivalent of corresponding view camera movements. This movement of the lens allows adjusting the position of the subject in the image area without moving the camera back; it is often used to avoid convergence of parallel lines, such as when photographing a tall building. Lenses that provide only shift are called **shift** lenses, while those that can also tilt are called **tilt-shift lenses**. The terms *PC* and *TS* are also used by some manufacturers to refer to this type of lens.

Short-focus perspective-control (PC) lenses (i.e., 17 mm through 35 mm) are used mostly in architectural photography; longer focal lengths may also be used in other applications such as landscape, product, and closeup photography. PC lenses are generally designed for single-lens reflex (SLR) cameras, as rangefinder cameras do not allow the photographer to directly view the effect of the lens, and view cameras allow for perspective control using camera movements.

A PC lens has a larger image circle than is required to cover the image area (film or sensor size). Typically, the image circle is large enough, and the mechanics of the lens sufficiently limited, that the image area cannot be shifted outside of the image circle. However, many PC lenses require a small aperture setting to prevent vignetting when significant shifts are employed. PC lenses for 35 mm cameras typically offer a maximum shift of 11 mm; some newer models offer a maximum shift of 12 mm.

Film Speed:- Film speed is the measure of a photographic film's sensitivity to light, determined by sensitometry and measured on various numerical scales, the most recent being the ISO system. A closely related ISO system is used to measure the sensitivity of digital imaging systems.

Relatively insensitive film, with a correspondingly lower speed index requires more exposure to light to produce the same image density as a more sensitive film, and is thus commonly termed a *slow film*. Highly sensitive films are correspondingly termed *fast films*. In both digital and film photography, the reduction of exposure corresponding to use of higher sensitivities generally leads to reduced image quality (via coarser film grain or higher image noise of other types). In short, the higher the sensitivity, the grainier the image will be.

Flash Gun :- A flashgun is simply a shoe mount flash, that can be triggered either by the hot shoe of the camera itself, a sync cable, or wireless trigger and is most commonly used to provide better fill ratio lighting than is possible with the built-in variety flash found on most cameras, and even in addition to. A diffuser is any device [or object] that diffuses the harsh light from a strobe by way of bouncing it off of or shooting it through a diffuse material such as a translucent fabric or plastic, and a wall or ceiling. Light diffusion can also be achieved by the use of a reflector or umbrella with reflective inner lining. You could even use a cereal box lined with aluminum foil to reflect or boune diffuse light from the flash back onto the subject. This is achieved by spreading out the pattern of light emitted by the strobe light, which is formed into a linear pattern by the fresnel lens element of the speedlight, breaking that pattern effectively softens it.

Light Meter:- A **light meter** is a device used to measure the amount of light. In photography, a light meter is often used to determine the proper exposure for a photograph. Typically a light meter will include a computer, either digital or analog, which allows the photographer to determine which shutter speed and f-number should be selected for an optimum exposure, given a certain lighting situation and film speed.

Light meters are also used in the fields of cinematography and scenic design, in order to determine the optimum light level for a scene. They are used in the general field of lighting, where they can help to reduce the amount of waste light used in the home, light pollution outdoors, and plant growing to ensure proper light levels.

CAMERA METERING & EXPOSURE

Knowing how your digital camera meters light is critical for achieving consistent and accurate exposures. Metering is the brains behind how your camera determines the shutter speed and aperture,

based on lighting conditions and ISO speed. Metering options often include partial, evaluative zone or matrix, center-weighted and spot metering. Each of these have subject lighting conditions for which they excel — and for which they fail. Understanding these can improve one's photographic intuition for how a camera measures light.

All in-camera light meters have a fundamental flaw: they can only measure reflected light. This means the best they can do is guess how much light is actually hitting the subject.

If all objects reflected the same percentage of incident light, this would work just fine, however real-world subjects vary greatly in their reflectance. For this reason, in-camera metering is standardized based on the luminance of light which would be reflected from an object appearing as middle gray. If the camera is aimed directly at any object lighter or darker than middle gray, the camera's light meter will incorrectly calculate under or over-exposure, respectively. A hand-held light meter would calculate the same exposure for any object under the same incident lighting.

Above patches depict approximations of 18% luminance. This will appear most accurate when using a PC display which closely mimics the sRGB color space, and have calibrated your monitor accordingly. Monitors emit as opposed to reflect light, so this is also a fundamental limitation.

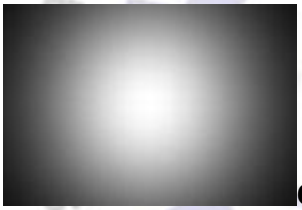
What constitutes middle gray? In the printing industry it is standardized as the ink density which reflects 18% of incident light, however cameras seldom adhere to this. This topic deserves a discussion of its own, but for the purposes of this tutorial simply know that each camera has a default somewhere in the middle gray tones (~10-18% reflectance). Metering off of a subject which reflects more or less light than this may cause your camera's metering algorithm to go awry — either through under or over-exposure, respectively.

An in-camera light meter can work surprisingly well if object reflectance is sufficiently diverse throughout the photo. In other words, if there is an even spread varying from dark to light objects, then

the average reflectance will remain roughly middle gray. Unfortunately, some scenes may have a significant imbalance in subject reflectivity, such as a photo of a white dove in the snow, or of a black dog sitting on a pile of charcoal. For such cases the camera may try to create an image with a histogram whose primary peak is in the midtones, even though it should have instead produced this peak in the highlights or shadows (see high and low-key histograms).

METERING OPTIONS

In order to accurately expose a greater range of subject lighting and reflectance combinations, most cameras feature several metering options. Each option works by assigning a weighting to different light regions; those with a higher weighting are considered more reliable, and thus contribute more to the final exposure calculation.



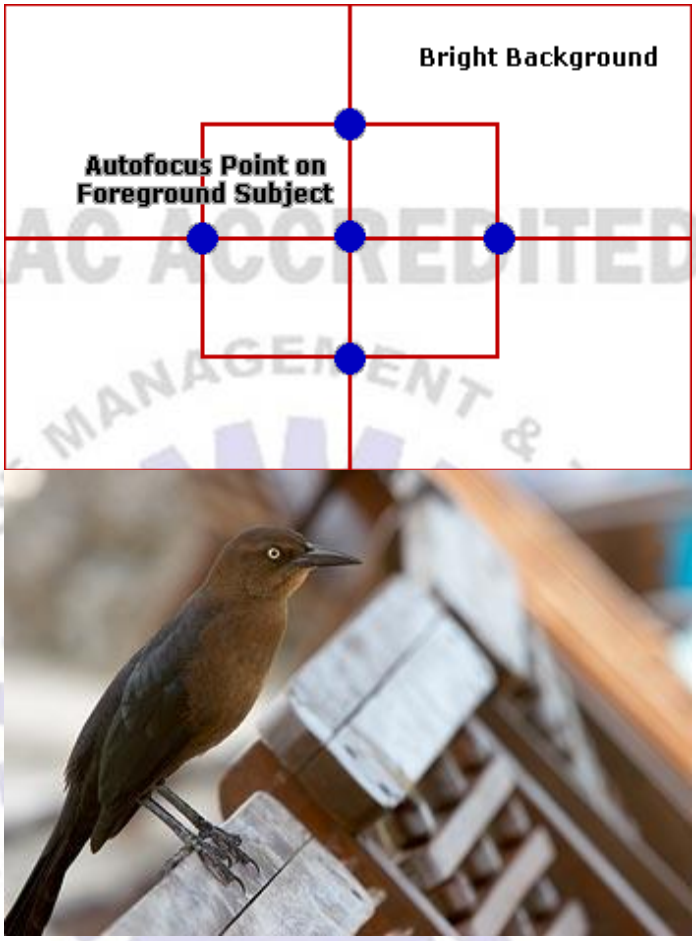
Center-Weighted Metering

Partial Metering

Spot Metering

Partial and spot areas are roughly 13.5% and 3.8% of the picture area, respectively, which correspond to settings on the Canon EOS 1D Mark II.

