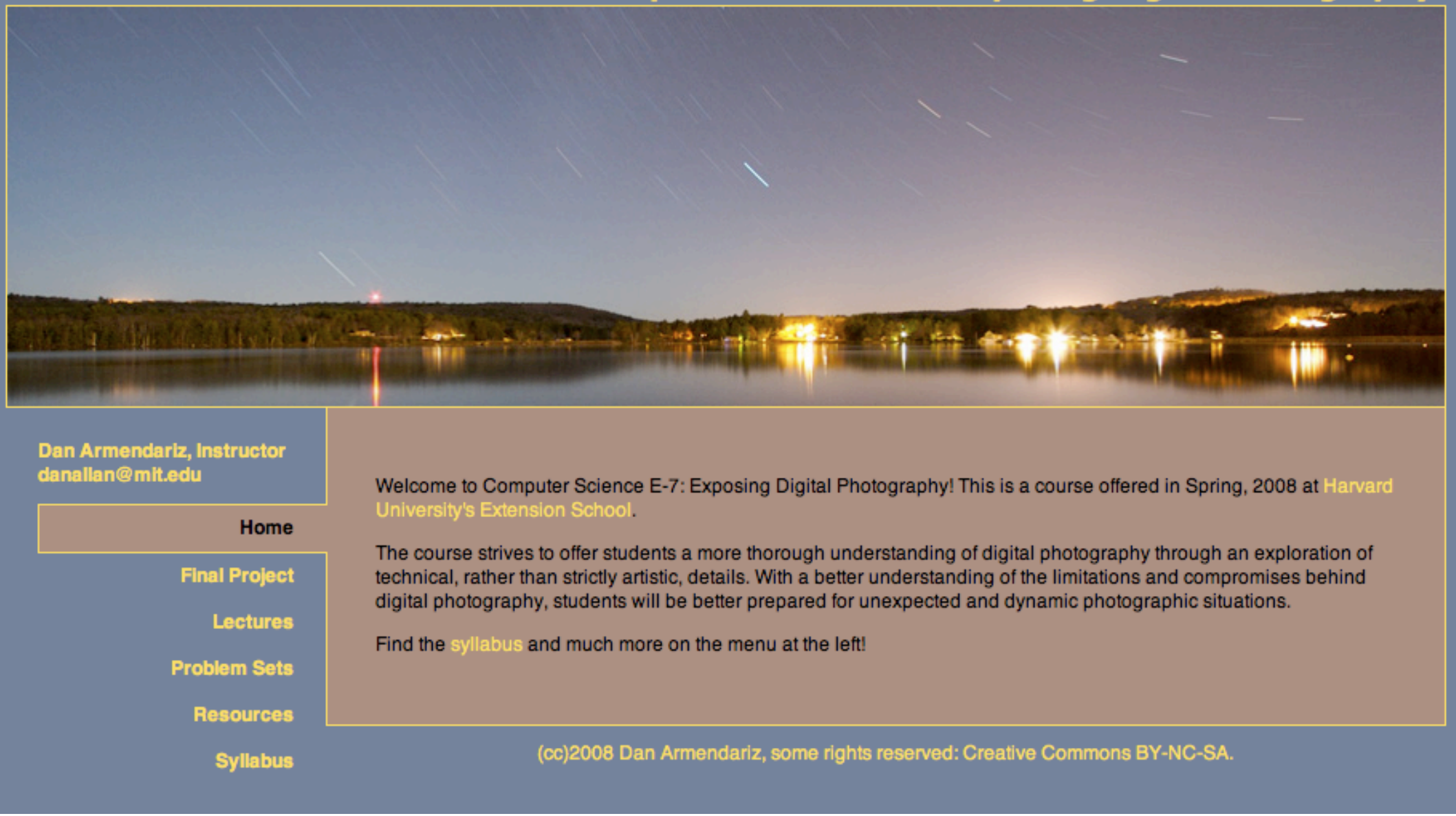
Computer Science E-7
Exposing Digital Photography

Lecture 10: Digital Cameras (cont.)
November 2, 2010

danallan@mit.edu



Assignment 4

Website Theme

page: 62718E

content: A17D71

highlight: FFDD46

text: 000000

Assignment 4

Color Scheme

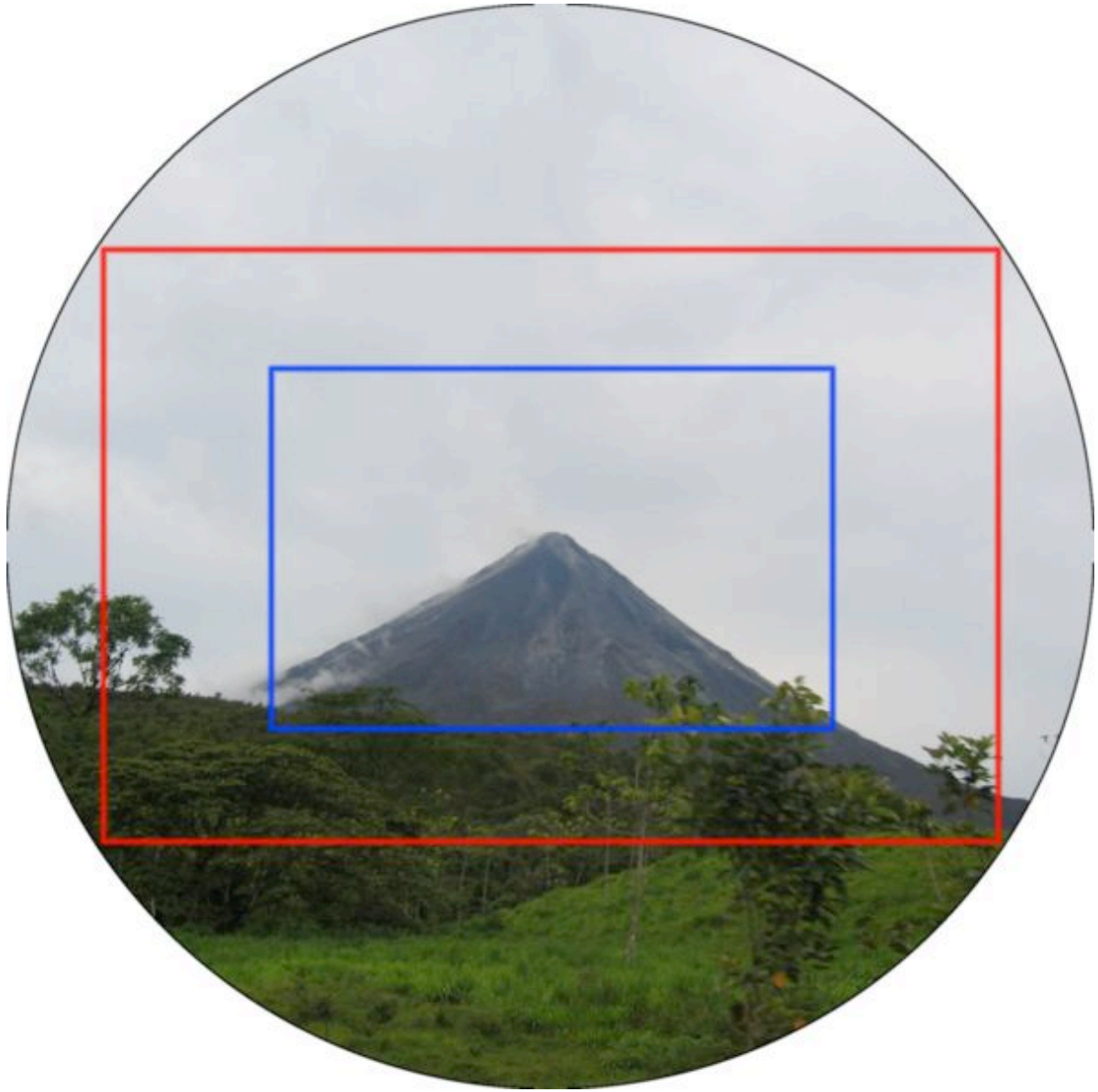
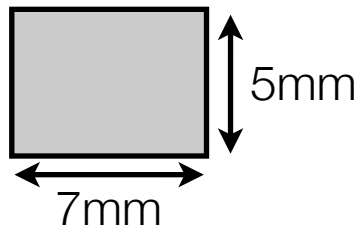
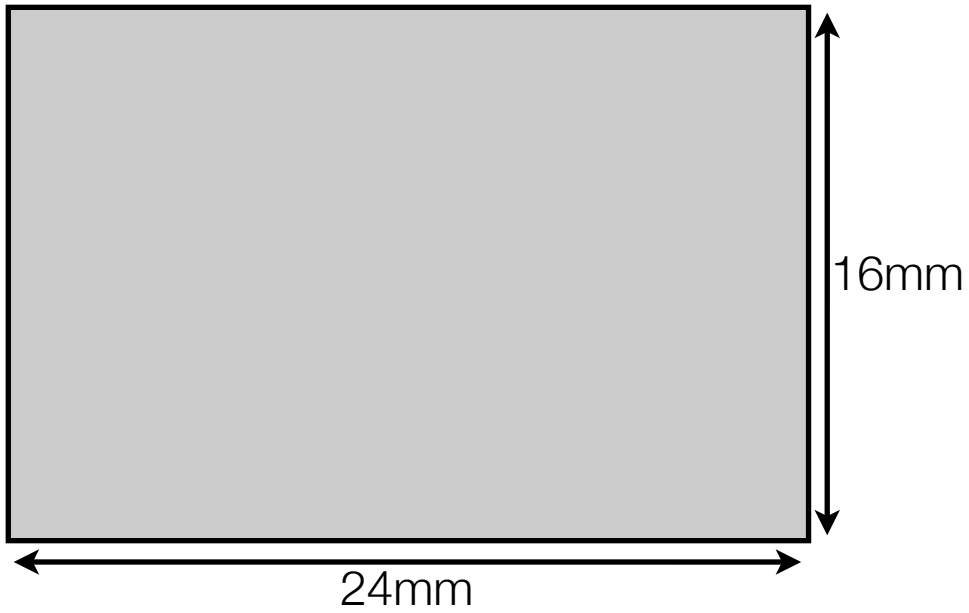


