

Image Sensing and Digitization

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Image sensing devices I



Image sensing devices II

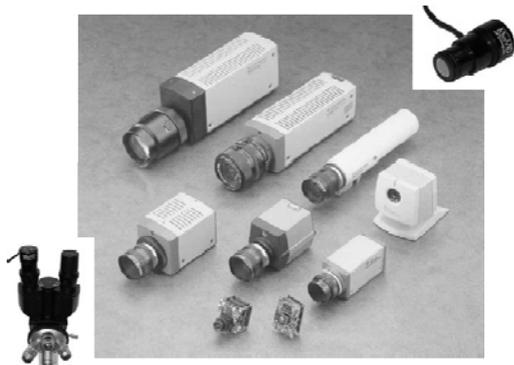
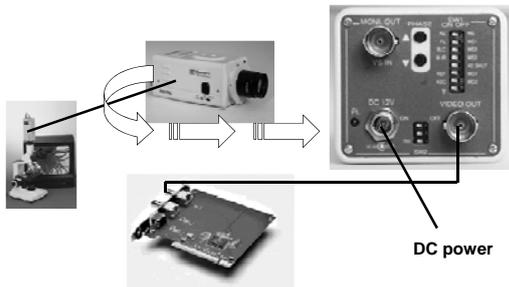


Image sensing devices III



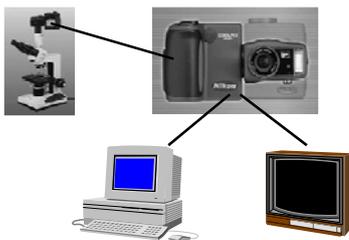
Possibilities, how to sense image (1)

- analogue TV videocamera + frame grabber



Possibilities, how to sense image (2)

- digital still camera (DSC)



Possibilities, how to sense image (3)

- digital videocameras for microscopy with different interface



Possibilities, how to sense image (4)

- specialized microscope, USB digital microscope



<http://www.theproscop.com>

Possibilities, how to sense image (5)

- specialized complex systems

Nikon Eclipse E-500 Microscope Equipped for Digital Photomicrography

Labels: DXM 1200 Camera, Halogen Illuminator, Tungsten Illuminator, Focus, Computer, Eyepieces, Keyboard.

High-resolution digital camera systems for microscopy.

- 1.1 to 5.8 million pixels
- Outstanding image quality
- Color or monochrome
- High sensitivity
- COOLED CCD
- Long integration exposure
- Very easy to learn & operate

Computers possibilities

- standard PC with frame grabber (FG)

digital videocameras with IEEE 1394 (FireWire)



- laptops with FG (PCMCIA + ext. module)

standard TV camera



digital videocameras with IEEE 1394 (FireWire)

Sensing videocameras

Analogue

Standard TV (interlaced)

Mono-chrome
Colour (1 or 3 chips)

CCIR
RS170
PAL
NTSC

Digital (non-interlaced)

WWW

Scientific

IEEE1394 (FireWire)
USB
Camera Link
Giga Bit Ethernet

Basic system configuration

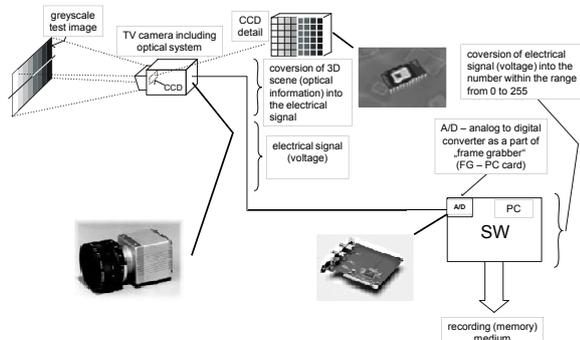
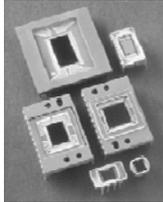
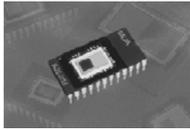
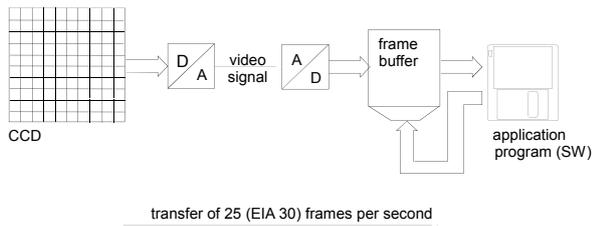