The whitest regions are those which contribute most towards the exposure calculation, whereas black areas are ignored. Each of the above metering diagrams may also be located off-center, depending on the metering options and autofocus point used.



More sophisticated algorithms may go beyond just a regional map and include: evaluative, zone and matrix metering. These are usually the default when your camera is set to auto exposure. Each generally works by dividing the image up into numerous sub-sections, where each section is then considered in terms of its relative location, light intensity or color. The location of the autofocus point and orientation of the camera (portrait vs. landscape) may also contribute to the calculation.

WHEN TO USE PARTIAL & SPOT METERING

Partial and spot metering give the photographer far more control over the exposure than any of the other settings, but this also means that these is more difficult to use — at least initially. They are useful when there is a relatively small object within your scene which you either need to be perfectly exposed, or know that it will provide the closest match to middle gray.

One of the most common applications of partial metering is a portrait of someone who is backlit. Metering off of their face can help avoid making the subject look like an under-exposed silhouette against the bright background. On the other hand, care should be taken as the shade of a person's skin may lead to inaccurate exposure if it is far from neutral gray reflectance — but probably not as inaccurate as what would have been caused by the backlighting.

Spot metering is used less often because its metering area is very small and thus quite specific. This can be an advantage when you are unsure of your subject's reflectance and have a specially designed gray card (or other small object) to meter off of.

Spot and partial metering are also quite useful for performing creative exposures, and when the ambient lighting is unusual. In the examples to the left and right below, one could meter off of the diffusely lit foreground tiles, or off of the directly lit stone below the sky opening:

NOTES ON CENTER-WEIGHTED METERING

At one time center-weighted metering was a very common default setting in cameras because it coped well with a bright sky above a darker landscape. Nowadays, it has more or less been surpassed in flexibility by evaluative and matrix, and in specificity by partial and spot metering. On the other hand, the results produced by center-weighted metering are very predictable, whereas matrix and evaluative metering modes have complicated algorithms which are harder to predict. For this reason some prefer to use it as the default metering mode.

EXPOSURE COMPENSATION

Any of the above metering modes can use a feature called exposure compensation (EC). The metering calculation still works as normal, except the final settings are then compensated by the EC value. This allows for manual corrections if you observe a metering mode to be consistently under or over-exposing. Most cameras allow up to 2 stops of exposure compensation; each stop of exposure compensation provides either a doubling or halving of light compared to what the metering mode would have done otherwise. A setting of zero means no compensation will be applied (default).

Exposure compensation is ideal for correcting in-camera metering errors caused by the subject's reflectivity. No matter what metering mode is used, an in-camera light meter will always mistakenly under-expose a subject such as a white dove in a snowstorm (see incident vs. reflected light). Photographs in the snow will always require around +1 exposure compensation, whereas a low-key image may require negative compensation.

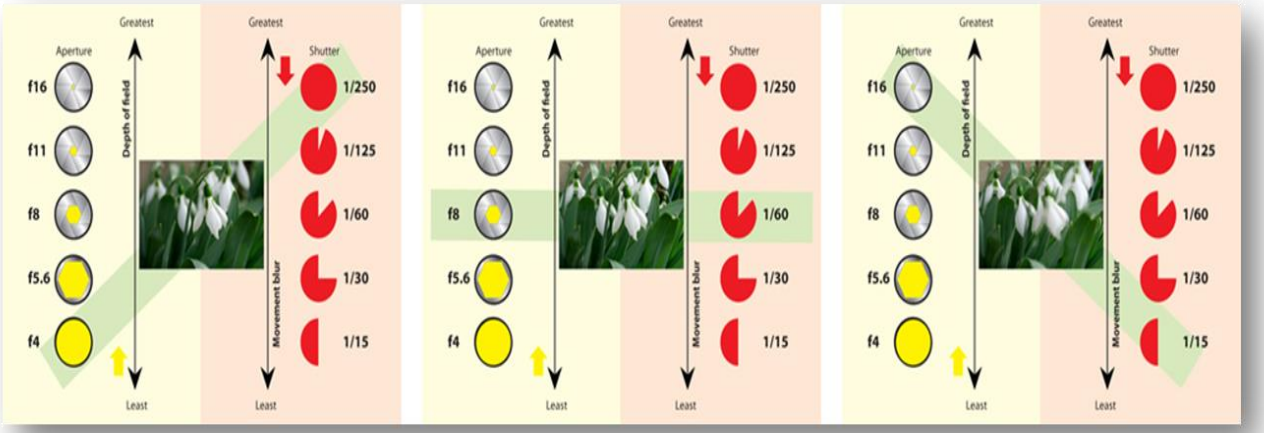
When shooting in RAW mode under tricky lighting, sometimes it is useful to set a slight negative exposure compensation (0.3-0.5). This decreases the chance of clipped highlights, yet still allows one to increase the exposure afterwards. Alternatively, a positive exposure compensation can be used to improve the signal to noise ratio in situations where the highlights are far from clipping.

Relationship between Aperture and Shutter Speed

There are many combinations between aperture and shutter speed that give the same exposure, e.g. the same quantity of light that reaches the optical sensor.

For example: F8, 1/60sec. = F4, 1/250sec. = F16, 1/15 /at the same ISO/

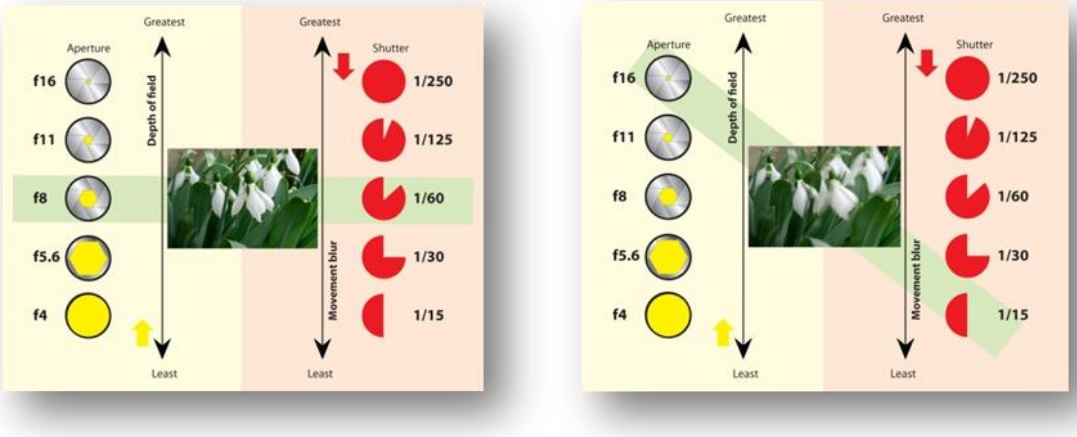
We will obtain the same exposure in all three cases.