Image from http://en.wikipedia.org/wiki/Crop_factor

Review

Focal Length and Perspective





1/2.5”
6 MP

APS-C (SLR-sized)
6 MP

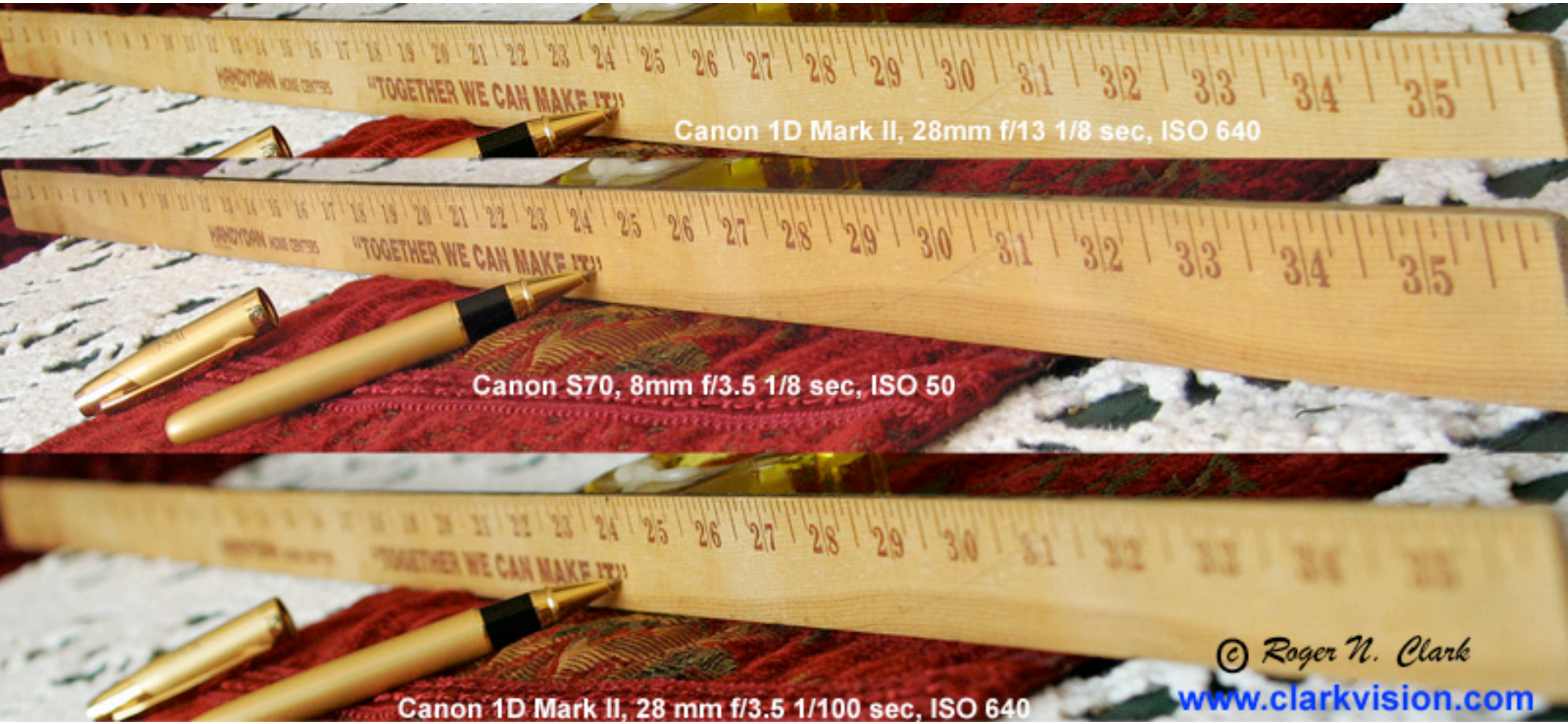
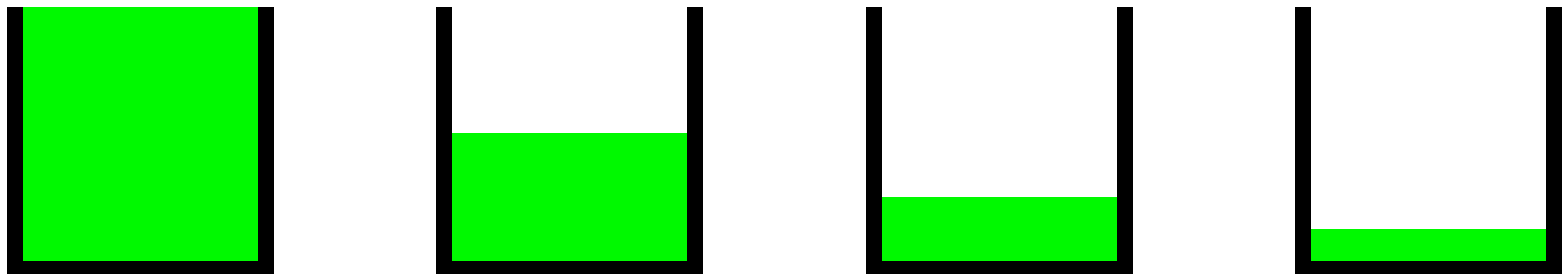


