

Note

Revolutionary transition in Photography and information-horizon

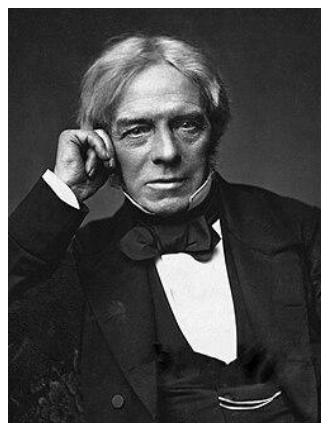
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1. **Introduction:** Photography began with the use of light in sensitive emulsions on chemically prepared film or paper with the help of cameras using photographic lenses. The first photograph was taken in 1826 by Joseph Nicéphore Niépce, and the first commercially successful photographic process was the daguerreotype, invented by Louis-Jacques-Mandé Daguerre in 1839.



Figure1 :First photograph taken in 1826 by Joseph Nicéphore Niépce.(First attempt



Transformation :1850s Michel Faraday



2006 : an amplified picture of a
Mushroom , taken by the author

What is Photography ? It is a blend of art and science and has continually evolved, reflecting changes in technology and society. From its inception it has captured moments, telling stories, and preserving history from its analog roots to the digital age when the digital images appeared in 1957. The transition from the analog to the digital era in photography marked a significant shift in how images were captured, processed, and shared for purposeful use.

In simple terms , photography is an image capture, drawing or registering device or process with the help of an instrument by Camera in the film or by Charge-Coupled Device (CCD), and Complementary Metal-Oxide-Semiconductor (CMOS) devices..

It began with the analogue mode of imaging, where a dark chamber or room with a hole (later a lens) in one wall, through which images of objects taken by camera outside the room were projected on the opposite wall in an inverted way according to the laws of physics . In Late 16th century, the Italian scientist and writer Giambattista della Porta demonstrated and described in detail the use of a camera obscura with a convex lens to project the image onto a paper and finally to use this as a drawing aid. While in subsequent centuries camera obscura was commonly used by artists to create images and they could trace, the results from these devices depended on the artist's drawing skills. Scientists thus continued to search for a method to reproduce images with no necessity of drawing skill of a photographer .

In 1826/27, using a camera obscura, Niépce produced the first successful photograph from nature. Like many other artists of his time, Daguerre made preliminary sketches by tracing the images produced by the camera obscura .Then almost simultaneously William Henry Fox Talbot developed the Calotype, an early photographic process an improvement over the [daguerreotype](#) where he demonstrated use of a photographic negative, from which multiple prints could be made, the process that was adopted then and continued for decades (with improvement) till digital photography revolutionized the photography world

A few Technicalities :

If we look at the subject/trade of photography processes it is entirely science based activities by which the end result of a photograph can be obtained according to their needs.

Photography transition processes and technology include a range of techniques and advancements that have evolved over time . The traditional photographic process finally consists of a camera, which is a light-tight container carrying a lens, a shutter, a device for recording the image in the correct plane, and a viewfinder to allow the camera to be aimed for desired subject to capture by camera. The lens that projects the inverted image of the scene in front of the camera onto the film in the image plane is sharp depending on the focal length of the lens and the distance of the object in front of the lens. The shutter consists of a set of metallic leaves mounted in or behind the lens or a system of blinds positioned in front of the film. The combination of the diaphragm opening and exposure time in a given light condition is the photographic exposure which need to be are fully adjusted with brightness /luminance of the subject and to the sensitivity or speed of the film.

In the image development process, the silver salt crystals that have been struck during the exposure by the light are converted into metallic silver, forming a visible deposit. An image of various brightness levels thus yields a picture in which these brightnesses are tonally reversed as a negative. Bright subject details record as dark or dense areas in the developed film; dark parts of the subject record as areas of low density; i.e., they have little silver. After development, the film is treated with a fixing bath that dissolves away all unexposed silver salt and so prevents subsequent darkening of such unexposed areas. Finally, a wash removes all soluble salts from the film emulsion, leaving a permanent negative silver image within the gelatin layer. The developer consists typically one or more developing agents, a preservative (such as sodium sulfite) to prevent oxidation by the air, an alkali, such as sodium carbonate to activate the developer, and a restrainer or anti fog to ensure that the developer acts only on exposed silver halide crystals. Developer's main characteristics are oxidation reduction, and effect on film gradation, graininess, and sharpness. Developers may be prepared on the basis of published formulas or bought as ready-mixed powders or concentrates for dilution with water. However, important is to refer that the improvement and modifications in analog photography by adopting some electronic and electrical application started after world war II. to

facilitate the system to run smoothly and gradually cameras become fully automatic in late 1900th century for analog photography.