What is the difference?

Smaller aperture and slower shutter speed gives higher depth of field but there is a risk of blurred moving objects on the picture.

A bigger aperture and higher shutter speed lead to lower depth of field but there is no risk of blurred moving objects.



Camera Accessories

Accessories for cameras are mainly for care, protection, special effects and functions.

1. **Lens hood:** used on the end of a lens to block the sun or other light source in order to prevent glare and lens flare.
2. **Lens cover:** covers and protects the lens during storage
3. **Lens adapter:** sometimes called a step-ring, adapts the lens to other size filters
4. **Lens extension tubes** allow close focus in macro photography
5. **Flash equipment:** including light diffuser, mount and stand, reflector, soft box, trigger and cord
6. **Care and protection:** including camera case and cover, maintenance tools, and screen protector
7. Large format cameras use special equipment which includes magnifier loupe, view finder, angle finder, focusing rail /truck.
8. **Battery and charger**

Unit-III

Natural and Artificial Lights Sources

Light sources can be either natural or artificial. Sun is the primary source of natural light, and lightbulbs or lamps are the artificial sources. Light is a form of electromagnetic energy that, in the case of natural light, comes from the sun as the source and, in case of artificial light, illuminates via energy from another source. No matter what the source, light has an impact on life on earth as a whole.

Properties of Natural Light

1. Natural light is self-generated and comes in a spectrum of colors --- the visible colors of the rays we experience. The color spectrum contains light with shorter wavelengths near the violet on one end

and light with higher wavelength near the red. Called ultraviolet and infrared rays respectively, these rays are not visible to us. The complete spectrum of light from the natural source is ideal for plant and animal life on earth. Plants and animals thrive on natural light. The darkness that follows photo activity in organisms helps rejuvenate and repair life forms at the cellular level. A moderate amount of exposure to the healthy sunlight benefits humans, as it increases one's energy and metabolism, boosts the immune system and helps build vitamin D --- all of which are essential for the body. Overexposure, on the other hand, has detrimental effects on living organism. The harmful ultraviolet rays can cause conditions such as skin cancer and cataracts while also damaging the texture of the skin. For plants, the need for light and dark periods helps balance the cell activity in terms of growth and repair. Sunlight is also harmful since we cannot alter or control it to suit our condition.

Properties of Artificial Light

2. Artificial light is man-made light generated from another energy source. Most of our activities would come to a halt if we didn't have an alternate source of light. The advantage with this light lies in the fact that we can control it at our own will. We can monitor the intensity, quantity and quality of light to suit each situation. Artificial light does not have as broad a spectrum of colors and wavelengths as natural light; hence, it is not as beneficial. Since the light has comparatively poorer quality, its effect on plant and animal life is also not as beneficial. Plants and animals exposed for prolonged periods to artificial light tend to yield poorer quality of life forms in plants and cause cellular degeneration or death in living beings.

Dual Nature of Light

Scientists build models of physical processes to help them understand and predict behavior. So it is with light energy. It is through seeing the effects of light that the models are developed. Scientists have observed that light energy can behave like a wave as it moves through space, or it can behave like a discrete particle with a discrete amount of energy (quantum) that can be absorbed and emitted. As we study and use light, both models are helpful.

Concept of a photon

The particle-like nature of light is modeled with photons. A photon has no mass and no charge. It is a carrier of electromagnetic energy and interacts with other discrete particles (e.g., electrons, atoms, and

molecules). A beam of light is modeled as a stream of photons, each carrying a well-defined energy that is

dependent upon the wavelength of the light. The energy of a given photon can be calculated by:

Photon energy (E) = hc/λ

Where, E is in joules

h = Planck's constant = 6.625 10–34 J•s

c = Speed of light = 2.998 × 108 m/s

λ = Wavelength of the light in meters

Characteristics of light waves

To understand light waves, it is important to understand basic wave motion itself. Water waves are sequences of crests (high points) and troughs (low points) that "move" along the surface of the water. When ocean waves roll in toward the beach, the line of crests and troughs is seen as profiles parallel to the beach. An electromagnetic wave is made of an electric field and a magnetic field that alternately get weaker and stronger. The directions of the fields are at right angles to the direction the wave is moving, just as the motion of the water is up and down while a water wave moves horizontally. Figure 1-3 is a one-dimensional representation of the electric field.

Properties of Light

Following are the properties of light that shows the behavior of light as a wave:

Reflection - Light is reflected off the surface like mirror such that angle of incidence is equal to angle of reflection.

Refraction - Refraction is the bending of light as it passes between material of different optical density

Dispersion - Light is composed of waves of different wavelengths that correspond to different colors of lights. When light wave passes through a material, these different wavelengths causes refraction by different amounts according to the wavelengths and which gives rise to different colors seen through prism or for rainbow.

Diffraction - This is the bending of light waves around obstacles in its path. ex. When a light wave comes against a barrier with a small opening, it acts as a single point source from where light emerges in all direction.

Interference - When two light waves coincide, it can create either constructive or destructive interference based on how crest & trough of each wave coincide with other.

Basic Types of Lighting in Photography

Direction and Angle of Lighting

1. **Front Lighting** Front lighting is accomplished by lighting the subject directly from the front or, in the case of outdoors photography, by taking the picture with the sun to your back. This form of lighting is good for accentuating details in your photograph, but has the often-undesirable effect of giving your subjects a flat and uninteresting look.
2. **Side Lighting** Side lighting is a useful alternative to front lighting. Lighting your subject from an angle will create shadows, resulting in more intriguing and artistic-looking photographs. Shadows provide the eye with additional information, creating the illusion of depth. Varying the angle at which the light shines will produce different results, and a little experimentation may produce new and interesting effects.
3. **Back Lighting** Back lighting is often used to create a silhouette effect by placing a light source behind the subject. It is also effective when taking pictures of people who are standing in direct sunlight or otherwise harsh light. People will often squint when facing a bright light, and this is easily remedied by turning them away from the light. Reflected light or a fill flash will help in reducing shadows caused by back lighting, where desired.
4. **Three-point Lighting** Three-point lighting is a combination of front, side and back lighting. The front, or key, light is the primary means of illuminating the subject (in outdoor photography, the sun is generally used as the key light). The side, or fill, light is used to generate shadows, and you can vary this light's angle and strength for different stylistic effects. The back light is used to help make the subject stand out from the background of the photograph.

Diffuse Lighting Diffuse lighting results in a softer light that can generate dramatic effects and often preserves details that would be lost in bright sunlight or under harsh artificial lights. This type of lighting

occurs naturally during the early morning and late afternoon hours, and is prevalent on cloudy days. You can generate your own diffuse lighting effects by placing a softbox in front of your light source or through the use of a reflective umbrella.

Lighting contrast and its control by fill in lights(Practical class)

One, two & three point lighting : Key, fill and back light

A typical three-point lighting setup

Three-point lighting is a standard method used in visual media such as video, film, still photography and computer-generated imagery. By using three separate positions, the photographer can illuminate the shot's subject (such as a person) however desired, while also controlling (or eliminating entirely) the shading and shadows produced by direct lighting.

