

The Camera and the Influence of Digital Technology

In the study of the camera, digital technology influence comes from a variety of different sources to give rise to modern digital photographic capabilities. Some of these technologies are then advanced in special niches to create new advances in science. One of the best examples of this exchange of digital technology is the CCD or Charge-coupled device. This is the digital technology breakthrough that made the digital camera possible.

When light strikes the CCD surface, it frees electrons to move around and those electrons accumulate in capacitors. Those electrons are "counted" at regular intervals by a circuit which dumps the electrons from each point on the CCD surface. When all of these measurements are combined, a picture can be instantly reproduced as a "virtual mosaic" of the individual point measurements. This is the picture we see. The more points of measurement found on the CCD, the higher the "resolution" of the resulting picture.

When building a highly specialized camera, digital technology such as this opens new doors which are not possible with film based technology.

In dentistry, an X-ray machine can be converted to a digital camera with a CCD which is sensitive to the photons that make up the X-ray spectrum. Instead of imprinting an image of X-ray on film, developing the film and finally reviewing the tiny film image, modern X-ray cameras can instantly display an X-ray image on a computer screen as the CCD processes the array of photon measurements. This not only saves time, but also produces no waste in the form of exposed film and development chemicals. So with this frequently used, specialized camera, digital technology creates improvements in a dentist's practice and protects the environment.

Another specialized camera that benefits from digital technology is the telescope. Traditional cameras, mounted to telescopes collect points of light and expose the film. This can provide more sensitivity than the human eye to faint points of light, but brighter points of light can also obscure fainter ones by "washing out" the image. With the application of digital technology the film camera is replaced by a digital camera using a CCD. The CCD can continue to receive and measure photons indefinitely. This means the process is a continuous measurement in contrast to the more simple exposure of a piece of film. Computers can then electronically filter out brighter sources of light making possible the detection of very faint points of light in the sky and even the study of celestial objects by the detection of the shadows they cast instead of the light they give off. By comparing the light collected over time, digital technology also allows this digital camera to detect distant objects by inferring their presence.

These are just two examples of how cameras are influenced by digital technology. New applications and even new science can result from such seemingly small advances in technologies that don't seem to be related at all. Think on this the next time you examine your own digital camera.

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About the Author

Dave Saunders is a professional lecturer, and lifelong technologist. He lives in the Washington, DC area with his wife, Irene and writes about his many passions. While pursuing his own enjoyments in broadly experiencing life, Dave enjoys creating interconnections through his writings and lectures to help others create context enjoy technology application. You can find out more about digital cameras at www.aboutdigitalcameras.net.