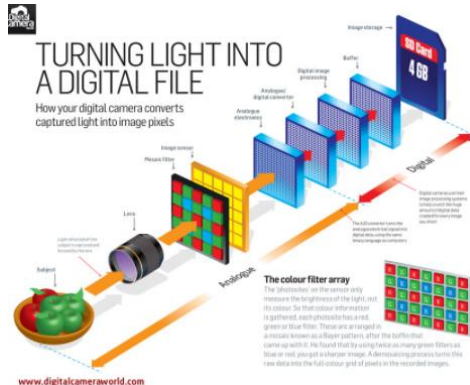


Unit 27: Digital Photography



Digital image capture

A digital camera does not take pictures by using the traditional method of storing a film strip and having to be developed. Today digital cameras use “image capture technology,” either a CCD (charge-couple device) or CMOS (complementary metal-oxide semiconductor) which is an electronic device



built inside the camera. It captures incoming light rays through the lens and transforms them into electrical signals that can be stored as pixels.

These pixels allow the image to be saved as a digital format, allowing them to be viewed on digital devices. There are a number of ways a digital image can be stored as the table below illustrates:

Storage Device	Description	Capacity	Image
SD card (Stored Digital Card) SDHC (Secure Digital High Capacity card)	This is a card that fits into the digital camera and stores photos taken. SDHC can hold more memory.	SD card 2GB SDCH 4GB- 32GB	
Micro SD Card	Used to save digital images in smaller devices such as mobile phones, not commonly used in digital cameras	Traditionally up to 32GB	
SDXC (Secure Digital extended Capacity)	These memory cards differ from Micro SD cards as they have higher storage capacity as well as a faster processing speed.	Up to 2TB	
Micro SDXC	This memory card is small in size so can fit into small devices such as Nintendo Switch, however it still has a large capacity and can hold a large amount of memory.	Up to 2TB	

There are three main formats in which digital images are saved and stored:

JPEG (JPG, JPE) - stands for Joint Photographic Experts Group and was developed in the 1980s to work with colour digital images. It works best with photographic images because it relies on the blending of colours. This format also reduces the file size of an image by blending the image pixels - once the image is compressed the edges of objects in the photo will appear blurry.

TIF/TIFF – this is a lossless image format which means no pixels are altered in the image. TIFF stands for Tag Image File Format. The format usually forms very large image sizes but also has the option of being compressed using either LZW (Lempel-Ziv-Welch) or ZIP which are also both lossless compression methods. Using the two methods mentioned above will shrink the TIFF image and allow there to be no lost data. The files are extremely large, much larger than JPEG files.

RAW – this is a lossless image format accessible on some digital cameras. Unlike JPEG image that is produced by the camera is then processed by the camera’s software, RAW does not enhance the photo by using white balance, contrast, sharpness, saturation etc. RAW is a direct unprocessed image as seen by the camera’s sensor which can then be edited if chosen to do so. Professional photographers prefer this format as it allows the most post-processing flexibility when dealing with image ‘negatives’.

Storage



There are numerous different ways to store images,


A USB memory stick also called a USB drive also known as a flash drive. This is a plug and play portable storage device that uses flash memory. Documents and images can be saved on this drive and it allows data to be retained for long periods and transferred to and from various devices with a USB port.


In addition another method is the cloud computing model, where data is stored on remote servers accessed through an internet connection. Cloud saved files are further protected for those whom the file belongs to, as it allows them to back up their files resulting in less chance of losing data. Backups to CD/DVD-ROM and USB drives cannot offer the same level of safety as they can be lost or easily damaged.


The final method of storage I will be addressing is the hard disk drive. This is non-volatile memory hardware device which permanently stores and retrieves data on a computer however can be found in mobile devices, consumer electronics and enterprise storage arrays in data centres. Hard disks spin at very high speed (approximately 7,200 RPM- revolutions per minute) within a sealed unit inside the computer.

	Example of Digital Camera	Camera functions and usage	Resolution	Image
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<p>Digital SLR</p> <p>A digital single-lens reflex camera is a digital camera that combines the optics and the mechanisms of a single-lens reflex camera with a digital imaging sensor, as opposed to photographic film.</p>	<p>Nikon D3400 DSLR Camera with AF-P 18-55mm Lens</p>	<p>Key Functions</p> <ul style="list-style-type: none"> • Nikon D3400 - digital camera AF-P DX 18-55mm lens • Digital camera - 1080p - SLR with Live View mode, movie recording • AF-P DX 18-55mm lens • 24.2 Megapixel • Zoom lens - 3x zoom - 18 - 55 mm - f/3.5-5.6 G Nikon AF-P DX • Optical - eye-level pentamirror • Automatic, manual • Bluetooth <p>Usage</p> <p>A professional photographer predominantly uses an SLR camera, as they contain advanced features and connect directly to PC.</p>	<p>Max Video Resolution</p> <p>1920 x 1080</p>	
<p>Compact Camera</p> <p>a small, simple 35 mm camera with automatic focusing and exposure.</p>	<p>Sony Cybershot W800 20MP 5x Zoom Compact Digital Camera</p>	<p>Key functions</p> <ul style="list-style-type: none"> • 20.1megapixels. • 5x optical zoom. • 26mm wide angle lens. • 2.7in LCD . • Image stabilisation. • Red eye reduction. • 720p high definition video capture and playback with sound. • Maximum ISO 100-3200. • Intelligent scene mode. • Self timer. • Built-in flash. <p>Usage</p> <p>A point-and-shoot camera, also known as compact camera, is a still camera</p>	<p>Optical Sensor Resolution</p> <p>20.1</p> <p>Effective Still Resolution</p> <p>20.1</p>	