The *key light,* as the name suggests, shines directly upon the subject and serves as its principal illuminator; more than anything else, the strength, color and angle of the key determines the shot's overall lighting design.

In indoor shots, the key is commonly a specialized lamp, or a camera's flash. In outdoor daytime shots, the Sun often serves as the key light. In this case, of course, the photographer cannot set the light in the exact position he or she wants, so instead arranges it to best capture the sunlight, perhaps after waiting for the sun to position itself just right.

A portrait with three-point lighting: a 300 watt key light, a 150 watt back light, and fill light from a bounce board

The *fill light* also shines on the subject, but from a side angle relative to the key and is often placed at a lower position than the key (about at the level of the subject's face). It balances the key by illuminating shaded surfaces, and lessening or eliminating chiaroscuro effects, such as the shadow cast by a person's nose upon the rest of the face. It is usually softer and less bright than the key light (up to half), and more to a flood. Not using a fill at all can result in stark contrasts (due to shadows) across the subject's surface, depending upon the key light's harshness. Sometimes, as in low-key lighting, this is a deliberate effect, but shots intended to look more natural and less stylistic require a fill.

In some situations a photographer can use a reflector (such as a piece of white cardstock mounted off-camera, or even a white-painted wall) as a fill light instead of an actual lamp. Reflecting and redirecting the key light's rays back upon the subject from a different angle can cause a softer, subtler effect than using another lamp.

The *back light* (a.k.a. the *rim*, *hair*, or *shoulder* light) shines on the subject from behind, often (but not necessarily) to one side or the other. It gives the subject a rim of light, serving to separate the subject from the background and highlighting contours.

Back light or rim light is different from a kick in that a kick (or *kicker*) contributes to a portion of the shading on the visible surface of the subject, while a rim light only creates a thin outline around the subject without necessarily hitting the front (visible) surface of the subject at all.

Photographic composition

Photographic composition is *the pleasing arrangement of subject matter elements within thepicture area.* Creative photography depends foremost on the photographer's ability to see as the camera sees because a photograph does not reproduce a scene quite the way we see it. The camera sees and records only a small isolated part of the larger scene, reduces it to only two dimensions, frames it, and freezes it. It does not discriminate as we do. When we look at a scene we *selectively* see only the important elements and more or less ignore the rest. A camera, on the other hand, sees all the details within the field of view. This is the reason some of our pictures are often disappointing. Backgrounds may be

cluttered with objects we do not remember, our subjects are smaller in the frame or less striking than we recall, or the entire scene may lack significance and life.

Good pictures are seldom created by chance. To make the most of any subject, you must understand the basic principles of composition. The way you arrange the elements of a scene within a picture, catch the viewer's attention, please the eye, or make a clear statement are all qualities of good composition. By developing photographic composition skills, you can produce photographs that suggest movement, life, depth, shape, and form, recreating the impact of the original scene.

How are photographic composition skills developed? You look, you study, you practice. Every time you take a picture, look all around within the viewfinder. Consider the way each element will be recorded and how it relates to the overall composition. You must become thoroughly familiar with the camera and learn how the operation of each control alters the image. Experiment with the camera and look at the results carefully to see if they meet your expectations. With experience and knowledge of your equipment, you begin to "think through your camera" so you are free to concentrate on composition. Devote serious study to the principles of good composition. Study books and magazine articles on composition. You should analyze various media: motion pictures, TV, magazines, books and newspapers, and evaluate what you see. What is good about this picture or that TV image? What is bad about it? What principles of good composition could you apply in a different way to make the picture better.

Good or correct composition is impossible to define precisely. There are no hard-and-fast rules to follow that ensure good composition in every photograph. There are only the principles and elements that provide a means of achieving *pleasing* composition when applied properly. Some of these principles and elements are as follows:

1. Center of interest	1. Lighting
2. Subject placement	2. Texture
3. Simplicity	3. Tone
4. Viewpoint and camera angle	4. Contrast
5. Balance	5. Framing

6. Shapes and lines	6. Foreground
7. Pattern	7. Background
8. Volume	8. Perspective

As you study these principles of composition, you should soon come to a realization that some are very similar and overlap one another a great deal.

Because all or most of these principles must be considered and applied each time you take a picture, it may all seem quite confusing at first. With experience you can develop a sense of composition, and your consideration and application of the principles will become almost second nature. This is not to suggest that you can allow yourself to become complacent or careless in the application of the principles of composition. Doing so will be immediately obvious because the results you produce will be snapshots, not professional photographs.

The principles of composition that follow apply equally to both still and motion media photography.

Center of interest

Each picture should have only one principal idea, topic, or *center of interest* to which the viewer's eyes are attracted. Subordinate elements within the picture must support and focus attention on the principal feature so it alone is emphasized.

A picture without a dominant center of interest or one with more than one dominant center of interest is puzzling to a viewer. Subsequently, the viewer becomes confused and wonders what the picture is all about. When the picture has one, and only one, dominant "point of interest," the viewer quickly understands the picture.

Note:

"Point of interest," as used here, has the same meaning as center of interest; however, using the term *point of interest* prevents giving the impression that the center of interest should be located in the center of the picture.

The specific topic, idea, or object to be portrayed must be set in your mind as you prepare to take a picture. When there is nothing in the picture to attract attention to a particular area or object, the eyes wander throughout the scene. The center of interest may be a single object or numerous ones arranged so attention is directed to one definite area

When the center of interest is a single object that fills most of the picture area or one that stands out boldly, such as a white sail against a background of dark water, attention is attracted immediately to it. As may be expected, not all subjects are as simple to arrange or as bold and impressive.

A photographer usually has at his or her disposal many factors or elements that can be used and arranged within the picture area to draw or direct attention to the primary idea of the picture. Some of these elements are lines, shapes, human figures, tone, and texture.

Human figures attract attention more strongly than almost any other subject matter and unless they are the main object of the photograph should probably be kept out of the picture; for instance, a photograph showing a person standing at some distance in front of a building may leave the observer wondering whether the person or the building is the primary subject. When people are included in a scene for comparative size of objects or just for atmosphere, keep them from looking directly at the camera. When people look at the camera and therefore at the viewer of the picture, the viewer tends to return their gaze by looking directly back into their eyes. When they are not the intended point of interest, we miss the statement and purpose of the picture. When people are subordinate elements within the picture and they are looking in a direction other than at the camera, the viewer's attention is directed from the people to what *they are* looking at, which *should* be the center of interest; for example, when people are grouped around a piece of machinery that is the center of interest of the picture, have them look at the machine, rather than the camera.

Subject placement

Sometimes good composition is obtained by placing the center of interest in the geometrical center of the picture; it is generally not a good idea to place it there. Too frequently it divides the picture into equal halves and makes the picture uninteresting and difficult to balance. By dividing the picture area into thirds, both vertically and horizontally, and locating the center of interest at

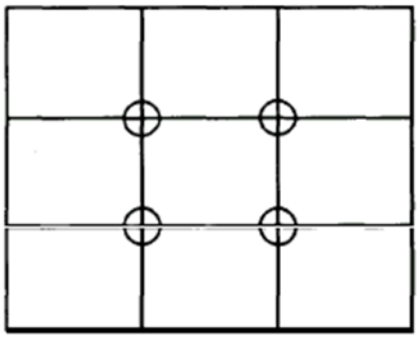


Figure 5-5.–Principle of thirds.

one of the intersections of the imaginary lines, you can usually create a feeling of balance to the composition (fig. 5-5).

