



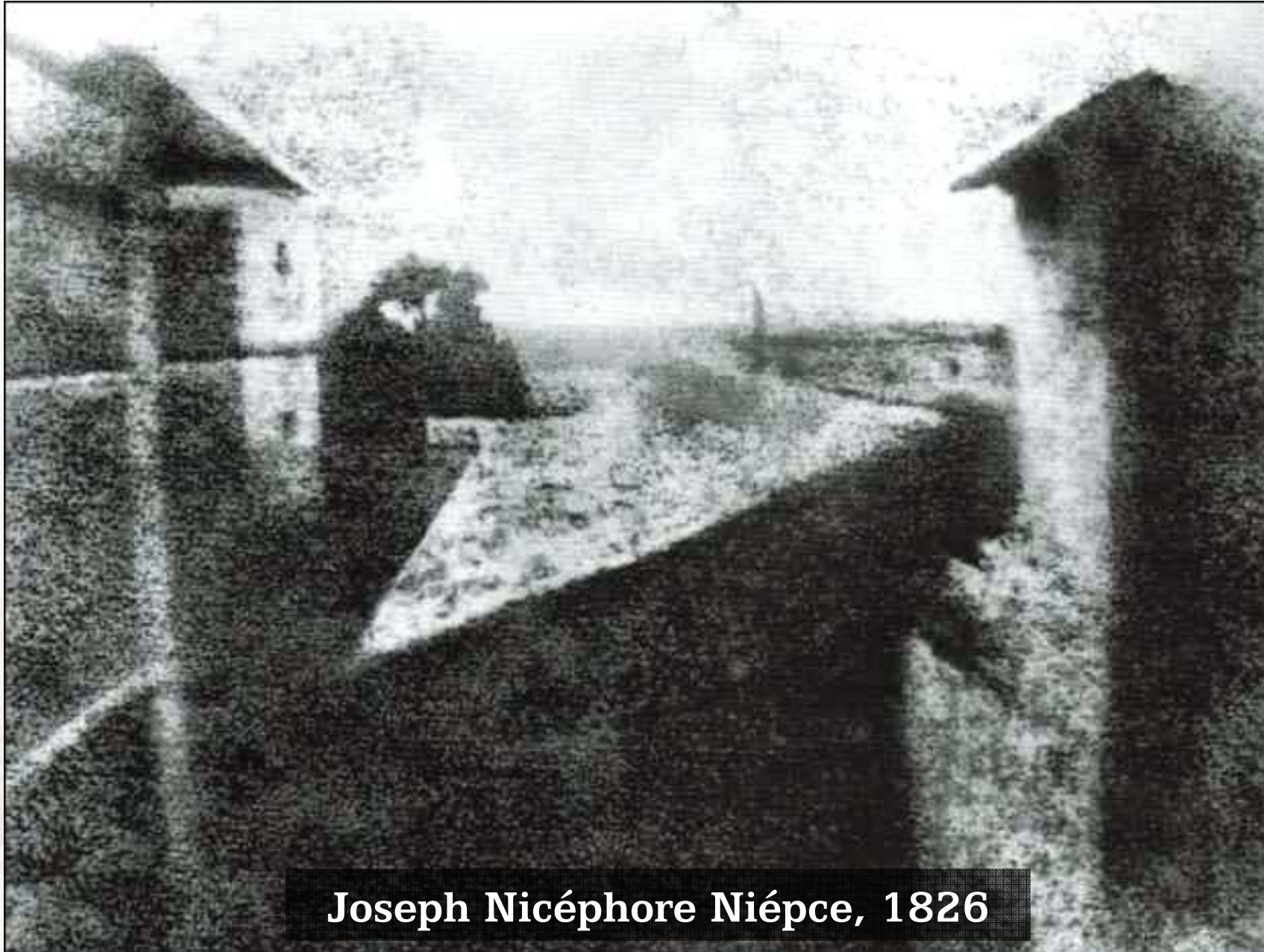
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# *How Digital Cameras Work*