		Designed primarily to be used by people new to photography.		
<p>Bridge Cameras</p> <p>Bridge Camera is a digital camera that has some degree of manual control, a long range zoom lens and a viewfinder but usually not interchangeable lenses. They are between a point and shoot camera, and a full DSLR.</p>	<p>Kodak Pixpro AZ252 16MP 25x Zoom Bridge Camera</p>	<p>Key Functions</p> <ul style="list-style-type: none"> • 16 megapixels. • 4x digital zoom. • 3in screen with LCD technology. • Focal length of 24-624mm. • 4.3mm wide angle lens. • Optical image stabilisation. • Up to 30 frames per second. • Shutter speed of 1/2000 to 30-1/4 sec. • CCD sensor. • Minimum ISO rating 80 and maximum ISO rating 3200. • Built-in flash. • Hot shoe for additional flash. • 720p HD recording. • Video capture with sound. • PictBridge compatible. • Features intelligent scene mode feature. <p>Usage They are used by people who are experienced in photography but perhaps not professional.</p>	16.1 megapixels	
<p>Mirrorless Interchangeable Lens Camera</p> <p>A mirrorless interchangeable lens camera (MILC) is a digital camera that has a lens mount and uses a</p>	<p>CANON EOS M100 Mirrorless Camera with EF-M 15-45 mm f/3.5-6.3 Lens</p>	<p>Key functions</p> <ul style="list-style-type: none"> • 24.2 megapixels. • 3in screen with LCD technology. • Lens focal length 15 - 45mm. • Optical image stabilisation. • Shutter speed of 30 to 1/4000 sec. • CMOS sensor, 22.3 x 14.9mm. • Built-in viewfinder. • Hot shoe. 	24.2 megapixels	

<p>digital display system.</p>		<ul style="list-style-type: none"> • Optical. • ISO range from 100 to 12800. • 1080p HD video capture. • Video capture and playback with sound. • Built-in flash. • Wi-Fi. • PictBridge compatible. • Accepts SD, SDHC, SDXC, microSDHC, microSD SD, SDHC, SDXC, microSDHC, microSD and compact Flash memory card formats. <p>Usage Professional photographers often use these cameras, as they are usually used to capture landscapes.</p>		
<p>Smart Phone Cameras</p> <p>Camera modules for smartphones called lens-style cameras. They have larger sensors and lenses than those in a camera phone but lack a viewfinder, display and most controls.</p>	<p>Apple iPhone X, 64Gb</p>	<p>Key Functions</p> <ul style="list-style-type: none"> • 12MP dual cameras with dual OIS, Portrait mode, Portrait Lighting, and 4K video up to 60 fps4. • 7MP TrueDepth front camera with Portrait mode, Portrait Lighting <p>Usage</p> <p>Capturing photos on the move, in an easy fast manner. Common camera used everyday by people of all generations.</p>	<p>1125 x 2436</p>	

<p>Go Pro</p> <p>At its core, a GoPro is a small camera that takes the best qualities of point-and-shoots and camcorders and packs them into a rugged frame that's smaller, waterproof, and virtually indestructible.</p>	<p>GoPro - HERO5 Session 4K - Action Camera</p>	<p>Key Functions</p> <ul style="list-style-type: none"> • 12MP dual cameras with dual OIS, Portrait mode, Portrait Lighting, and 4K video up to 60 fps. • 7MP TrueDepth front camera with Portrait mode, Portrait Lighting <p>Usage</p> <p>Capturing photos on the move, in an easy fast manner. Common camera used everyday by people of all generations.</p>	<p>1125 x 2436</p>	

One difference between a smart phone camera and a compact camera is the quality of zoom. When zooming in on a smart phone you are simply cropping what's in the image in front of you, possibly resulting in lack of detail or blurriness. Whereas a compact camera includes optical zoom, which increases the sharpness and detail of the image. The most obvious difference between a bridge and SLR camera visually is the size. Bridge cameras are generally smaller but may look very similar to a digital SLR camera. The main technical differences are: The lens on a bridge camera cannot be removed also Bridge Cameras offer all the versatility of a compact camera bridging the gap between point-and-shoot compact digital cameras and digital SLR cameras. Smart phone cameras also differ from the other cameras mentioned in the table above as you can edit photos using apps on your smart phone, enhancing the photo by altering the colour, brightness contrast etc. while on the move.

