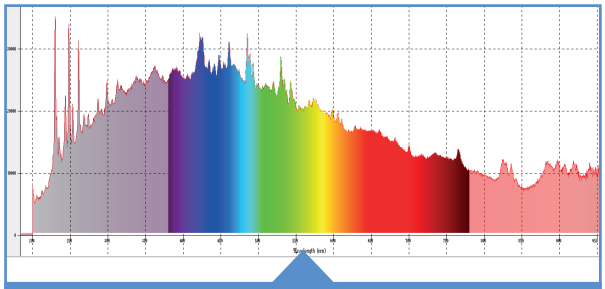
APPLICATION NOTE **#7**

LIGHT COLOR AND PHOTO ENFORCEMENT

For image capture in traffic enforcement applications, local regulations lead to constraints in terms of illuminator light color: bright white light to get well colored illuminated images, soft red light to reduce dazzling effect or IR light to make the flash illuminator invisible. On the other hand enforcement system integrators have to deal with image quality standards including sharpness or color rendering.

After an overview of technical background, this document will detail, through practical cases, possible combinations of cameras and illuminators.

Illuminators - colors and filters



Xenon Flash spectrum

Xenon Flash illuminators produce light essentially in the visible + IR range. UV is usually cut-out by the glass wall itself.

Filters

A spectrum can be narrowed by filtering to: Red+IR only, IR only... Filtering causes losses in light intensity.

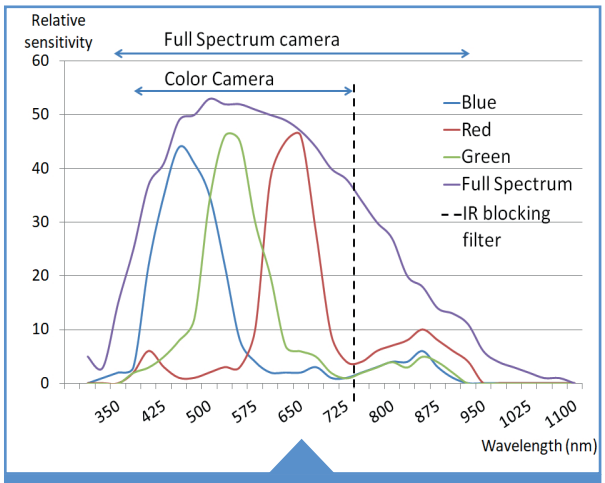
Cameras' relative spectral sensitivities

A color camera is fitted with a full spectrum sensor but:

- sensitivity is altered because of Blue, Red and Green filters positioned in front of pixels (called Bayer matrix) in order to actually detect color at sensor level.

- wavelength range of image capture is limited to the visible spectrum by an IR blocking filter positioned in front of camera sensor.

A full spectrum camera has a greater sensitivity than a color camera, but images are in grey shades and not in color



A typical camera's sensor is sensitive to a broadband spectrum from about 350 to 1000 nm

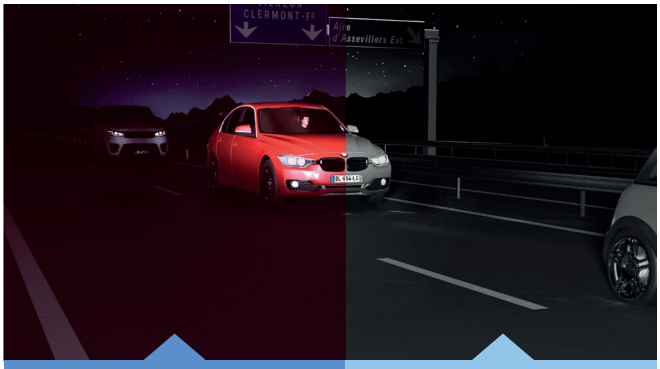
Practical cases of possible combinations of camera and flash

Goal #1: Capture a color image

Night time Full-spectrum flash Color camera	Daytime No flash Color camera

To get a clear color picture, a color camera and a full spectrum flash must be associated.

Goal #2: Avoid dazzling drivers



Night time Red flash Color camera	Night time Red flash Full spectrum camera

To reduce the dazzling effect, the flash spectrum can be limited to its red part, the color rendering being affected because of missing light in the blue region. Such a flash can be then associated with either a full spectrum camera to maximize sensitivity or a color camera.

Goal #3: Work with «invisible light»

Night time Infra Red flash Full spectrum camera	Daytime No flash Full spectrum camera

To make the flash invisible, the flash spectrum must be limited to its infra-red part. Sensitivity of color camera in that spectrum being very limited, a full spectrum camera shall be used.

Goal #4: Maximize sensitivity

Night time Full-spectrum flash Full spectrum camera	Daytime No flash Full spectrum camera

When local regulations entitle grey shades images, it is worth using a full spectrum camera so that the sensitivity is maximized and resulting images are brighter.