Image from http://www.clarkvision.com/photoinfo/dof_myth/

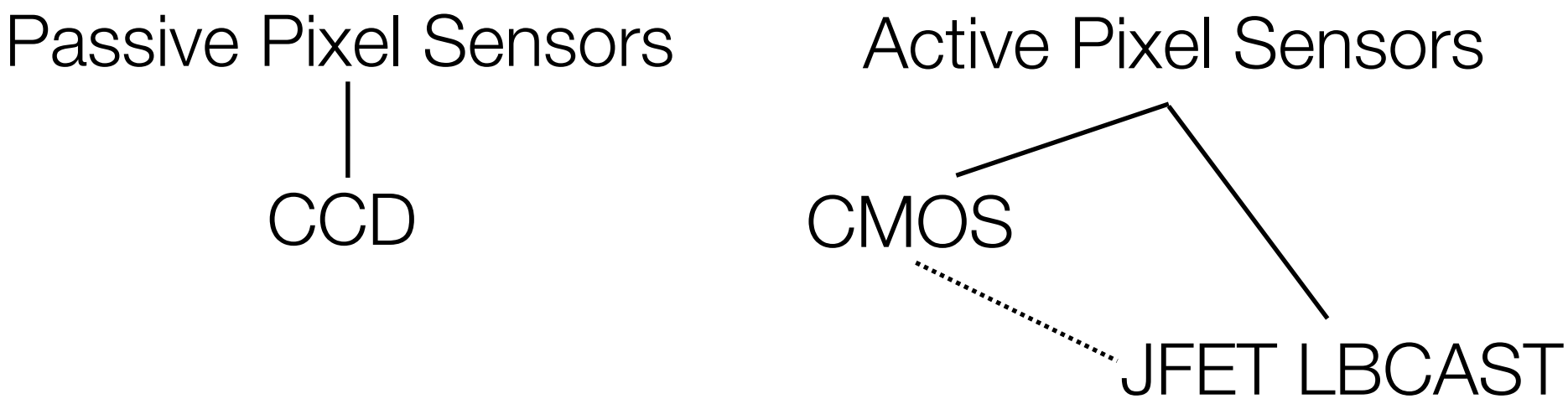
Review

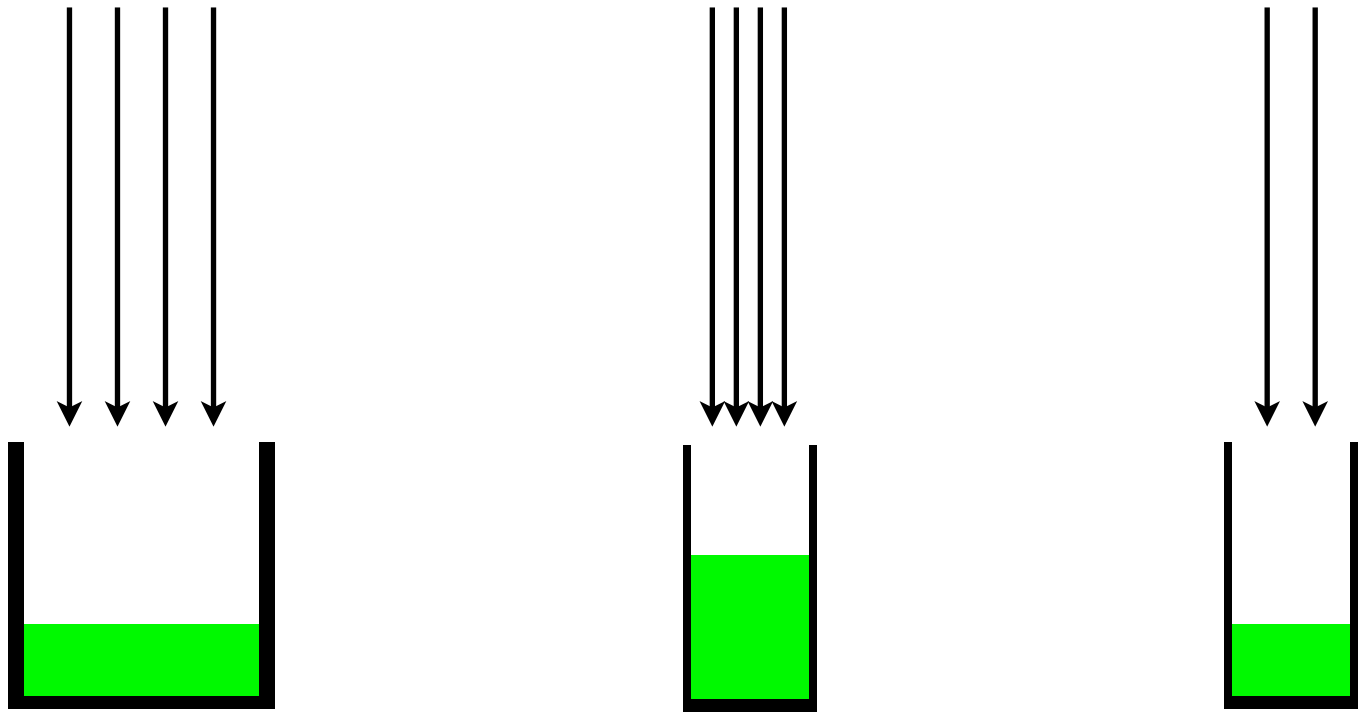
Depth of Field



Review

Full capacity of pixels at ISOs


Passive Pixel Sensors
CCD
Active Pixel Sensors
CMOS
JFET LBCAST



Sensors

Pixel Size

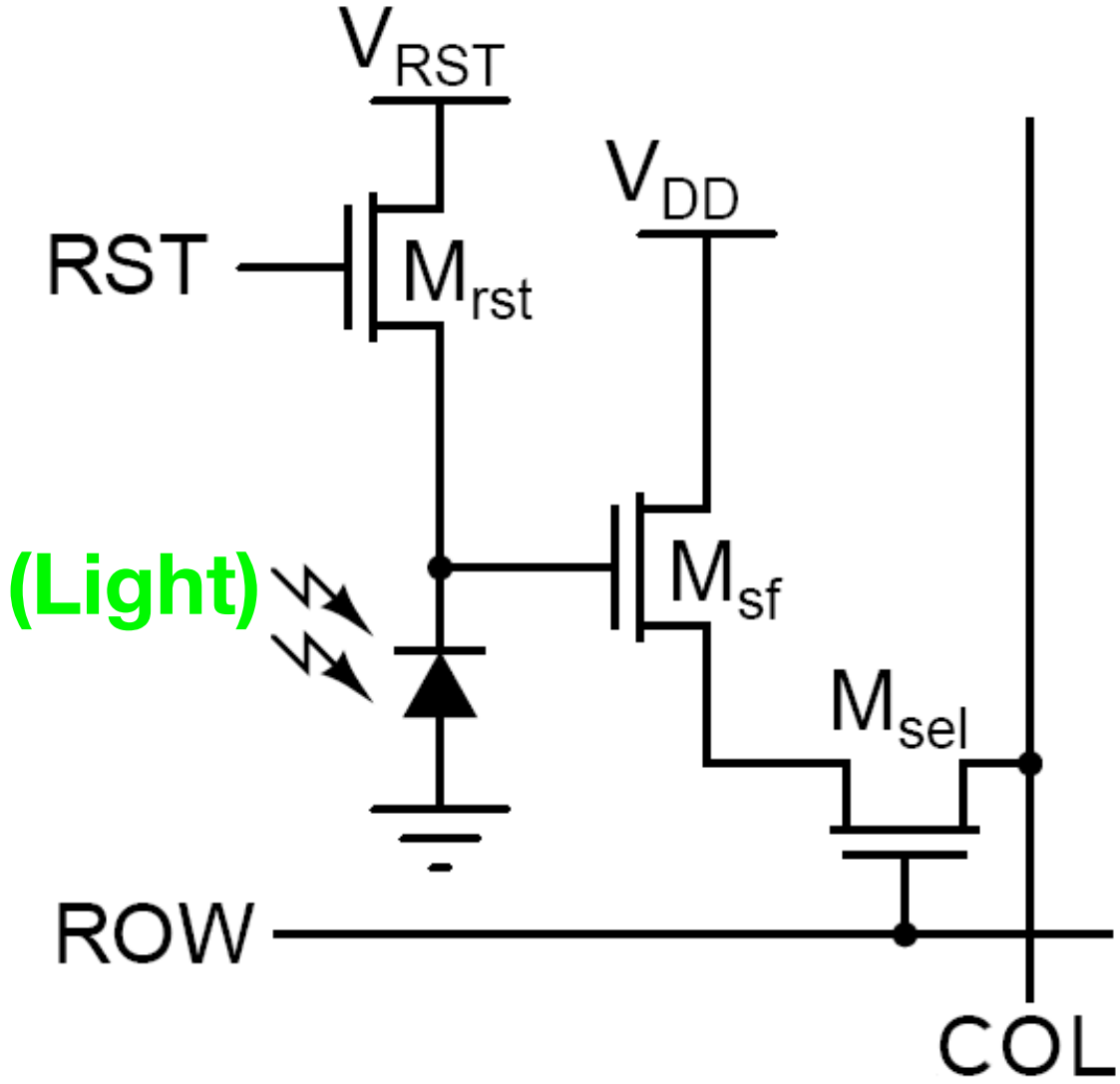


Image from http://en.wikipedia.org/wiki/Active_pixel_sensor

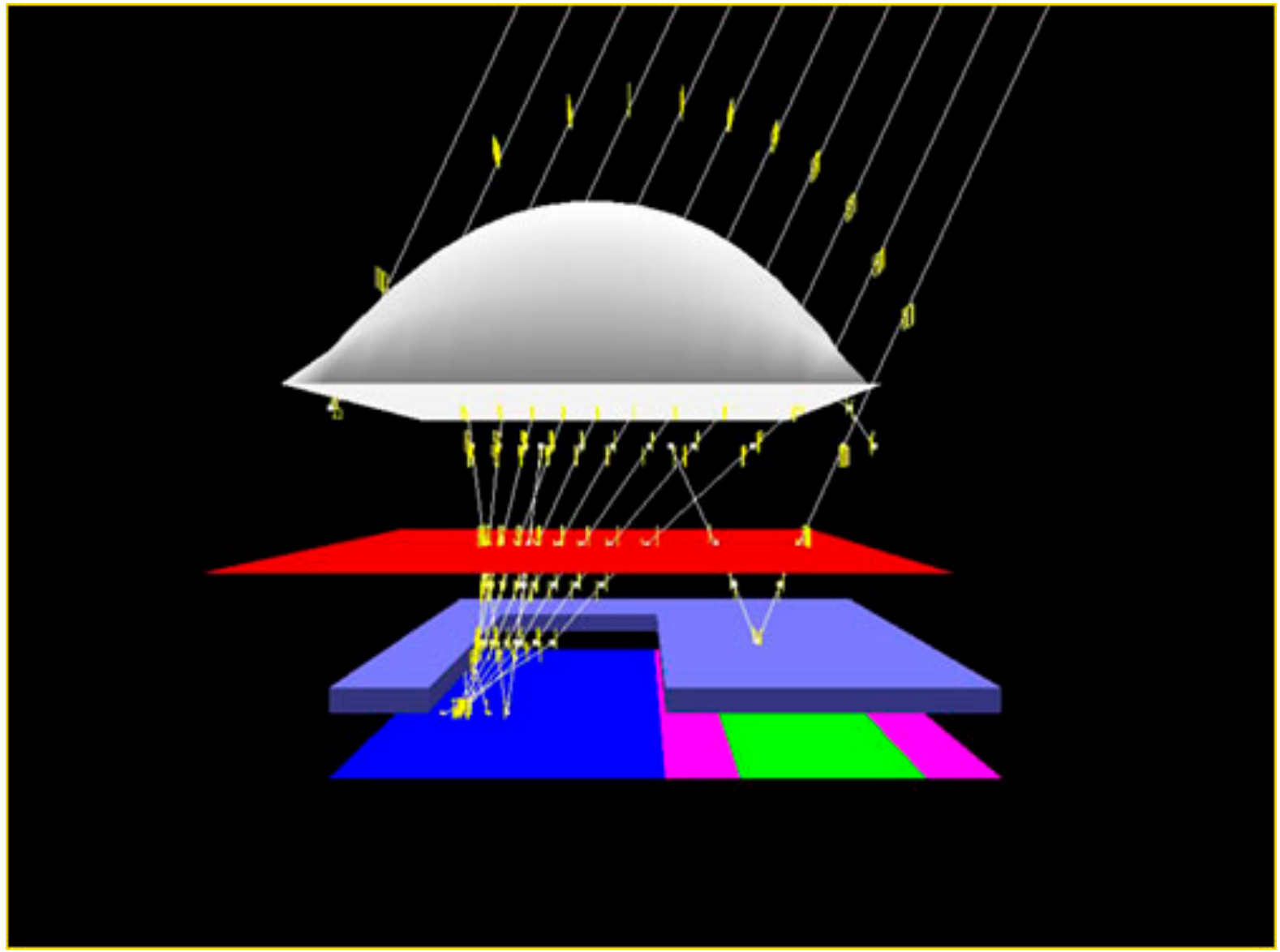


Image from Eastman Kodak, from http://www.luminous-landscape.com/essays/kodak-iss.shtml