Figure :The stone structure of the Umananda the smallest island of the world as captured by the author in conventional camera (ASR -100)

Digital Photography

The evolution from film to digital photography marks one of the most significant transformations in the history of imaging technology. Film photography, with its rich analog process, relied on light-sensitive chemicals to capture images, creating a tangible and unique photograph. Over time, however, digital photography emerged, introducing a revolutionary shift by converting light into electronic signals and storing images as data.

The transition to digital photography began in the late 20th century. The first digital cameras were developed for military use before becoming commercially available to the general public. This shift marked a significant change in how photographs were taken, processed and shared. Digital cameras eliminated the need for film, making photography more cost-effective and accessible. The introduction of digital sensors and the development of image processing software revolutionized the

trade. Photographers could now instantly review and edit their images, greatly expanding creative possibilities. This era also saw the rise of digital storage and the ability to share images electronically, changing the way photographs were distributed and used. The digital revolution democratized photography, allowing more people to participate in capturing and sharing their perspectives. However, it also brought challenges, such as the issue of digital image manipulation and the sheer volume of photographs being produced.

The history of digital photography began in the 1950s. In 1951, the first digital signals were saved to magnetic tape via the first video tape recorder. Six years later, in 1957, the first digital image was produced through a computer by Russell Kirsch. It was an image of his son.



First digital image ever created, by Russell Kirsch. It is an image of his son, Walden.

Digital photography uses cameras containing arrays of electronic photodetectors interfaced with an analog-to-digital converter (ADC) to produce images focused. The first semiconductor image sensor was the charge-coupled device (CCD), invented by physicists Willard S. Boyle and George E. Smith at Bell Labs in 1969. While researching the metal-oxide semiconductor (MOS) process, they realized that an electric charge was analogous to a magnetic bubble and that the charge could be stored on a tiny MOS capacitor. As it was fairly straightforward to fabricate a series of MOS capacitors in a row, they connected a suitable voltage to the capacitors so that the charge could be stepped along from one to the next. This semiconductor circuit was later used in the first digital video cameras for television broadcasting, and its invention was recognized by a Nobel Prize in Physics .

The first self-contained (portable) digital camera was created in 1975 by Steven Sasson of Eastman Kodak by using the CCD image sensor chips developed by Fairchild Semiconductor in 1973.. The

camera weighed 8 pounds (3.6 kg), recorded black-and-white images to a cassette tape, had a resolution of 0.01 megapixels (10,000 pixels), and took 23 seconds to capture its first image in December 1975. The prototype camera was a technical exercise, not intended for production. While it was not until 1981, that the first consumer camera was produced by Sony, the groundwork for digital imaging and photography had been laid.

The first digital single-lens reflex (DSLR) camera was the Nikon SVC prototype demonstrated in 1986, followed by the commercial Nikon QV-1000C released in 1988. The first widely commercially available digital camera was the 1990 Dycam Model 1; uses a CCD image sensor, stored pictures digitally, and connected directly to a computer for downloading images. With the first version of Adobe Photoshop, software for post processing /editing the image captured by Digital camera, digital imaging allowed for the unspoiled change ability of digitally altered images. The use of computer photo retouching and photo printing became more common with the rise of digital photography.

The advent of digital photography also gave way to cultural changes in the field of photography. Unlike film photography, dark rooms and hazardous chemicals were no longer required for the post-production of an image – images could now be processed and enhanced from a personal computer. This allowed photographers to be more creative in editing techniques. As the field became more popular, digital photography and photographers diversified. Digital photography expanded the field of photography from a small, somewhat elite circle to one that encompassed many people and . have made photography more accessible to a wider audience. Digital technology has also led to advancements in camera equipment, such as more powerful lenses, improved image stabilization, and better low-light performance. These advancements have expanded the creative possibilities for photographers and allowed them to capture shots that were previously challenging or impossible. The camera phone further helped popularize digital photography, along with the Internet, social media, and the JPEG image format. The first cell phones with built-in digital cameras were produced in 2000 by Sharp and Samsung. Small, convenient, and easy to use, camera phones have made digital photography omnipresent in the daily life of the general public

The emergence of AI-generated images is the latest development in the co-evolution of photography with technology.

