

TRANSCRIPT

Importance of lens in a camera, focal length of camera lenses and its effects on photographs

A modern digital camera consists of two parts. The camera body and the detachable lens. The detachable feature of the lens provided in a digital camera itself is enough reason to gauge the importance of lens in a camera. Since the literary meaning of the word photography is writing or drawing with light, it is absolutely necessary to have a surface to draw or write and a tool to do it. As regards photography the surface is the photographic film or digital sensor and the tool is the lens. The lens provided in a camera allows the light reflected from a subject to enter in camera and place it on sensor in a desired way. Further the lens also decides from which field of view the light should enter in camera, which in turn decides the picture frame. Therefore the lens incorporated in a camera decides the picture frame in a camera static position. Further the quality and level of creativity that can be achieved in photograph is also depending on the lens. Thus lens used in a camera is pivotal and play a very important role in creation of a good photograph.

The camera lens

By definition 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.

Slide 1

Camera Lens Characteristics

All camera lenses filter and focus light on to the camera sensor or film strip. However, there are a variety of other factors that determine how a camera lens affects the look and quality of a photograph.

Focal length

Focal length is the distance between the optical center of the lens, and the camera sensor or film plane when focused at infinity. The optical center is where light rays converge inside the body of the lens. The focal length defines the magnification and field of view for a given lens. This value is generally measured in millimeters. Prime lenses have fixed focal lengths whereas zoom lenses focal lengths are variable within a range. The focal length of a lens is expressed by a number, and that number indicates the area of the scene the camera will be able to capture. Smaller numbers have a wider angle of view enabling to showcase more of a scene and larger numbers have a narrower angle of view to reduce area.

Aperture

Aperture indicates the diameter of lens diaphragm opening that lets light in which are measured or expressed in f-stops. F-stops are inversely proportional,

ie, the larger the number, the smaller the opening. For example, f/2.8 allows twice as much light into the camera as f4, and 16 times as much light as f11. Aperture affects the depth of field: larger openings create a shallower depth of field, while smaller openings make more of the image in focus.

Maximum Aperture

An individual lens will always have a maximum aperture printed on the barrel, indicating the maximum width a lens aperture can open. Typically, lenses with lower f-stops which are capable to open wider are expensive. A lens with a wide maximum aperture is good for low light situations.

Depth of Field.

Controlling the focus plane in a photograph is one of the photographer's best tools to help draw the viewer's eye. For example, landscapes are typically shot so that everything is in focus, so photographers will shoot at small apertures (e.g. f11 or f16). Where as in portraits a narrow depth of field is preferred for which lenses with large openings (e.g. f1.4 or f1.8) are preferred.

The achievable depth of field varies with the type of lens, due to the limitation of maximum aperture available in a lens.

How Does Focal Length influence an Image

An understanding on the impact of focal length on the look and quality of a photograph can very well be utilised to create pleasing images. let us list some prominent ones.

SLIDE2

Field of view. In a static position it is the focal length of a lens that determines how much of a scene is captured in an image. Shorter focal length lenses are called wide-angle lenses and are used to get a wider field of view in one image. Lenses with long focal lengths are called telephoto lenses, and have a smaller field of view. A lens having a focal length 50mm is considered to be in normal perspective due to its resemblance to a human eye focal length. There for focal lengths less than 50mm are termed as wide angle and above 50mm gets classified into telescopic.

SLIDE 3

Depth of field. Lenses with long focal lengths tend to have a shallow depth of field, which allows to focus in on small objects (even faraway ones) at specific distances. Meanwhile,

lenses with short focal lengths have a larger depth of field, which makes it capable to get a wider range of elements in focus.

SLIDE 4

Perspective. Focal length can also be utilised to change the perspective and scale of images. A short focal length lens “expands” perspective, giving the appearance of more space between the elements in a photo. On the contrary, the telephoto lenses tend to stack elements in the frame together to “compress” perspective.

Image shake. Image shake is the blurriness and reduction in image quality that occurs from the vibration of pressing down the shutter release or hand shake while clicking. When using a lens with a long focal length and tight perspective, the lens and camera are more sensitive to the slightest motion. Image shake in this scenario can be prevented by using a tripod.

Focal Lengths in DSLR detachable Lenses

There is a wide variety of detachable DSLR camera lenses available in various focal lengths in different price ranges. Choosing a lens is entirely based the types of photography one engages in. for example, ultra-wide angle lenses are of immense use in landscape photography whereas telephoto lenses outline a better option for wildlife photography.let us list the prominent focal lengths and its terminology.

SLIDE 5

- **Ultra wide angle (focal length 8mm to 24mm):** These lenses are sometimes called fisheye lenses, which have a very wide viewing area. While they can take an image of up to 180 degrees around the lens, they distort the image quite significantly, making everything appear almost as if inside a sphere.
- **Standard wide angle (focal length 24mm to 35mm):** Smaller focal lengths and a wider angle can distort images. With a lens of this size, distortion is minimal and the image appears more natural. Pretty much everything is in focus unless your subject is very close to the camera and there is less spatial distortion than a very wide lens, but it still makes things seem farther away than they actually are.
- **Standard lens (focal length 35mm to 70mm):** These versatile lenses are good for just about any type of photography, from portraits to landscapes. These all-in-one lenses render images roughly the way the human eye sees the world, and easily adjust to a shallow or deep depth of field, depending on aperture.
- **Telephoto lens (focal lengths 70mm to 300mm or more):** These lenses are ideal for picking out a distant subject, the way a telescope does. Good for compressing your subject and the background, which makes the background appear much closer to the subject. Telephoto lenses quite often have a shallow depth of field unless everything you're shooting is far away.

How Does Crop Factor Impact Focal Length

Crop factor is a photography term for identifying camera's sensor size in comparison to a 35mm film frame. Crop factor affects the focal length because a “cropped” sensor captures

less of the projected image than a “full frame” sensor, resulting in a photo that appears to be zoomed in. For instance, some camera brands, including Canon and Nikon, make DSLR cameras with sensors smaller than 35mm. Nikon’s DX cameras have a crop factor of 1.5, which means they’re only 75% the size of a traditional film frame.

Cameras with higher crop factors produce a narrower field of view that can create the impression of a longer focal length. To avoid taking photos that feel too zoomed in, multiply the focal length of the used lens by the crop factor of camera sensor, then use the resulting number (ie. effective or equivalent focal length) to make an appropriate adjustments to the equipment.

In this module we had narrated the Importance of lens in a camera, focal length of camera lenses and its effects on photographs