Sensors

Microlens

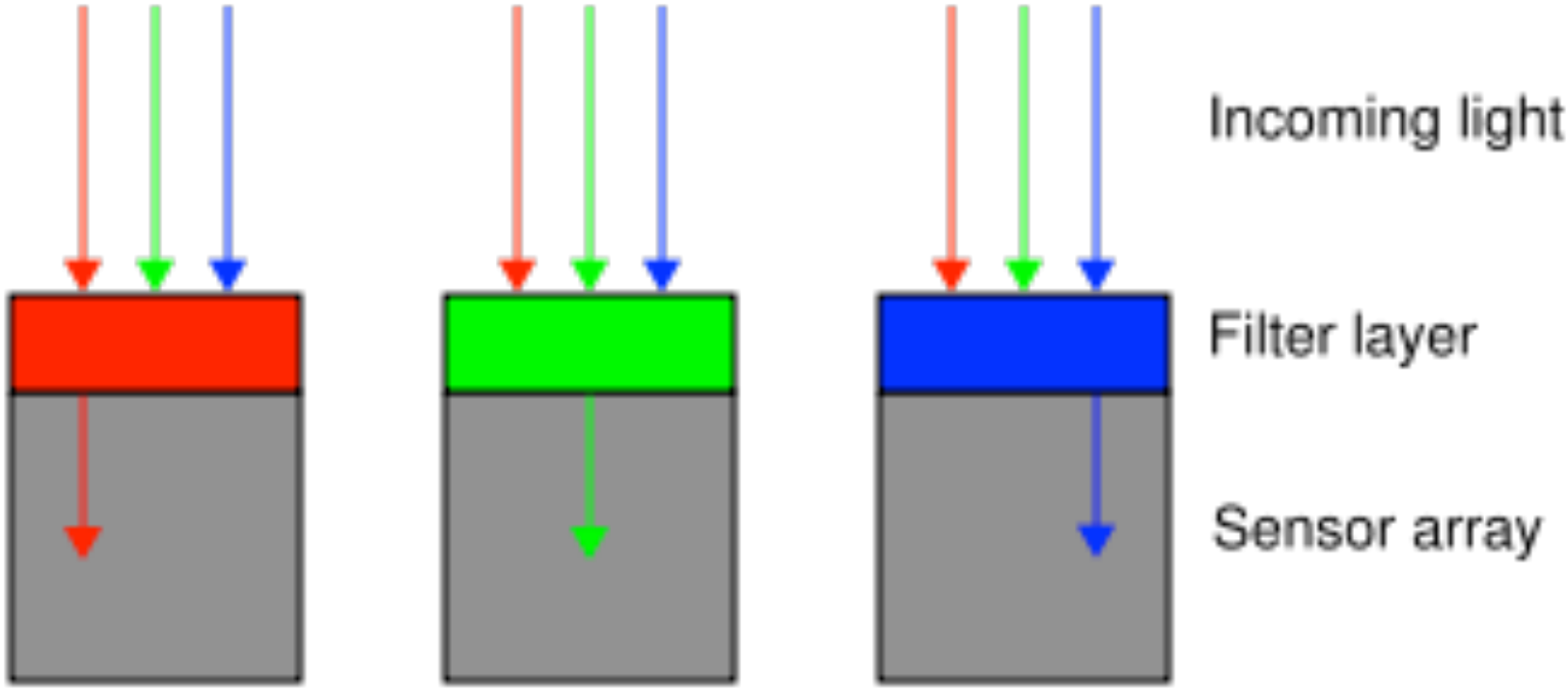


Image from http://en.wikipedia.org/wiki/Bayer_filter

Sensors

Color Filter Arrays

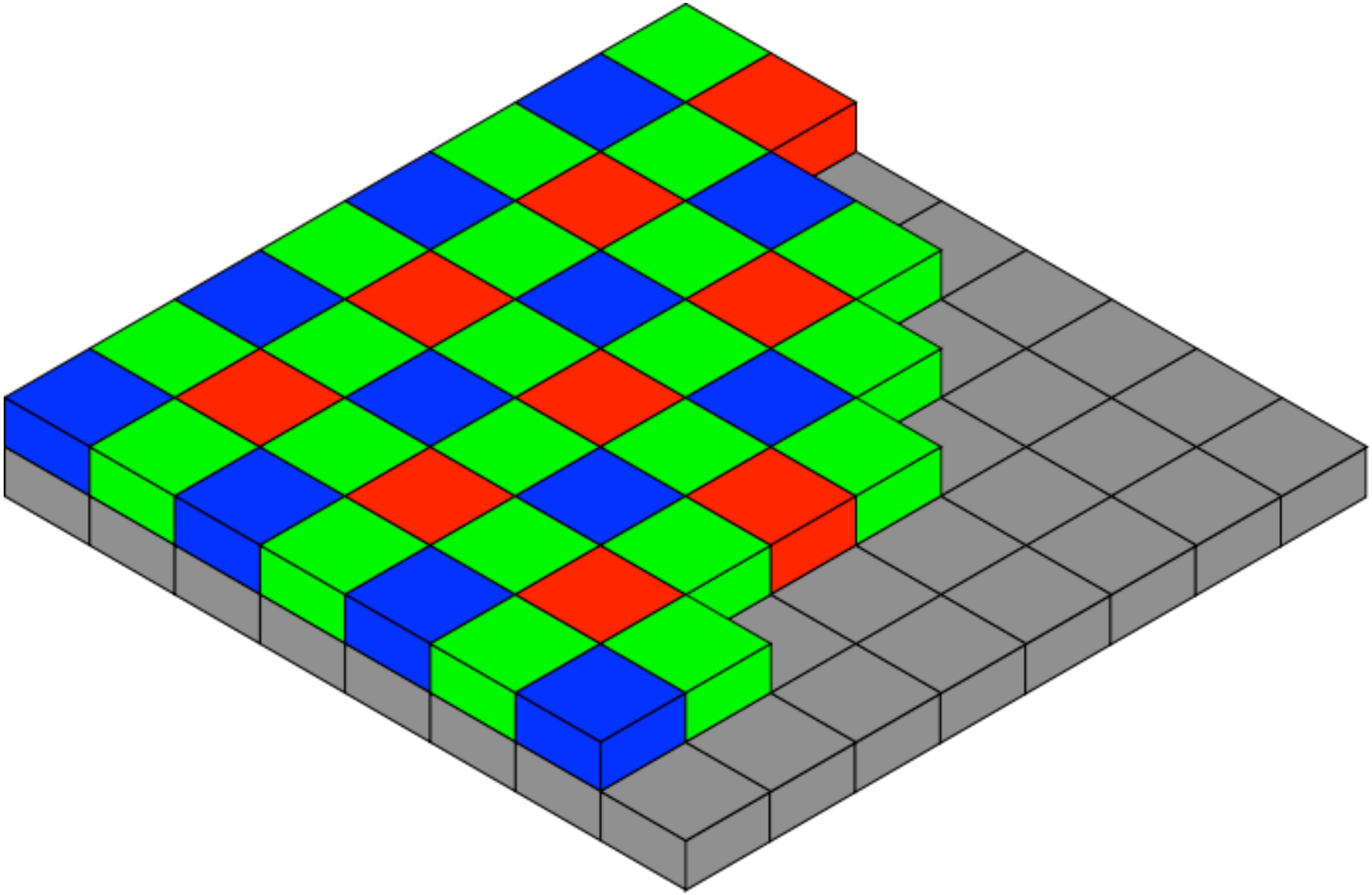
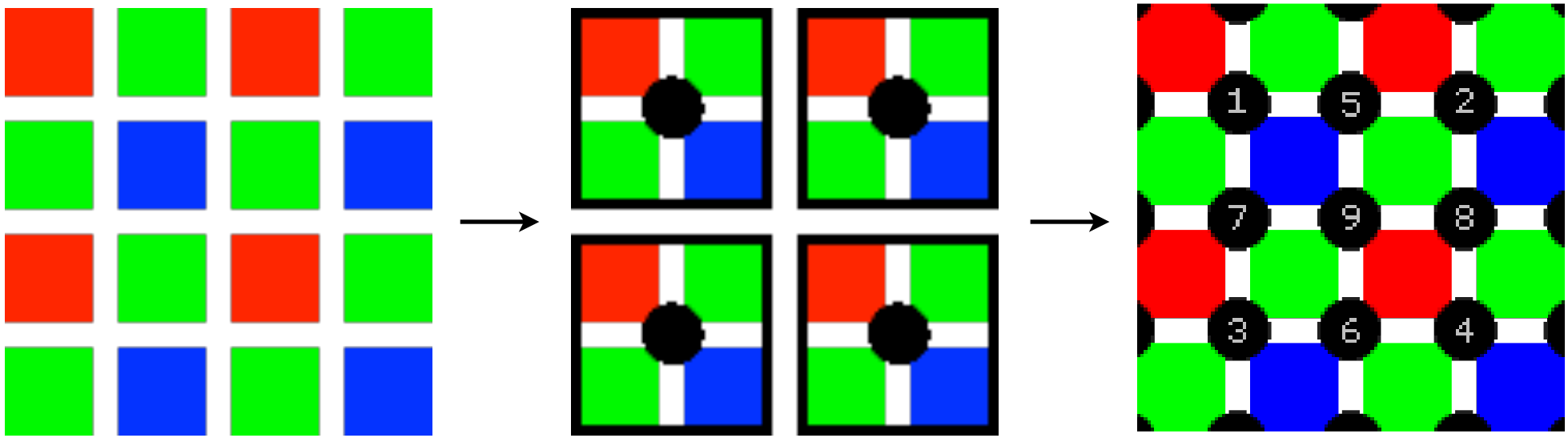


