

Essay-Contest 2017/18

Clemens Bauer, Bundesgymnasium Feldkirch, 10. Schulstufe,
Fremdsprachenerwerb: 6 Jahre

Willard Boyle

What has been the most influential invention in the last 50 years? For people born in Generation Y or Z it is probably a product from an acclaimed company like Apple, invented by famous creators like Steve Jobs or perhaps even Elon Musk, the founder of SpaceX and Tesla. On the other hand, there are some people, though they are probably few in number, who will think of "Simon", the first Smartphone developed by BellSouth and IBM, which shaped an entire new industry. It is perhaps important to acknowledge the fact that it is irrational to want to accurately determine which invention was the most important, considering the huge changes that have happened in this abovementioned time period. Nevertheless, I want to present an invention that plays a huge part in today's technology but is widely unknown. The innovation that in my opinion should be more appreciated is the Charge-Coupled Device, a revolutionary technology discovered by Canadian scientist Willard Sterling Boyle, for which he even received the 2009 Nobel Prize in Physics.

"Willard Boyle", Wikipedia.org
https://en.wikipedia.org/wiki/Willard_Boyle

The Charge-Coupled Device, in short CCD, was invented by Willard S. Boyle in 1969, a feat for which he received multiple awards like the Stuart Ballantine Medal in 1973, the 1974 IEEE Morris N. Liebmann Memorial Award, and in the end even the 2009 Nobel Prize in Physics. The man behind everything, Willard S. Boyle, was born on August 19th, 1924, and sadly passed away on May 7th, 2011. He is also the mind behind some smaller inventions and discoveries, like that of the first continuously operating ruby laser that uses a synthetic ruby crystal as its gain medium in 1962. In addition, he was a supporter of the Apollo space program and also helped select the lunar landing sites. As previously mentioned, however, his greatest accomplishment was the CCD, a device that shaped today's digital photography.

The CCD is basically an integrated circuit etched onto a silicon surface forming light sensitive elements called pixels. One of silicon's special properties is that it is a semiconductor, which means that it needs energy to be able to conduct electricity. In silicon's case, it only takes the energy of a few photons to send out a charge which is then transformed into a digital

copy of the light patterns falling on the device by the electronics. This technique is used in almost every single digital camera, meaning that Boyle's invention can truly be said to have given birth to the era of digital imagery.

"Willard S. Boyle, Father of Digital Eye, Dies at 86", Douglas Martin, published May 9th 2011, NY-Times online magazine
<http://www.nytimes.com/2011/05/10/science/space/10boyle.html>

"What is A CCD", Spencist.com
http://www.specinst.com/What_Is_A_CCD.html

The CCD is an important aspect of our lives, considering that a huge proportion of things we encounter daily, such as advertisements, flyers, magazines, etc., are all based on digital photography. The images that are used by these media affect us on a subconscious level and evoke different emotions that make us interested in things, make us detest certain people or quite simply entertain us. While not always present to our consciousness, these things deeply impact our daily life, and all this is made possible by pictures based on a small silicon chip.

In a similar manner, the CCD chip exists in almost every notebook or smartphone, and is used by us daily on social networks like Instagram, where we view different images taken by the Charge-Coupled Device, or on Snapchat, where we communicate with snapshots taken with an identical mechanism. To put this into perspective, according to the online statistics portal "statista.com", the number of photo messages created by Snapchat users every day was a whopping 3 billion during the third quarter of 2016 and the first quarter 2017. That means that there are 1.095 Trillion messages sent on snapchat every year, which alone confirms the importance of digital cameras in today's society.

"Number of photo messages created by Snapchat users every day from 3rd quarter 2016 to 3rd quarter 2017 (in billions)", Statista.com
<https://www.statista.com/statistics/257128/number-of-photo-messages-sent-by-snapchat-users-every-day/>

More importantly, photographs are essential as a way of preserving memories. Be it a holiday you really enjoyed, your birthday or even a day as meaningful as your wedding – a photograph captures all these moments in just a few seconds and preserves them for the next decades. In this way, electrons on a hard drive become part of our heart. If you print them out, they're an even greater treasure and will surely be a pleasure to show to your children one day to explain important periods of your life to them, or just to have a laugh with your friends about old times.

To sum everything up, the CCD was an excellent invention by Boyle and definitely deserved the Nobel Prize. Willard Boyle's achievements are extraordinarily influential in our lives and are definitely part of the most important innovation of the last 50 years. His work is not only inspiring, but also shows how a simple thing can change the world. By inventing this device, he was not only able to influence the world's entire economy and the daily lives of billions of people, but also managed to bring us laughter and nostalgia, help us form a better connection to the past and give us the means to continue to do so in the future.

Sources:

Articles:

"Willard S. Boyle, Father of Digital Eye, Dies at 86", Douglas Martin, published May 9th 2011, NY-Times online magazine

<http://www.nytimes.com/2011/05/10/science/space/10boyle.html>

"Willard Boyle", WebCite

<https://www.webcitation.org/696vQGdlQ?url=http://www.telegraph.co.uk/news/obituaries/science-obituaries/8517452/Willard-Boyle.html>

https://www.webcitation.org/696rLUoJR?url=http://www.nobelprize.org/nobel_prizes/physics/laureates/2009/boyle.html

"Willard S. Boyle, a Nobel Prize-winning physicist, dies at 86", T. Rees Shapiro, published on May 9th, 2011, The Washington Post online magazine

https://www.washingtonpost.com/local/obituaries/willard-s-boyle-a-nobel-prize-winning-physicist-dies-at-86/2011/05/09/AFAGJecG_story.html?utm_term=.d0b4ad506f04

Wikipedia:

https://en.wikipedia.org/wiki/Charge-coupled_device

https://en.wikipedia.org/wiki/Willard_Boyle

https://en.wikipedia.org/wiki/Ruby_laser

https://en.wikipedia.org/wiki/Active_laser_medium

https://en.wikipedia.org/wiki/Integrated_circuit

<https://en.wikipedia.org/wiki/Smartphone>

Other online Sources:

http://www.specinst.com/What_Is_A_CCD.html

Videos:

Youtube:

<https://www.youtube.com/watch?v=nnRQYEsuU0I>

Statistics:

Snapchat Daily:

<https://www.statista.com/statistics/257128/number-of-photo-messages-sent-by-snapchat-users-every-day/>