In photographic composition there are two general guides for determining the best location for the center of interest. *The* first is the *principle of thirds. The* other is *dynamic symmetry.* In the principle of thirds, the intersection of lines that divide the picture area into thirds are marked by O's. These intersections are good locations for the center of interest in most photographs. Notice we said THE center of interest. Remember, have only one center of interest to a picture-keep it simple. The principle of dynamic symmetry is a similar idea. A good location for the center of interest is found by drawing or imagining a diagonal line from one corner to an opposite corner. Then, draw a second line perpendicular to the first from a third corner (fig. 5-6). The intersections of the lines are the location for the center of interest.

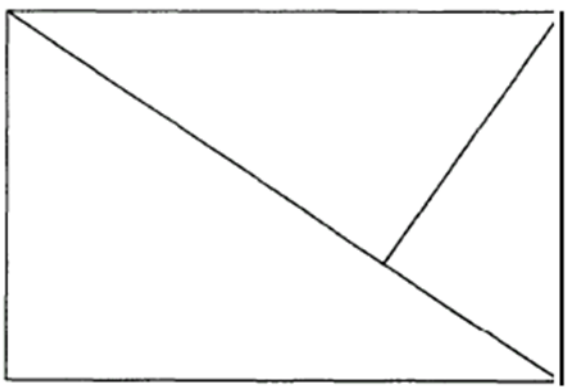


Figure 5-6.–Dynamic symmetry.

Simplicity

Simplicity is the key to most good pictures. The simpler and more direct a picture is, the clearer and stronger is the resulting statement. There are several things to be considered when we discuss simplicity. First, select a subject that lends itself to a simple arrangement; for example, instead of photographing an entire area that would confuse the viewer, frame in on some important element within the area. Second, select different viewpoints or camera angles. Move around the scene or object being photographed. View the scene through the camera viewfinder. Look at the foreground and background. Try high and

low angles as well as normal eye-level viewpoints. Evaluate each view and angle. Only after considering all possibilities should you take the picture. See beyond and in front of your subject. Be sure there is nothing in the background to distract the viewer's attention from the main point of the picture. Likewise, check to see there is nothing objectional in the foreground to block the entrance of the human eye into the picture.

A last point of simplicity-*tell only one story*. Ensure there is only enough material in the picture to convey one single idea. Although each picture is composed of numerous small parts and contributing elements, none should attract more of the viewer's attention than the primary object of the picture. The primary object is the reason the picture is being made in the first place; therefore, all other elements should merely support and emphasize the main object. Do not allow the scene to be cluttered with confusing elements and lines that detract from the primary point of the picture. Select a viewpoint that eliminates distractions so the principal subject is readily recognized. When numerous lines or shapes are competing for interest with the subject, it is difficult to recognize the primary object or determine why the picture was made.

Viewpoint and camera angle

The proper viewpoint or camera angle is an important factor in good composition. Repositioning your subject within the viewfinder frame and changing the camera viewpoint or camera angle are two simple ways of controlling composition.

Photographing from a different viewpoint or camera angle can often add drama and excitement or even bring out an unusual aspect of a subject. Most of the subjects you photograph are three-dimensional and should be photographed from an angle (to the right or left of and/or from higher or lower than the subject) that allows the viewer to see more than one side of the subject. The photographer should study the subject from different sides and angles. Walk around the subject and look at it from all viewpoints. See it from elevated and low positions as well as from eye level to find the best composition. This greatly assists in composing the subject for the best balance and helps to select a background that compliments, not distracts from the subject.

The terms *viewpoint* and *camera angle* are often used in conjunction with one another and sometimes used interchangeably. They can also have different meanings depending on how they are applied.

Viewpoint" is the camera position in relationship to the subject. "Camera angle" is the angle in which the camera lens is tilted; for example, a picture of sailors marching, made from ground level with the camera held horizontal with reference to the ground, may be referred to as a "low viewpoint" (or camera position); however, when this picture is made, again from ground level, but with the camera pointed up, it may be referred to as a "low camera angle." Likewise, a picture made from an elevated or high position, with the camera again held horizontal with reference to the ground, or even pointed straight down, can be referred to as a "high viewpoint"; however, if the camera is not held horizontal to the ground or pointed straight down, but pointed at some angle between horizontal and vertical, the camera position could be referred to as a "high camera angle."

Eye-level shots

With the camera held horizontal, eye-level shots are usualIy made at a height of about 5 1/2 feet, the height from which the average adult sees, and with the camera horizontal. With the camera held at eye level but pointed up or down, the camera position changes and you have either a low or high camera angle, respectively.

Balance

Balance in photographic composition is a matter of making pictures look harmonious. Each element in a picture has a certain amount of value in respect to all the other elements. Every tone, mass, shape, tree, rock figure, building, line, or shadow contributes a certain amount of weight that must be arranged correctly in the composition to give the impression of balance. The subject placement within the picture area is the factor that must be carefully considered.

Composition is kept in balance by two different methods: symmetrical, or formal, balance and asymmetrical, or informal, balance.

Asymmetrical, or Informal, Balance

Asymmetrical, or informal, balance is usually much more interesting than symmetrical balance. In asymmetrical balance the imaginary central pivot point is still presumed to be present; however, instead of mirror images on each side of the picture area, the subject elements are notably different in size, shape, weight, tone, and placement. Balance is established by equalizing the element forces in spite of their differences.

Asymmetrical balance is introduced when the presumed weight of two or more lighter objects is equalized by a single heavier object placed on the other side of the imaginary pivot point (fig. 5-10). Asymmetrical balance is more difficult to achieve than symmetrical balance, because of the problem of establishing relative weight values for dissimilar elements within the picture area as well as presenting some form of stability.

Aspects of Balance

There are many other factors to consider in order to make pictures appear balanced. Some of these are as follows:

1. An object far from the center of the picture seems to have more weight than one near the center.
2. Objects in the upper part of a picture seem heavier than objects of the same size in the lower part of a picture.
3. Isolation seems to increase the weight of an object.
4. Intensely interesting objects seem to have more compositional weight.
5. Regular shapes seem to have more weight than irregular shapes.
6. Elements on the right side of an asymmetrical picture appear to have more weight than elements of the same size on the left side of the picture.
7. The directions in which figures, lines, and shapes appear to be moving within the picture area are important to balance; for example, a person may be walking in a direction, or his eyes may be looking in a direction, or the shape of some element creates a feeling of movement. When the feeling of direction is present within a scene, it tends to upset the balance if judged on the size of the subject alone.

Understanding the factors required to create pictorial balance is essential for you to produce good pictures. To gain this understanding, you can continually test your feelings for balance as you look through your camera viewfinder. Once you gain an understanding of the principles of pictorial balance, achieving balance in your photographs becomes an easy process.

Shape

Shape is the most common and powerful pattern element. Repeated lines, tone, and color can also provide unity to your composition and combinations of these create interesting pictures. Triangles, squares, and circles are the basic shapes to look for in a pattern. Triangles and squares are usually static but can be placed to create a tension-filled, dynamic effect. Circles and curves are pleasing pattern shapes.