Image from http://en.wikipedia.org/wiki/Bayer_filter

Color Filter Arrays

Bayer Filter



Images from http://www.cambridgeincolour.com/tutorials/sensors.htm

Color Filter Arrays

Demosaicing

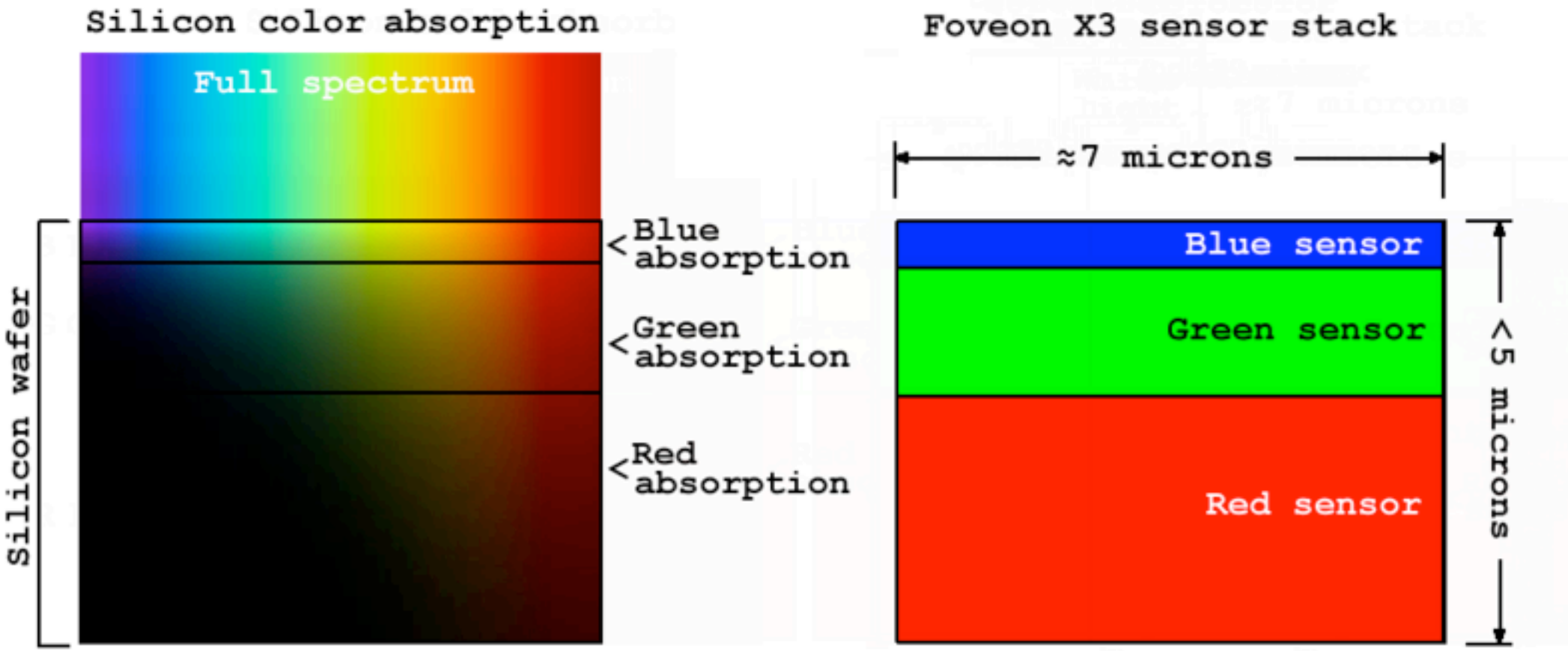
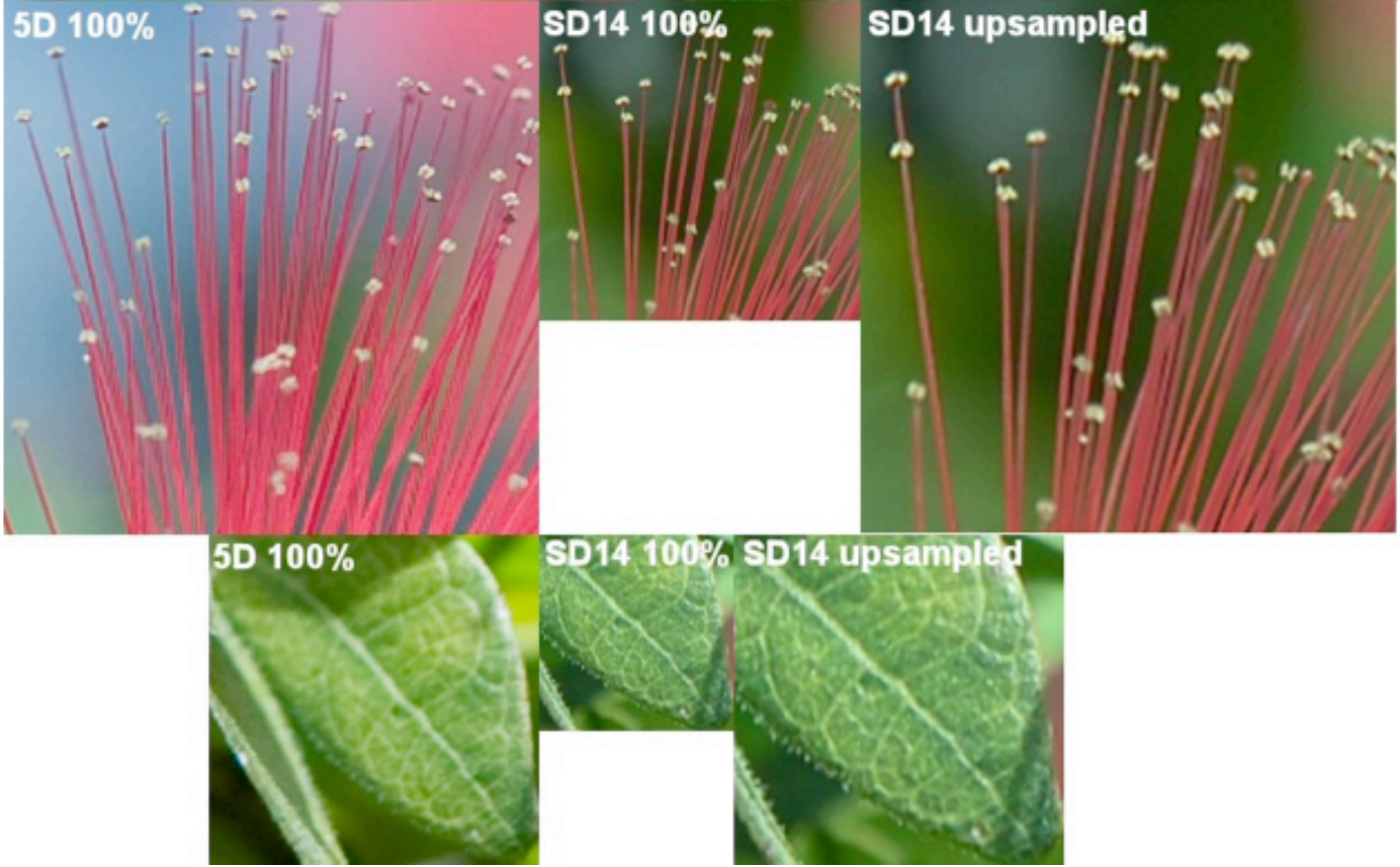