Image manipulation

Image manipulation is being able to transform an image from its original state into something you want. This process could be seen as an art to increase clarity of the original photo or in some cases seen as deceitful, editing programmes such as airbrushing. Photoshop is used in digital photography to change and enhance images used in media to either portray a body image or to make an image more appealing. However not all photo manipulation has got to be performed via a computer. Within the camera software you are able on most new digital cameras to change the lighting/contrast and colour; also you can crop and sharpen the image first taken to make it stand out. Some filters can be attached to the camera; they are called lens filters, for capturing scenery in extremely difficult lighting conditions. Filters are widely used in photography and cinematography.

Some examples of lens filters are:

Lens Filter	Photography Type	Purpose
Neutral Density (ND) Filter	Landscape, Flash Photography	Reduces the amount of light entering the lens, Useful for situations where motions blur needs to be captured.
Polarizing Filter	Any	Dramatically reducing reflections, enhancing colours and increasing contrast.
Close-Up Filter	Macro Photography	Known as “diopter”, a close-up filter allows a lens to zoom in on subjects.
UV/Clear/Haze Filter	Any	Protects the front of a lens, High quality UV filters can be permanently attached to lenses without affecting the image

In addition to this, the modes on a digital camera are also used to change the effect of an image. The four modes are:

- **Manual (M)** – This allows you to manually set the aperture and the shutter speed, allowing you to fully take over the exposure controls.

- **Aperture Priority (AV) or (A)** – This allows you to manually set the aperture levels, while the camera chooses the right shutter speed.

- **Shutter Priority (TV) or (S)** – Opposite of the AV. This allows you to set the shutter speed, while it controls the aperture levels, depending on the amount of light.

- **Program (P)** – Camera automatically sets the shutter speed

- **And aperture levels-** This is the mode used for ‘point and shoot’ moments.



Shooting Mode Exposure Control

Post production

In digital photography post- production to the work that has been done on digital files after the images have been captured by the camera. The process can be successfully carried out by using different software on computers or other editing programs, such as Photoshop



The table below shows some of the editing programs that are used in post-production of image manipulation these are:

P.C programs	Purpose
Photo-retouching e.g. airbrushing and Photoshop	Modify photographs and edit illustrations
Graphic software e.g. Vector and Raster graphics editors and 3D modelers	Manipulate, enhance and transform images.
Vertus fluid mask programs	Allows you to render out images
Slash three programs	Allows you to add shadows adding realism to your photo manipulation

Production Process

Many people want to have the opportunity to print their photographs from their camera; in order for this to be successful there is a process in which you will need to follow to achieve this task. Follow the simple instructions below.

You'll need:

- A computer with Windows Live Photo Gallery installed
- A printer connected to your computer, with a supply of paper
- An internet connection if you plan to print photos via an online photo printing website
- An account with one of the online photo-printing websites listed below (these are free to set up).

Step 1: insert your SD card from your camera into your PC

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Step 2: download photos from SD card onto windows onto windows live photo gallery

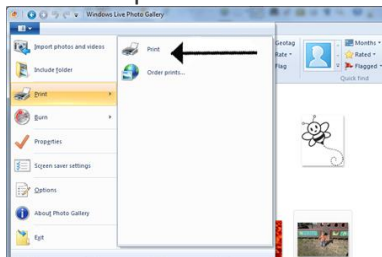
Step 3: Once you've opened Windows Live Photo Gallery, click Home at the top left of your screen.

Step 4: Next, find the photo you want to print and click on it once to select it.

Step 5: In the top left corner of your screen, you will see the 'File' button, which is marked with a small square icon. Click this and a drop-down list appears offering you a range of functions.



Step 6: Move your mouse pointer over 'Print', the third option down, and a side menu will appear. Click the top button: Print.



Step 7: A pop-up window will now appear asking you: 'How do you want to print your pictures?' It will ask you to select the paper type and size, as well as the quality of your print. You can also at this stage select whether you want to make a full-page print or choose from a range of smaller sizes, including tiled, wallet-size prints.

Step 8: Click Print and your photo will begin to print on your home printer.

Camera Components



Other equipment


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- Lighting 
- Camera 
- Tripod 
- Lenses 

Lighting is an important element in taking a perfect photo and can create and enhance an ambience. There are four type of artificial lighting used in photography.

Incandescent 

Fluorescent 

LED 

Studio strobe 