Advantages and shortcomings :

Finally when we compare a given subject captured by digital and analog systems, both of them have some merits and demerits, though we can't compare them on a 1:1 basis.

It is true that overall, digital technology has changed the way we take, share, and view photographs, and its full impact on the medium is still being felt. A digital image has good resolution in image, broad tonal range, its image is stored in digital signal in memory card, we can have the image instantly in the display screen for editing by using soft wear for photography. The initial cost of a digital system is enormous but in the long run there is less recurring cost. In the present digital era digital photography has an enormous flexibility, like shearing, editing, manipulation, reviewing etc.

The evolution from film to digital photography marks one of the most significant transformations in the history of imaging technology, film photography, with its rich analog process, relied on light-sensitive chemicals to capture images, creating a tangible and unique photograph. Over time, digital photography emerged, however, there are concerns about the image quality of digital cameras compared to film cameras, as well as the rapidly changing computer market and finding compatible hardware and software programs to keep digital images from being lost. Additionally, digital cameras tend to be more delicate and have less tolerance to extreme heat, cold, and moisture than traditional film cameras.

The transition of photography analog to digital primarily has primarily changed the image capturing device i.e from silver halide/bromide or chlorobromide to CCD/CMOS. The analog photography was predominantly based upon chemistry i.e chemical salt and solution and present day photography is based upon the electronics like semiconductor, microprocessor and built in micro/nano chips with active and passive components etc. In one word we can say that today's photography has shifted from chemical processes to electronic/physics law and objectives.

But if we look at the color images taken in analogue modes with [photographers creative quality we cannot identify mode of photography as one can see from some examples of digital and analog photographs taken by the author displayed in the Figure 4



Figure 4 (a) digital colour photo taken by the author (mega pictal 12, 500 mm f/8 catadiapotic lens/mirror)

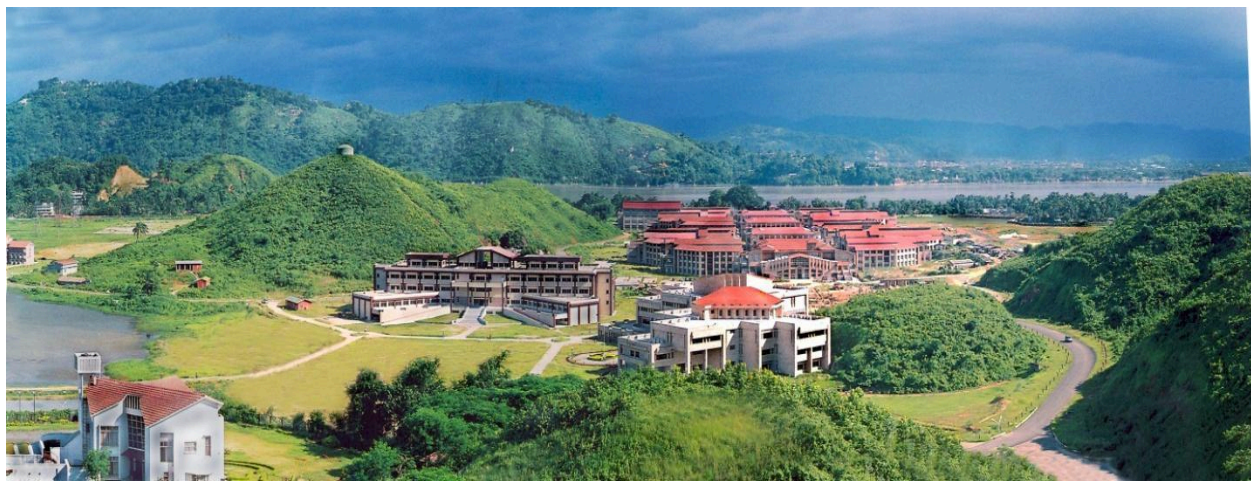


Figure 4(b): digital colour photo taken by the author(megapixel 6), distance, broad view



Figure 4c: analog colour photocolour photo taken by the author(100 ASA micro lens). With moderate resolution)
Butter fly with dew drops

Because if we compare resolution of normal analogue film and digital sensors CCD/CMOS, the 70 to 80 megapixel of the film is higher compared to normal 30mega pixel of digital sensors (CCD/CMOS). Therefore the infrastructure for processing the film like temperature, humidity and time factors are to be precisely maintained as required for the development of the film . The photographer's imaginations and technical skills are important rewards to the picture quality.