Image from http://en.wikipedia.org/wiki/Foveon_X3_sensor

Sensors

Foveon X3



Images from http://www.ddisoftware.com/sd14-5d/

Sensors

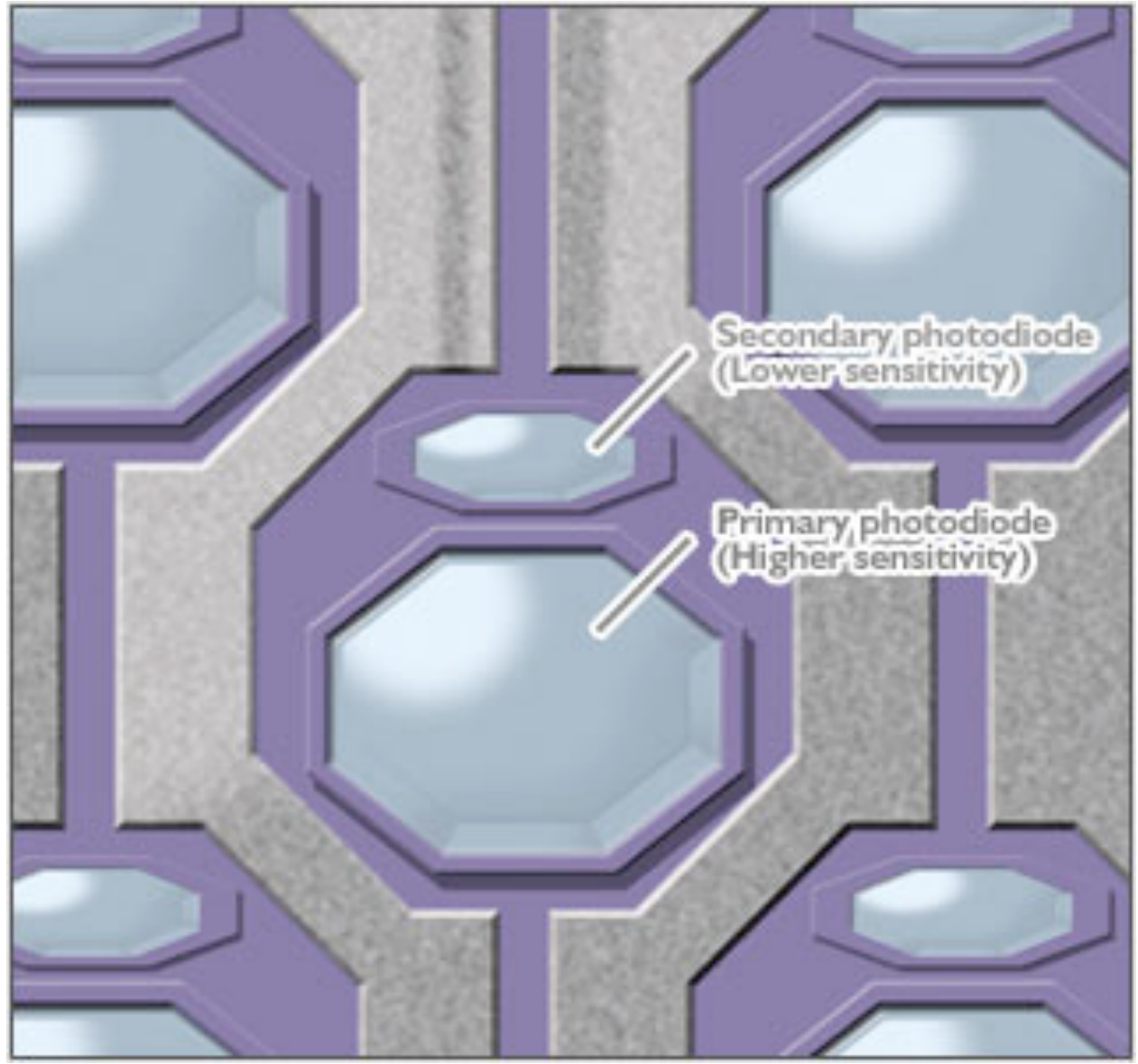
Foveon X3

Foveon

Bayer

Bayer+LP (AA)

Images from http://www.ddisoftware.com/reviews/sd9-v-bayer/



Images from http://www.dpreview.com/news/0301/03012202fujisuperccdsr.asp

Sensors

Fujifilm SuperCCD SR

309s, ISO 100

Photo by Dan Armendariz, 2009

Digital Cameras

Histograms

Images from http://www.dpreview.com/learn/?/Glossary/Digital_Imaging/dynamic_range_01.htm

Digital Cameras

Dynamic Range

Images from http://www.dpreview.com/learn/?/Glossary/Digital_Imaging/dynamic_range_01.htm