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*Contemporary Issues in Science and Technology*

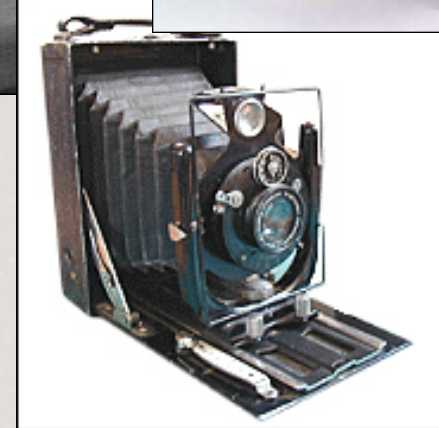
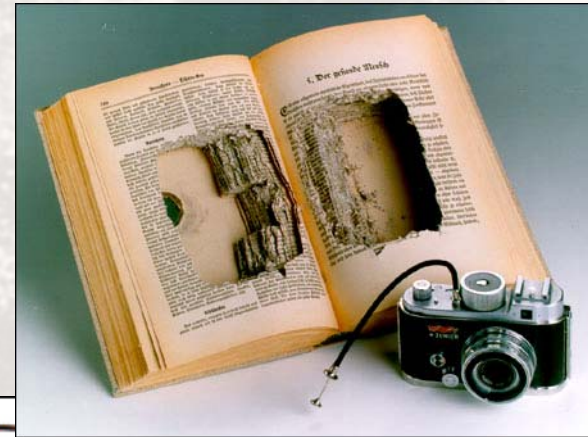


**Joseph Nicéphore Niépce, 1826**

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# *History*

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*Contemporary Issues in Science and Technology*

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## *Basics about digital images*

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**A digital image is a long string of 1s and 0s that represent tiny coloured dots (=pixels)**

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## *A common example (7 Feb., 2005)*

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Memory



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### Canon 4 MP ELPH PowerShot S410 Digital Camera

**\$279.43** **Canon**

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The slim 4 MP Canon PowerShot S410 is as big on style as it is on image quality. This digital camera is packed with advanced features that are fun and easy to use, making great shots

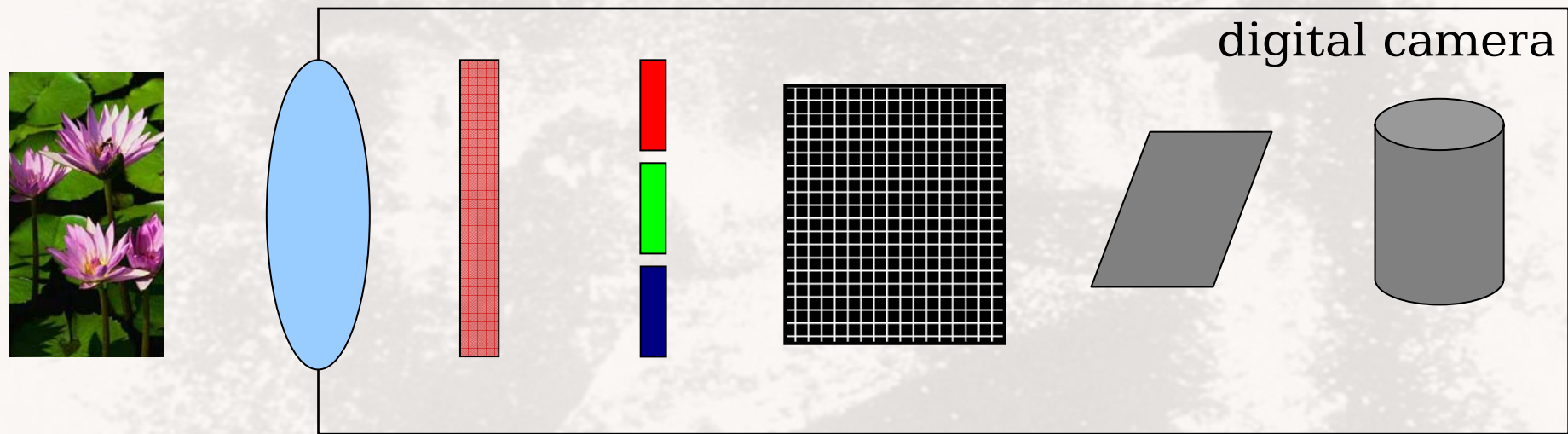
Resolution

Zoom

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## *Assembly of digital cameras*