Volume

When photographing most subjects, you face the problem of how to symbolize three-dimensional objects in a two-dimensional picture. The solution becomes simple when a distinction is made between the two different ways three-dimensional objects appear: as positive, or occupied space (volume) or as negative, or unoccupied space.

unit placed at the camera, you only *symbolize* empty or negative space; however, a sense of depth is provided because of increasing darkness toward the back of the shop. Occupied or positive space (the machines) is If you make a picture to show the entire machine front-lighted and appears shadowless and flat. On the shop aboard a repair ship using only one powerful flash other hand, if you use a series of lights along the sides of the machine shop to sidelight the machines, shadows are cast at their sides and occupied or positive space appears three-dimensional; however, since all the machines, both near and far, are now lighted the same, you do not create a sense of depth, and empty or negative space appears flat. For the best picture of the machine shop, you should light the machines in a way that the three-dimensional form is represented, while creating a sense of depth by reducing the intensity of illumination toward the back of the shop.

Lighting

Lighting is also an important creative element of composition. By controlling the light and directing it where you want it, you can subdue objects or distracting elements in the scene to give more emphasis to the main point of interest.

For good picture composition, you must develop an awareness of how changes in lighting can affect the appearance of things around you. Light and shadows can be used in composition to create mood, to draw attention to an area, to modify or distort shape, or to bring out form and texture in the subject.

Shadows are a key to apparent form in photographs. Without shadows, the subject records without form, curvature, or texture, appearing flat and lifeless. This does not mean that shadows must be harsh and black to achieve the effects of form, curvature, and texture. They may be soft, yet of sufficient density to show the most delicate roundness and form. Generally, harsh, black shadows are undesirable in a photograph due to the loss of detail in them. From a compositional standpoint, black shadows can be very useful in balancing a scene and directing attention to the point of interest. Harsh shadows can also be excellent for emphasizing texture and form, for creating interesting patterns, and for directing attention to the main point of interest; however, the same elements can also obscure detail and reduce form. When the lighting is harsh, such as on a clear, sunny day, shadows have sharply defined edges and are probably very dark, sometimes to the point that they appear stronger than the primary subject and attract attention to themselves.

Texture

Texture helps to emphasize the features and details in a photograph. By capturing "texture" of objects being photographed, you can create form.

When people observe a soft, furry object or a smooth, shining surface, they have a strong urge to touch it. You can provide much of the pleasure people get from the feel of touching such objects by rendering texture in your pictures. Texture can be used to give realism and character to a picture and may in itself be the subject of a photograph. When texture is used as a subordinate element within the picture, it lends strength to the main idea in the photograph. It usually takes just a little different lighting or a slight change in camera position to improve the rendering of texture in a picture. When an area in a photograph shows rich texture, the textured area usually creates a form or shape; therefore, it should be considered in planning the photograph (fig. 5-16).

Tone

Tone is probably the most intangible element of composition. Tone may consist of shadings from white-to-gray-to-black, or it may consist of darks against lights with little or no grays. The use of dark areas against light areas is a common method of adding the feeling of a third dimension to a two-dimensional black-and-white picture. The interaction of light against dark shades in varying degrees helps to set the mood of a composition. A picture consisting of dark or somber shades conveys mystery, intrigue, or sadness. When the tones are mostly light and airy, the picture portrays lightness, joy, or airiness.

Contrast

Contrast in photographic composition is an effective means of directing the viewer's attention to the center of interest. Positioning of subject elements to create contrast gives them added emphasis and directs the viewer's attention.

When we speak of contrast as it relates to composition, we are referring to both tonal contrast, as in black-and-white photography, and color contrast as it relates to color photography. In black-and-white photography, contrast is the difference in subject tones from white-to-gray-to-black or from the lightest tone to the darkest tone. In color photography different colors create contrast.

Tonal Contrast

In black-and-white photography, contrast is considered either *high*, *normal*, or *low*. A high-contrast scene or photograph consists primarily of white and black with few or no middle gray tones. A black sailor in a white uniform against a light background is an example of a high-contrast (contrasty) scene. Most scenes you photograph have normal contrast. There will probably be elements within the scene that are very light or white, some that are very dark or black, and many tones or colors that reproduce as various tones of gray.

A low-contrast (flat) scene has colors or tones in which highlights and shadows have very little difference in densities. In other words, all colors or tones within the scene are very similar in appearance. A white sailor in a white uniform against a light background is an example of a scene with low contrast.

In black-and-white photography, high contrast conveys a sense of hardness and is characteristic of strength and power. Low contrast conveys a sense of softness and is characteristic of gentleness and mildness.

Color Contrast

Color contrast is an effective compositional element in color photography, just as tone is in black-and-white photography. Colors with opposite characteristics contrast strongly when placed together. Each color accentuates the qualities of the other and makes the color images stand out dramatically. Color contrast is enhanced when you create the contrast of detail against mass. An example is a single, bright, red flower in a clear, glass vase photographed against a bright, green background.

Cold colors (bluish) and warm colors (reddish) almost always contrast. Cold colors recede, while warm colors advance. Light colors contrast against dark ones, and a bold color offsets a weak color.

High- and low-key colors

.–High-key color pictures contain large areas of light desaturated colors (pastels) with very few middle colors or shadows. Intentionally overexposing color film (exposing for the shadows) helps to create a high-key effect.

A low-key effect is created when the scene is dominated by shadows and weak lighting. Low-key pictures tend to have large areas of shadow, few highlights, and degraded colors. Naturally dark subjects are best for low-key pictures. Low-key color pictures can be induced by exposing color film for the highlights.

Framing

Framing is another technique photographers use to direct the viewer's attention to the primary subject of a picture. Positioned around the subject, a tree, an archway, or even people, for example, can create a frame within the picture area. Subjects enclosed by a frame become separated from the rest of the picture and are emphasized. Looking across a broad expanse of land or water at some object can make a rather dull uninteresting view. Moving back a few feet and framing the object between trees improves the composition.

An element used as a frame should not draw attention to itself. Ideally, the frame should relate to the theme of the picture; for example, a line of aircraft parked on the flight line framed by the wing and prop of another aircraft.

Not only is framing an effective means of directing the viewer's attention, it can also be used to obscure undesirable foregrounds and backgrounds. The illusion of depth can be created in a picture by the effective use of framing (fig. 5-19).

Foreground

A large percentage of otherwise good pictures is ruined, because they include unnecessary or distracting foreground. This common fault can result from the photographer standing too far away from their subject when they *take* a picture, or the fact that normal focal length or standard lenses cover a relatively wide angle of view.

Undesirable foreground can be eliminated by moving in closer to the subject, by making pictures with a longer than standard focal-length lens, or by changing viewpoint or camera angle. Many already existing pictures can be improved by enlarging only a section of the negative and by cropping out meaningless or distracting foreground. In most cases, the foreground should be sharply focused and of sufficient depth to furnish substantial support for the subject. No object in the foreground should ever be so prominent that it distracts from the subject. You should clear the foreground of items that have no connection with the picture. The ultimate example of carelessness on the part of the photographer is to leave his or her camera case where it shows in the picture. Generally, the foreground contains the leading line that is the line that leads the eye into the photograph and toward the point of interest. Whether this line is an object or series of objects or shadows, it should be sharply focused. A fuzzy, out-of-focus foreground usually irritates the senses and detracts from emphasis on the subject matter.