Image sensing elements

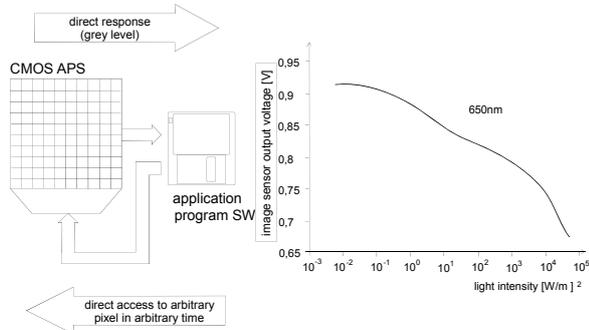
- vacuum tubes
- semiconductor
 - CCD
 - CID
 - CMOS
 - CIS



Basic system configuration with CCD image sensor



Basic system configuration with CMOS image sensor



PMT („photomultiplier tube“)

(adopted from <http://micro.magnet.fsu.edu>)

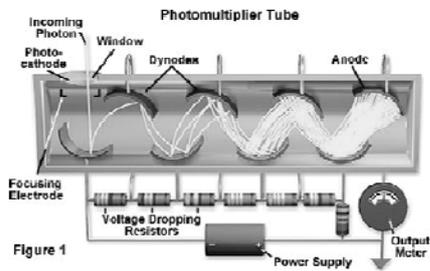


Figure 1
PMT are used in confocal microscopes

II („image intensifiers“) - ICCD

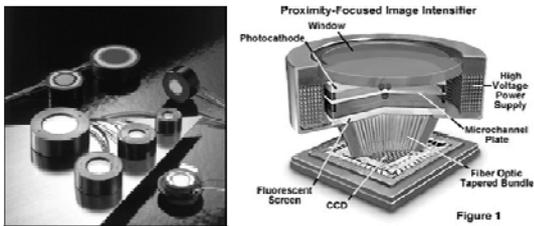


Figure 1
adopted from <http://micro.magnet.fsu.edu>

Image digitization (sampling) I

- 2D and time sampling

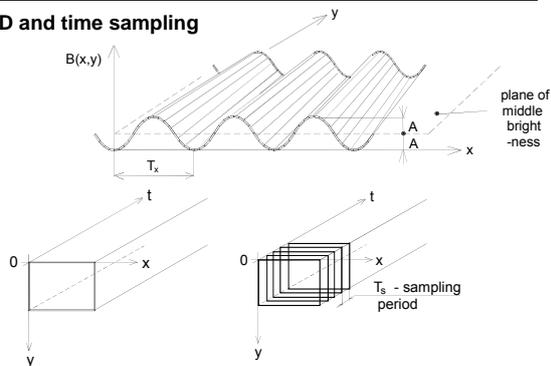


Image digitization (sampling) II

- spatial sampling

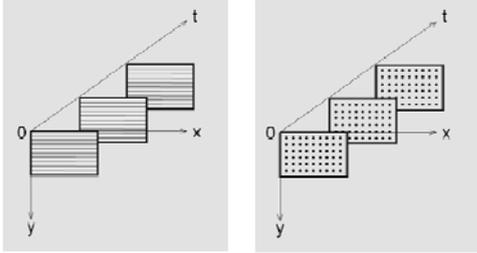
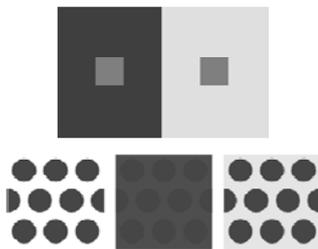


Image digitization (sampling) III

- level digitization (quantization)

- brightness and contrast perception



WWW page with useful links

<http://webzam.fbmi.cvut.cz/hozman>

- free download of educational SW MIPS (Microscopy Image Processing Software, with Menu in English and help in Czech)
- free download of lecture (PDF file in Czech),
- free download of presentation (PDF and PPT in English),
- useful links to the image processing topics

Thank you for your attention