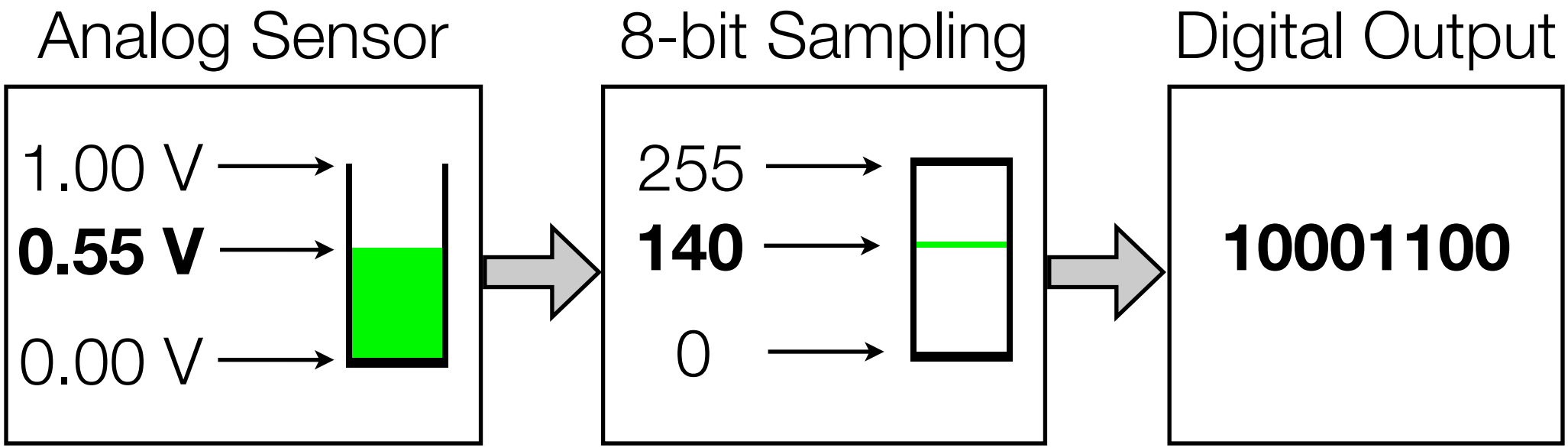
Digital Cameras

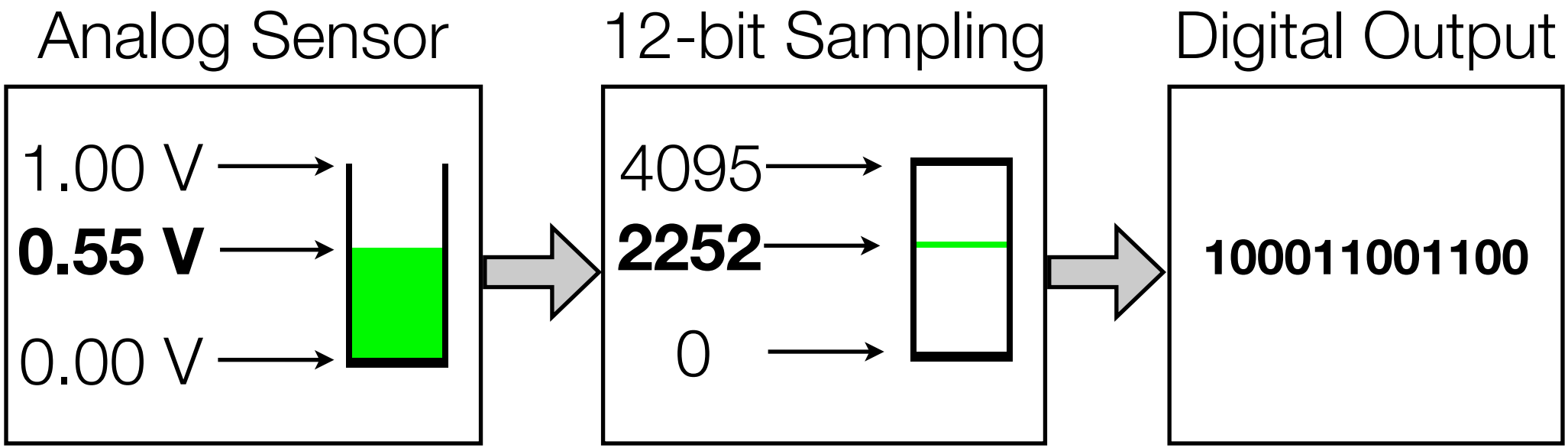
Dynamic Range

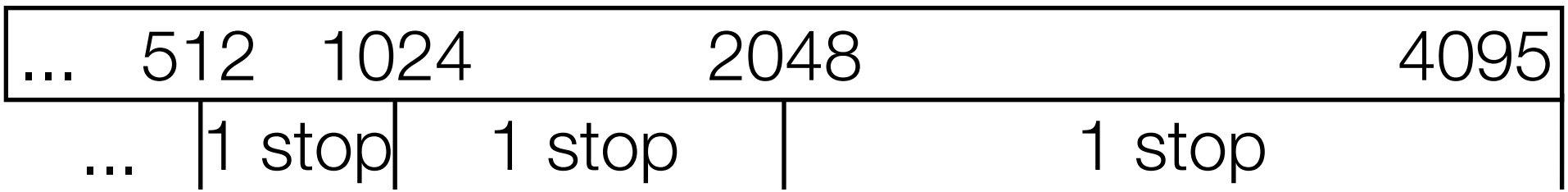
Bit	0 or 1
Byte	8 bits

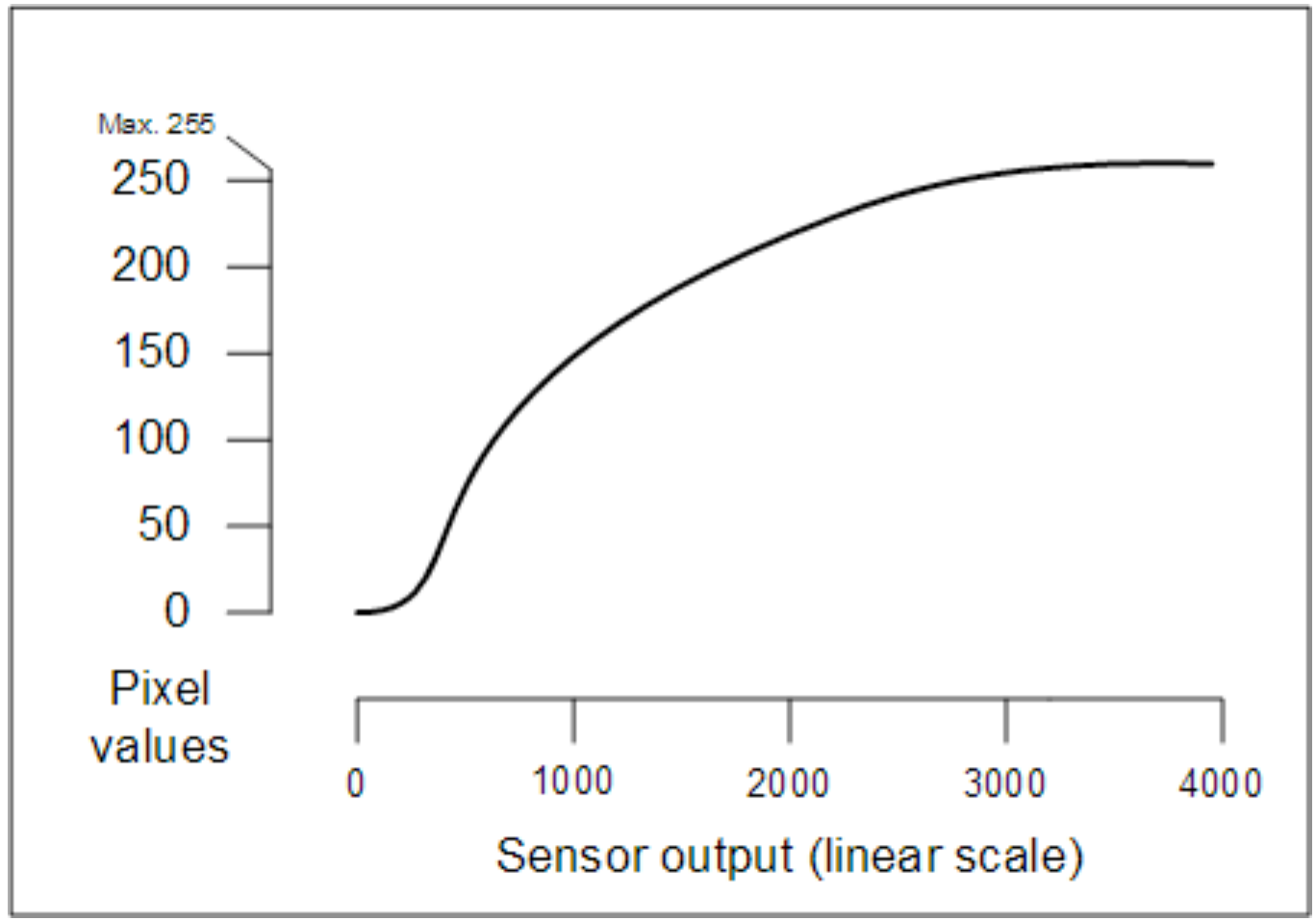
Bits and Bytes

Refresher


Analog Sensor
8-bit Sampling
Digital Output
1.00 V
0.55 V
0.00 V
255
140
0
10001100


Analog Sensor
12-bit Sampling
Digital Output
1.00 V
0.55 V
0.00 V
4095
2252
0
100011001100


... 512 1024 2048 4095
... 1 stop 1 stop 1 stop



Images from http://www.covingtoninnovations.com/dslr/Curves.html