Background

The background is almost as important an element in good composition as the camera angle. Too often it is overlooked when composing a scene since the photographer normally gives so much attention to the subject. Be particularly observant of the background to see that it contains nothing distracting. A tree or pole that was unnoticed in the distance behind a person when composing the scene may appear in the photograph to be growing out of his or her collar or supporting his or her head.

The background should be subordinate to the main subject in both tone and interest. It should also make the subject stand out and present it to best advantage. Unsharpness and blur are effective ways for separating the subject from the background. Unsharpness can be accomplished by using a relatively large f/stop to render the background out of focus. In the case of subjects in motion, the subject can be pictured sharply and the background blurred by panning the subject (fig. 5-20). Occasionally, you may want to reverse these effects and record the subject unsharp or blurred and the background sharp. This is done to create the impression of the subject being closer to the viewer or to express motion by holding the camera still as you use a shutter speed that is too slow to "stop" the motion.

Types of Photography

Photography is an expansive art form that includes more than just portraiture, landscape or glamour photography. Both professional and amateur photographers may favor specific types of photography

over others. While a professional photographer may work in photojournalism, an amateur may be particularly interested in macro-photography. Read on to learn more about the various types of photography.

Photojournalism

Although, amateurs may break into this field without formal training, photojournalism is often limited to professionals. One reason photojournalism is generally practiced by professionals is that serious photojournalists must be sure that their shots maintain the integrity of the original scene.

Photojournalism requires the photographer to shoot only the facts: no alteration or embellishment of the photo is permitted. Photojournalism pictures are often powerful images that engage the viewer with the news story. Knowing how to take such shots to capture the original emotion is often learned only through years of practice and experience.

Documentary Photography

Documentary photographs tell stories with images. The main difference between photojournalism and documentary photography is that documentary photography is meant to serve as a historical document of a political or social era while photojournalism documents a particular scene or instance.

A documentary photographer may shoot a series of images of the inner city homeless or chronicle the events of international combat. Any topic may be the subject of documentary photography. As with photojournalism, documentary photography seeks to show the truth without manipulating the image.

Glamour Photography

Glamour photography, sometimes confused with pornography, may be sexy and erotic but it is not pornographic. Instead of focusing on nudity or lurid poses, glamour photography seeks to capture its subject in suggestive poses that emphasize curves and shadows. As the name implies, the goal of glamour photography is to depict the model in a glamorous light. Consequently, many glamour shots carry flirtatious, mysterious and playful tones.

Underwater Photography

Underwater photography is usually employed by scuba divers or snorkelers. However, the cost of scuba diving, coupled with often expensive and unwieldy underwater photography equipment, makes this one of the less common types of photography. Similarly, if an amateur has the equipment and the scuba

know-how, taking shots underwater can be complicated, as scuba goggles are magnified and distort the photographer's vision.

Art Photography

Artistic photography can embrace a wide variety of subjects. While a nature photographer may use underwater photography to create an art show based on sea life, a portrait photographer's show may feature black and white artistic portraitures. In all cases, the photographs must have aesthetic value to be considered art.

Portraiture

Portraiture is one of the oldest types of photography. Whether the subject is your family or your pet, the goal of portraiture is to capture the personality of the subject or group of subjects on film.

Advertising Photography

Because photography plays a vital role in advertising, many professional photographers devote their careers to advertising photography. The need for unique and eye-catching advertising copy means the photographer may work with multiple types of photography, including macro photography and glamour photography.

Travel Photography

Travel photography may span several categories of photography, including advertising, documentary or vernacular photography that depicts a particularly local or historical flavor. A travel photographer can capture the feel of a location with both landscapes and portraiture.

Night photography

It refers to photographs taken outdoors between dusk and dawn. Night photographers generally have a choice between using artificial light and using a long exposure, exposing the scene for seconds, minutes, and even hours in order to give the film or digital sensor enough time to capture a usable image. With the progress of high-speed films, higher-sensitivity digital image sensors, wide-aperture lenses, and the ever-greater power of urban lights, night photography is increasingly possible using available light.

Wildlife photography

It is the act of taking photographs of wildlife. Wildlife photography is regarded as one of the more challenging forms of photography. As well as needing sound technical skills, such as being able to expose correctly, wildlife photographers generally need good field craft skills. For example, some animals are difficult to approach and thus a knowledge of the animal's behavior is needed in order to be able to predict their actions. Photographing some species may require stalking skills or the use of a hide/blind for concealment.

While wildlife photographs can be taken using basic equipment, successful photography of some types of wildlife requires specialist equipment, such as macro lenses for insects, long focal length lenses for birds and underwater cameras for marine life. However, a great wildlife photograph can also be the result of being in the right place at the right time.

In the early days of photography, it was almost impossible to get a photograph of wildlife, due to the slow lenses and the low sensitivity of early photographic media.

Nature photography

It refers to a wide range of photography taken outdoors and devoted to displaying natural elements such as landscapes, wildlife, plants, and close-ups of natural scenes and textures. Nature photography tends to put a stronger emphasis on the aesthetic value of the photo than other photography genres, such as photojournalism and documentary photography.

UNIT-IV

Steps involved in printing of digital photographs: manipulation, choice of paper and choice of printers

Photographic printing is the process of producing a final image on paper for viewing, using chemically sensitized paper. The paper is exposed to a photographic negative, a positive transparency (or *slide*), or a digital image file projected using an enlarger or digital exposure unit such as a Light Jet printer.

Alternatively, the negative or transparency may be placed atop the paper and directly exposed, creating a contact print. Photographs are more commonly printed on plain paper, for example by a color printer, but this is not considered "photographic printing".

Following exposure, the paper is processed to reveal and make permanent the latent image.

Printing on black-and-white paper

The process consists of four major steps, performed in a photographic darkroom or within an automated photo printing machine. These steps are:

1. Exposure of the image onto the sensitized paper using a contact printer or enlarger;
2. Processing of the latent image using the following chemical process:
3. Development of the exposed image reduces the silver halide in the latent image to metallic silver;
4. Stopping development by neutralising, diluting or removing the developing chemicals;
5. Fixing the image by dissolving undeveloped silver halide from the light-sensitive emulsion:
6. Washing thoroughly to remove processing chemicals protects the finished print from fading and deterioration.

Optionally, after fixing, the print is treated with a *hypo clearing agent* to ensure complete removal of the fixer, which would otherwise compromise the long term stability of the image. Prints can be chemically toned or hand coloured after processing. [1]

Panalure paper

Kodak **Panalure** is a panchromatic black-and-white photographic printing paper. **Panalure** was developed to facilitate the printing of full-tone black-and-white images from color negatives – a difficult task with conventional orthochromatic papers due to the orange tint of the film base. **Panalure** also finds application as paper negatives in large format cameras. It is generally not suitable for conventional black-and-white printing, since it must be handled and developed in near-complete darkness.

Kodak has announced that it will no longer produce or sell this product. However, as of early 2006, it is still available from various online retailers.

Printing on color paper

Colour papers require specific chemical processing in proprietary chemicals. Today's processes are called RA-4, which is for printing colour negatives, and Ilfochrome, for colour transparencies.

