

Explain the principles of modern color imaging.  
What is a color filter array? What is the  
demosaicing?

Michel Jean Joseph Donnet

# CCD structure

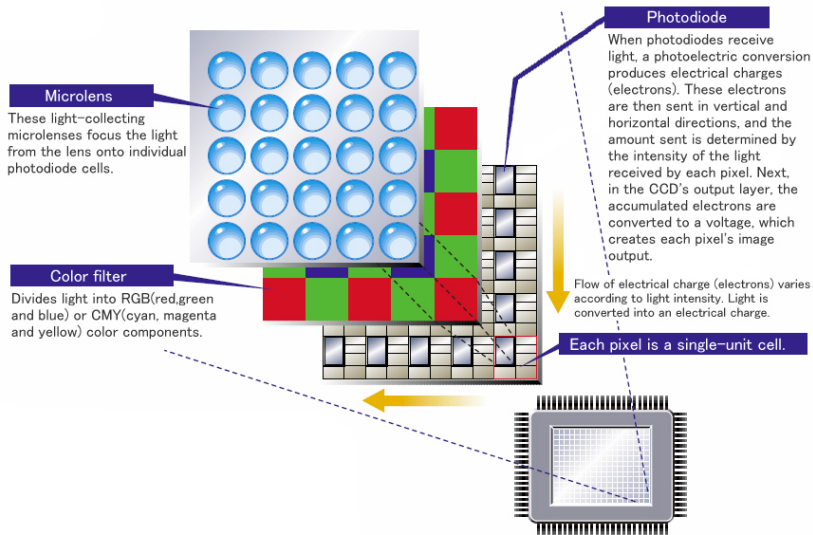


Figure 1: source: [av.jpn.support.panasonic.com](http://av.jpn.support.panasonic.com)

## New: Fovean X3 structure

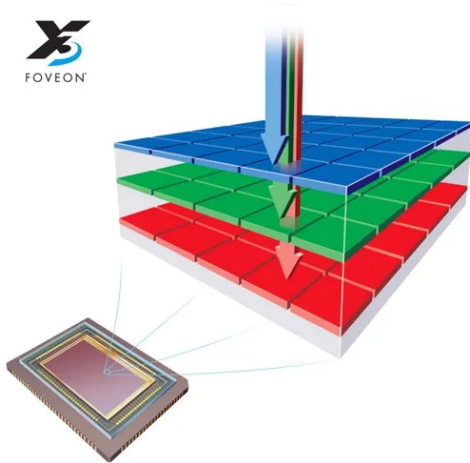


Figure 2: source: ymcinema.com

## 3-CCD architecture

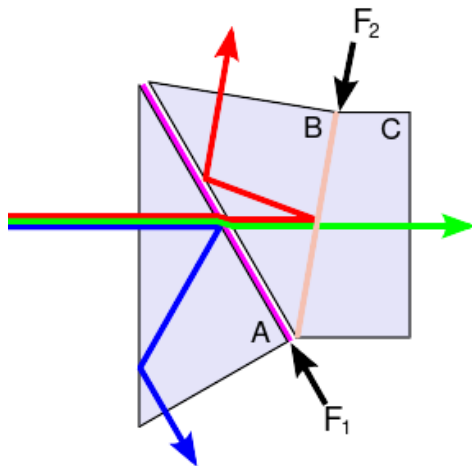


Figure 3: source: wikipedia

- ▶ pros: no light loss
- ▶ cons: expensive and difficult to produce

# CCD vs CMOS

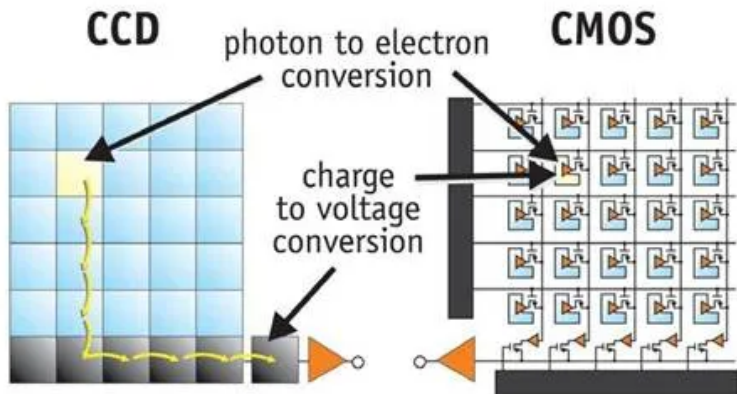


Figure 4: source: scienceshot.com

# Bayer filter

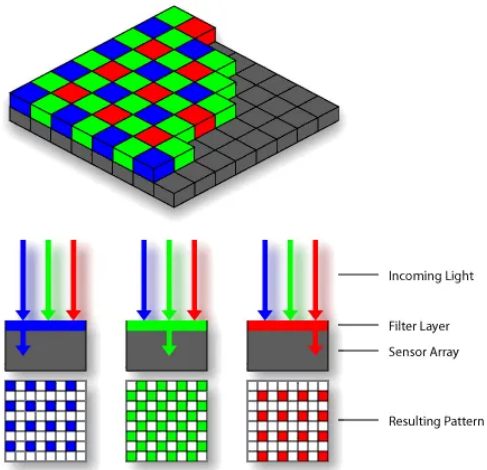


Figure 5: source: wikipedia

## Other filter

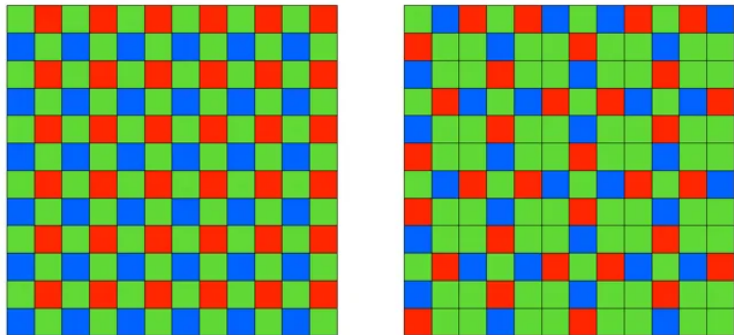


Figure 6: source: [pixelcraft.photo.blog](http://pixelcraft.photo.blog)

## Demosaicing: initial image



Figure 7: source: wikipedia



Demosaicing: image obtained by the bayer filter



Figure 8: source: wikipedia

## Demosaicing: result



Figure 9: source: wikipedia

# Demosaicing: methods

- ▶ Linear interpolation (naïve way)
- ▶ Machine-learning algorithms