PHOTOGRAPHY

Digital cameras: a decade of revolutionary pictures

Steven Sasson, the Kodak engineer who invented digital photography 35 years ago, discusses how he did it and the impact it has had

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By Peter Nowak, CBC News

*The intermediary output device for the first digital camera, designed by Kodak in 1975. (Courtesy Kodak)*As historians document the first decade of the millennium, much attention will be paid to how global terrorism, as well as the rise of the internet, transformed the world and its people. Less obvious, however, is how the past 10 years changed how we see the world — or more specifically, how we photograph and visually record it.

The photographic revolution, where the idea of "film" — small sheets of plastic that recorded images when exposed to light — became obsolete and gave way to a new digital equivalent, was one of the most profound events of the past decade. It was a seemingly minor shift in technology, but it had a huge impact.

Just as Gutenberg's invention of the printing press in the 15th century transformed the act of reading from an upper-class privilege to something everyone could partake in, digital cameras democratized the previously esoteric art of photography, and brought it to the masses. Ten

years ago, photographers were a small, highly-trained elite. Now, they have to compete with everyone with a working finger. Today, even the simplest cellphone can snap decent-quality photos and instantaneously share them with the world through an internet connection. The rise of social media sites such as YouTube and Facebook, meanwhile, has largely been predicated on this technological advancement.

The digital camera itself will officially turn 35 in 2010. Steven Sasson, the electrical engineer who invented it for Kodak, is proud of his creation, but admits he had no idea what forces he was setting in motion all those years ago.

"I wasn't attaching any sort of historical importance to it," says Sasson, now a retiree who still lives in Rochester, N.Y., near Kodak's headquarters. "I'm as amazed as probably anybody about the progress because I know where it started."

Experimental project

In 1975, Sasson was tasked with learning about an experimental new technology, the charge-coupled device (CCD), invented in New Jersey at Bell Labs and developed by Silicon Valley-based Fairchild Semiconductor, which could convert electrical signals into digital values. Sasson believed the CCD could transform photographic images into the ones and zeros of digital binary code so, along with a few technicians, he set to building an electronic camera based on it.

The team worked on the camera for the better part of a year. The only proof they had over that time that the camera was recording images — it had no display — were voltage readings registered on an oscilloscope.

Sasson eventually came up with a rather ugly construct; about the size of a toaster, it had crooked angles, exposed circuits and an audio tape, which recorded images, hanging off the side. He also had to build an intermediary output device that would, ironically, take the camera's digital image and transform it back into analogue so that it could ultimately be displayed on a television screen.

Ready to take the first ever digital photo, Sasson found a dark-haired lab technician, Joy Marshall, and asked her to pose against a white background. The image took 23 seconds to record — he only knew it was working because he saw the audio cassette spinning — and a further 30 seconds to render onto the TV screen.

The result was a muddy mess, Sasson says. Marshall's silhouette was recognizable, but her face had no detail.

"Joy was less than enthralled with the picture," he says. "She said, 'It needs work,' and walked out."

*Kodak engineer Steven Sasson holds the first digital camera, which he designed. (Courtesy Kodak)*The crew spent an

hour fiddling with how the camera read the electronic bits and tried again, this time successfully. Marshall's image was displayed in full black-and-white glory on the TV monitor in Sasson's lab, the first successful digital photograph.

Sasson quickly poured cold water on any enthusiasm Kodak may have had for the camera, as there was a host of problems with it. Unlike today, "digital" was a dirty word in the seventies — it represented expensive, complicated and problematic technology. The CCD used in the camera also had to be manually calibrated — if any of its 12 individual voltage adjustments were off in even the slightest way, its output would match the muddiness of the earliest photo.

There was also no way to save pictures. The audio tapes didn't hold the image for long and had to be re-used out of necessity, which means those first photos of Joy Marshall are lost to the ages. Ironically, Sasson had to use a film camera to photograph a digital image displayed on a TV in order to save it for posterity's sake.

Moreover, the photo quality was not at all usable. The first photo measured 100 pixels by 100 pixels, or .01 megapixels, a far cry from the 12-megapixel (or 12-million-pixel) cameras that are common today.

"It was totally impractical," Sasson says. "The image quality, although recognizable and perfectly suitable for our demonstration purposes, was in no way challenging any film format at the time."

Close prediction

Asked to predict when the digital camera might become commercially viable, Sasson used the only technological predictive measure he knew

of — Moore's Law, coined by Gordon Moore, one of the scientists who founded both Fairchild Semiconductor and Intel. Sasson figured that for a digital photo to compete with a film equivalent, it would need to be made up of at least a million pixels, or one megapixel (two megapixels if it was colour).

Applying Moore's Law, which states that the processing power of electronics doubles roughly every 18 months, Sasson guessed that digital cameras would be viable in 15 to 20 years. Kodak hit fairly close to the mark with its first commercially available camera in 1994, or 19 years after its invention.

"The prediction actually turned out to be not too far wrong, but I think I was incredibly lucky by missing so many things that just cancelled each other out," Sasson says. "It was pure luck."

A slew of other technological advances happened in the meantime that built on Kodak's patent on the digital camera, including the rise of personal computers and storage medium and the improvement of image compression. Taken together, these developments helped bring the cost of cameras down and the quality of photos up.

Ironically, Kodak management was too cautious with digital cameras and saw other companies, including Canon and Sony, run away with the early market while it held on to film. Today, several estimates find Kodak has only about 10 per cent of the world market for digital cameras.

Sasson first noticed the impact of his invention while visiting Yellowstone National Park with his wife Cindy in the late nineties. While waiting for the Old Faithful geyser to erupt, he noticed a number

of tourists sporting digital cameras.

"I told my wife that [the revolution] was finally happening," he says. "I felt very strange looking at this knowing that I had had the opportunity to do it many, many years before."

Sasson still works for Kodak part-time these days, despite being retired. His main role is helping the company enforce its patents in digital photography, but he's also a walking museum on the topic.

He says he feels like Daniel Boone, the American pioneer who discovered new lands in the 18th century.

"I count myself being pretty lucky as the guy who first got to play with this technology," he says.

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CoolVoiceofReason **wrote:**Posted 2009/12/22
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From the article:
Ready to take the first ever digital photo, Sasson

From the "disputed Nobel" article:
Tompsett is the one responsible for designing and building the first two CCD cameras at Bell Labs, and his

name is on the patent for those devices.
==========
Did Bell Labs build the first CCD cameras but never take a picture? If so what was the point?
Kodak may not have properly exploited the consumer market, understandable given the film based nature of their business, but today they are with the leaders in building the most advanced CCD sensors.

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spectre **wrote:**Posted 2009/12/22
at 5:53 PM ETWhat a cool story. Funny that they got one of the lab technicians to be the model for the first photo, rather than doing still life - after all, they knew whatever they took the photo of would have to hold still! I wonder if they were thinking along the lines of Mona Lisa.

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