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Subject

Infrared filter

CCD

RAM

Lens

RGB filter

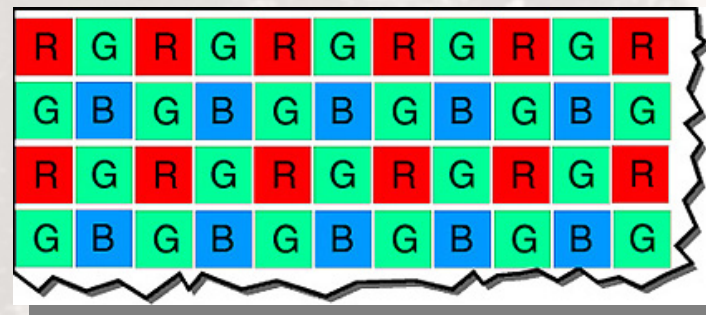
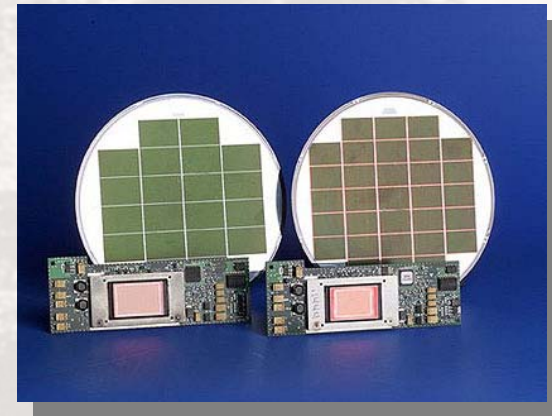
A/D-Converter

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# CCD

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- CCD = Charge Coupled Device
- Replaces the chemical film
- Light-sensitive silicon diodes
  - more light = more electrical charge
- 2-D array of millions of photosites
  - 1 photosite = 1 primary color = 1 Pixel
  - (→ interpolation needed)



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## *Types of digital cameras*

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- Array-Sensor
  - One-Shot camera (common!)
    - CCD records red, green and blue simultaneously
    - Interpolation because there is only one CCD
  - Three-Shot camera
    - CCD records red, green and blue in succession
    - No interpolation
  - Three-In-One-Shot camera
    - CCD records red, green and blue simultaneously
    - No interpolation, because there are three CCDs
- Row-Sensor
  - Shoots the picture row by row (works like a scanner)



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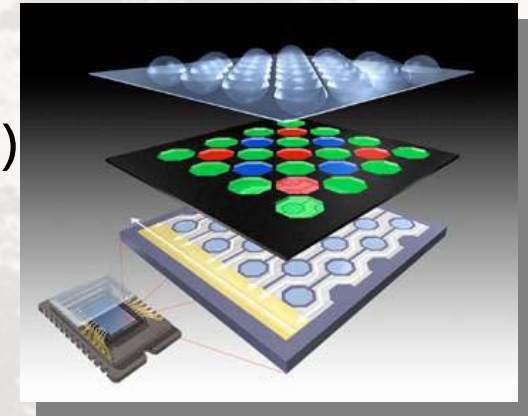
## *Outlook on the future of digital cameras*

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- SuperCCD

Photosites have special shapes (honeycomb)

- Higher resolutions
- More light-sensitive
- Better results using interpolation



- CMOS

Like CCDs this semiconductor works with a photovoltaic reaction

- Only tenth of energy consumption of a CCD
- functions directly on the chip
- small and cheap(!)



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*The End...*

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