Printing from color negatives

1. Colour negatives are printed on RA-4 papers and produce a Type C print. These are essentially the same as colour negative films in that they consist of three emulsion layers, each sensitive to red, green and blue light. Upon processing, colour couplers produce cyan, magenta and yellow dyes, representing the true colours of the subject. The processing sequence is very similar to the C-41 process.
2. Rollei make a film called 'Digibase 200 Pro' that is like a conventional C-41 film but it has no orange mask, allowing easy prints on black-and-white paper with a grade 2 or 3 variable contrast filter

Printing from color transparencies

1. Ilfochrome paper uses the dye destruction process to produce prints from positive transparencies. The colour dyes are incorporated into the paper and bleached during processing.
2. Older papers and processes, like EP2 and Type R print are no longer in production.

Printing

1. Difference between The Lab & Home Printers

Primarily, all commercial photo printers work on the thermal dye technology. This means that the printer's head evaporates colors from the color band and deposits them on the paper to create prints. More deposition at one place means a darker color. Home printers are mostly inkjet printers. Due to the advent of technology it is possible to get quality prints from your inkjet printer at home which can compete with the commercial lab printers. But it is still advisable to go in for commercial prints when you want to order in bulk or want large sizes that your home printer cannot deliver.

2. Monitor Calibration

A calibrated monitor is a primary requirement of the post-processing workflow. This is especially required if you are processing the photographs for prints. This is due to the difference in display characteristics of the two media – the monitor and the paper. The monitor is an artificial source of light whereas the paper is only a reflective surface. Thus the luminance (vaguely brightness) characteristics of the monitor must be closely calibrated to simulate the paper accurately. Professional photographers use monitor calibration equipment to calibrate and profile their monitor. A good start is to set your monitor's color temperature (white point) to 6500k (or D65).

3. Monitor resolution Vs Print resolution

The image size displayed on the monitor is not an accurate representation of the final print size that you get. This is because printers resolution is calculated in dots-per-inch whereas monitors resolution is

measured in pixels. The size of the pixel varies from monitor to monitor and needs to be calculated into pixels-per-inch. In Photoshop you set the ppi in Edit > Preferences > Units & Rulers > Screen Resolution. Thereafter you can go to View > Print Size to get a pretty accurate representation of the print size. To size of the image is visible in teh info palette or by going to Edit > Image Size > Document Size. Make sure the size of prints you are ordering is close to the document size else it may be scaled or cropped in the lab.

4. Soft-Proofing

Professional photographer insist on asking the lab for their printer profile. This is important because, prints do not come out exactly as they appear on the monitor. That's because monitors essentially use the RGB color space and the printers use the CMYK color space. Thus a mapping or transformation of image data takes place inside the printer. With the lab printers color profile, photographers are able to soft-proof their photographs (which is a very close representation of the actual print that will come from the lab).

5. Sharpening

Though we covered sharpening under post-processing in the last post, sharpening for print is different from the sharpening for web. Sharpening for print is more aggressive because the ink is absorbed by the paper. Also the ink dots projected on the paper ofter bleed into the dots nearby thereby killing the sharpness.

6. File Format

Ideally TIFF is a desirable file format as it is loss-less. However a fine JPG will do just fine and the differences are so negligible that they can't be noticed by the bare eye.

7. RGB or CMYK

When it's time to send the photographs for print, it's time to decide whether your lab requires the CMYK or the RGB images. Most of the dedicated photo printers have RGB as their working space. To be sure, check with the lab.

Printing is a complex process — one which needs to be carefully synced between various data formats, output devices and different color profiles. While this is not an exhaustive step-by-step article to walk you through the entire process, we hope is it a good pointer to get you going in the right direction. In the next and final article in this series we'll see how to get prints at home with your very own photo printer.

Converting developed photograph into digital photograph

For that we require

* Photos, slides, or negatives
* A computer
* A flatbed scanner with attachments for slides and negatives
* A soft photography or makeup brush
* A lint-free cloth
* Isopropyl alcohol
* Photo editing software

Step 1. Organize your photos

Before scanning, organize your photos – and slides and negatives, if you have them – into logical groups. This will make renaming and labeling them much easier later on.

Step 2. Clean your photos

Using a soft photography or makeup brush, gently clean your photos. Any dirt or smudges will be visible in your scans.

Step 3. Clean the scanner

Using isopropyl, or another cleaning agent that won't leave residue or streaks, and a lint-free cloth, wipe any dust, smudges, and fingerprints off the scanner's glass bed.

Step 4. Select your DPI based on your image use

For images you intend to print, a DPI (or dots per inch) of 300 is recommended. Slides or negatives need a DPI of at least 2,400. For use on the Web, a DPI of 72 is acceptable.

Step 5. Scan your old photos

Using the software that came with your scanner, scan each photo into your computer.

Step 6. Rename your digital scans

Your scans will likely have numerical names that tell you nothing about the content of the scanned image. Rename each file.

Step 7. Edit your images

Using photo- editing software, view each image, cropping out bits you don't want.

Step 8. Backup your images

Photo library software makes organizing and viewing photos on the computer simple, but you should also burn your scanned photos to a CD, DVD, or an external hard drive for safekeeping

Photo appreciation

Photo appreciation is a technique through which we actually analyze the point of view of the cameraperson. We try to understand the relationship between the camera and the subject. We minutely define the colour composition, angle of the photograph and it wants to depict to the audience. For this it is very important to understand the photography composition or grammar to analyze the whole environment.

Problems related to Photography

Taking photos and images can prove to be a more difficult task to do at times. One has to have the proper material and equipment to do the job in order to produce the best results. Photography is the art of reproducing live images in printed form. Therefore one has to deliver quality images that probably represent a picture close to the real object. It can also be used in portraying a message or giving a clearer meaning to a certain situation. There are many problems associated with the reproduction of photographic material.

Patience is very important when taking photos. The photographer has to be fluent in timing for the perfect picture especially in journalism. This is very vital especially when dealing with celebrities. There is a need to bring out rare events or situations as proof material for gossip sake. You have to wait for the perfect moment that will be out of the ordinary in order to get the cream of material that will sell in a magazine. To reproduce the perfect imagery in this modernized world, use of the most advanced technology is an advantage to professional photographers. Some cameras are not enhanced with modern features that can capture moving images.

Some will even reproduce a blurred picture that will be rendered useless. Upgraded technology will enable one to take a photo of a moving object and still give out an image that is clear and precise. In

other situations, light is a disturbing factor and needs to be countered in the best way. Sometimes one is required to take photos in the dark as in the evening. The latest technology enables you to do that by including a night mode in its components. The most suitable of the cameras are the Sony's and LG. Modernized technologies such as these have image capturing features like video stabilization in order to bring out the best quality if pictures. Unwanted objects or backgrounds are another problem of photographing. Some images can come out with different shades of light or color thus making it unattractive. These can be caused by too much light coming from the sun and surrounding lights. Having a beautiful background is also important in taking pictures. Photographers have to make sure that the aimed object is clear of any distractions that may draw attention from the main theme. Another problem associated with photography is that of a perfect angle. Sometimes an object may come out with a weak 'call out' if not angled properly.

The angle will enhance the implication of the image in aim. A certain angle will give out the true meaning and is likely less to be misinterpreted. A bad angle can produce an uneven shape of the desired object at hand. Self portraits are the most difficult to deal with if you don't have someone to do it for you. Modernized cameras have a facility that times a person to be able to get into position for the photo shoot. In all, there are many problems that come with photography and experience is an added advantage over this field. Getting the image that portrays the real thing in reality is very vital and has to be aimed for all the time.

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