Digital Cameras

Tonal Curve

	RAW	JPEG
Bit depth	10-, 12-, 14-bit	8-bit
Tonal Curve	Not applied	Applied
White Balance	Not set	Set
Compression	Lossless	Lossy
Portability	Nonstandard	Standard
Post-Processing	Required	Optional

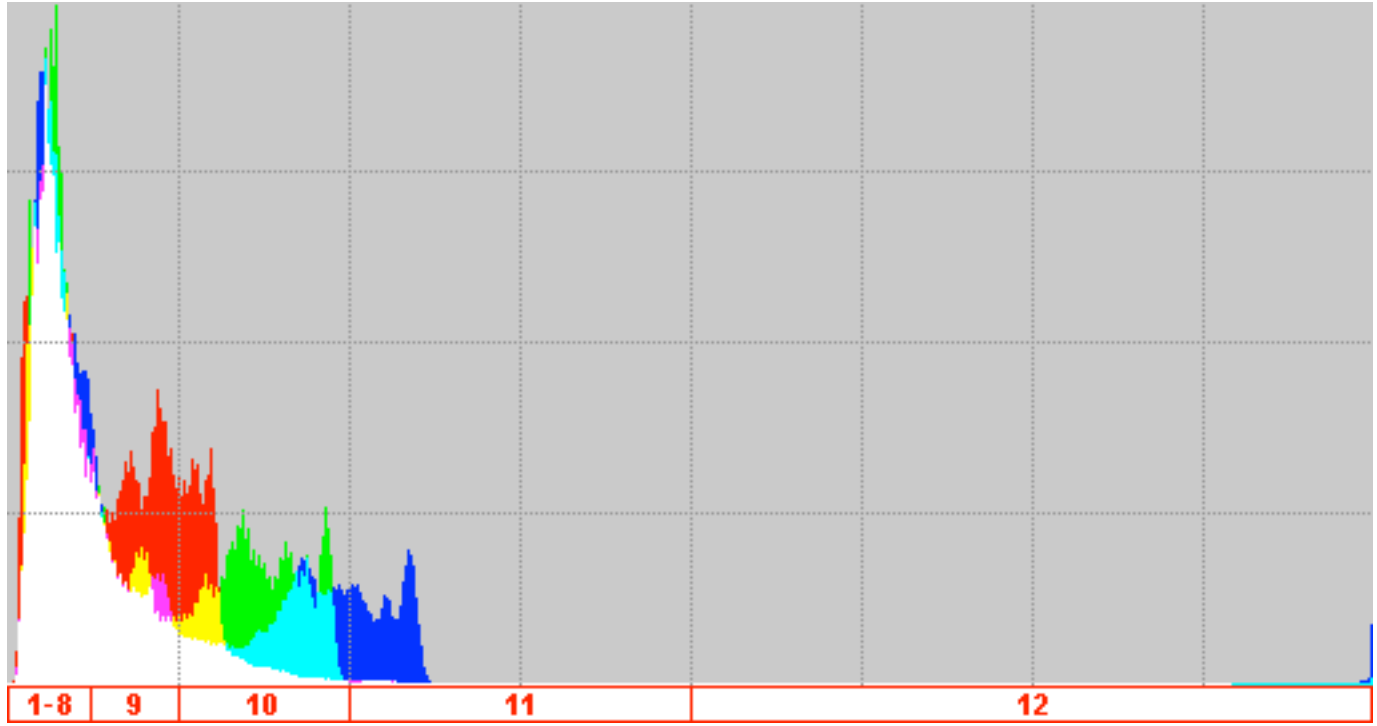


Image from http://www.guillermoluijk.com/tutorial/dcraw/index_en.htm

Digital Cameras

“Expose to the Right”

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November 2, 2010

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