

Better edges

Beside a camera with a suitable sensor, the optics as well as the lighting system are the fundamental pillars for good image qualities and for this reason for reliable applications. A flash ensures well-illuminated and sharp images. In order that an unchanging illumination is guaranteed over long periods, digital lighting controllers are used. The following white paper shows, how lighting systems improve the image quality.

Introduction

The invention and the wide availability of LED technology as well as the existence of the three primary colors red, green and blue as LEDs marked a milestone in the history of lighting systems in the industrial image processing market. Above all, the **excellent price-performance-ratio**, the **long service life**, and the **robustness against vibration and dirt** paved the way for the success of the LED technology. **Short response times** are a further advantage of LEDs in contrast to fluorescent lamps and halogen lamps and make a synchronous flash in combination with image acquisition possible. The LEDs are so robust that there will be no damaging effect if you **switch them on and off repeatedly**. A positive side effect that a turn off will have is the fall of the temperature, which **will extend the service life of the LEDs**. Flashing is supported by the LEDs. I.e. for a short time it is possible to power the LEDs ten times higher than during continuous operation. The high light intensity **reduces the effect of extraneous light** and **provides sufficient light for short exposure times**. Consequently **motion blur can be minimized** in fast application. A lighting controller like the vicolux DLC3005 from Vision & Control ensures the right current pulse (voltage, current, duty cycle).

Assembly of the sample application with lighting controller

Reading fonts and codes on packagings are common applications especially in the pharmaceutical and medical domain. Following components are used for the assembly of the sample application:

1. One smart camera mvBlueGEMINI
2. One bar light „LAL14x100-B470/UDC/-a“ from Vision & Control
blue, directed, luminous field 14mm x 100mm
3. One lighting systems „vicolux DLC3005“ from Vision & Control

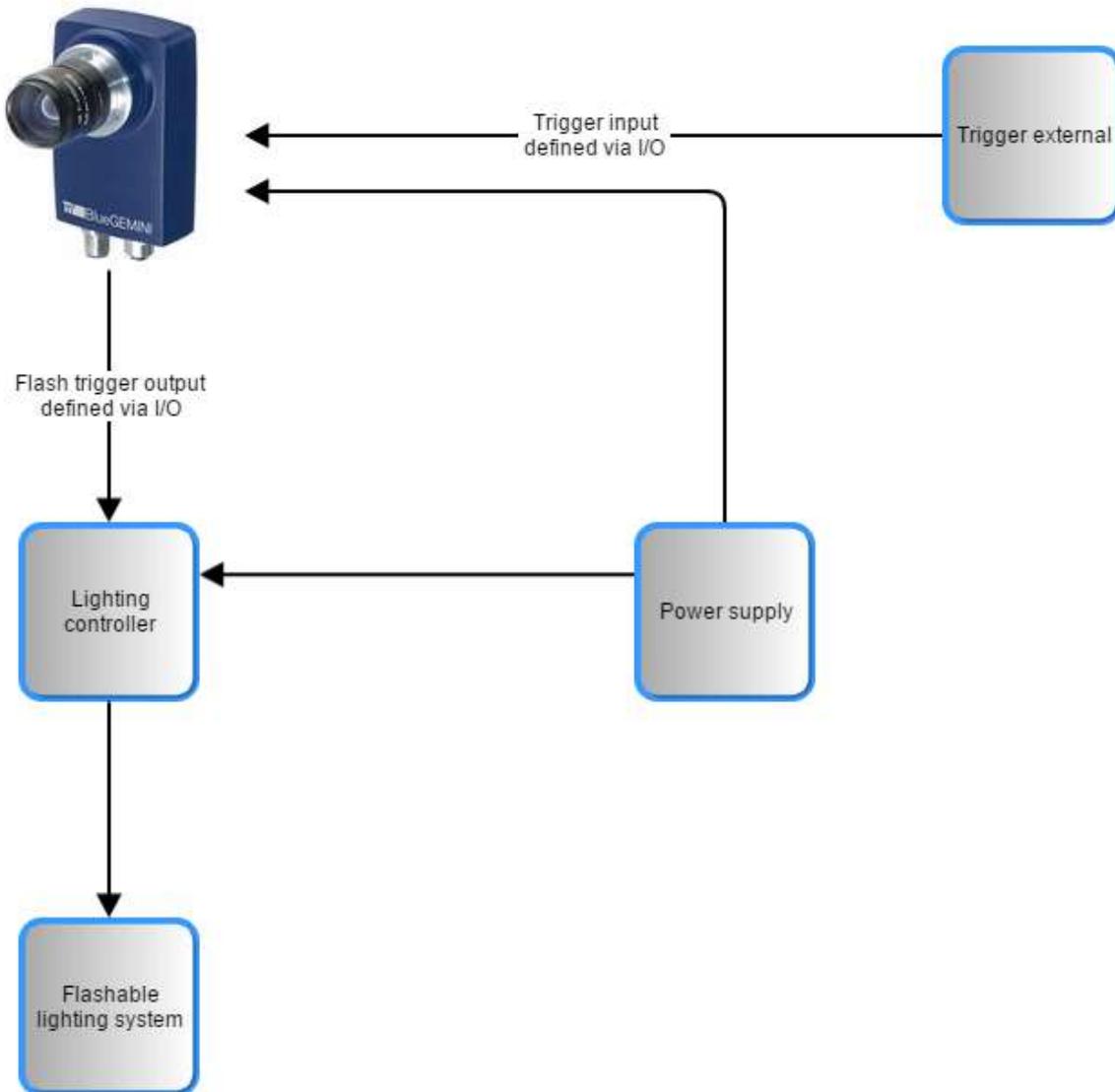


Figure 1 Assembly of the sample application

The distances between

1. camera and package: 370mm
2. package and bar light (hypotenuse): 190mm
3. package and bar light (adjacent): 100mm

Flow chart of the sample application with lighting controller



A snap with ambient light will look like the following:



Figure 2 Packaging with ambient light

The result looks great for the human eye. The industrial eye will also be able to read most of the areas, but almost all edges are blurry which will lead to inaccuracies and for this reason to a bad reading quality.

Using a flash, the result will look as follows (the flash was triggered by the mvBlueGEMINI smart camera):



Figure 3 Packaging with flash light

You can see that the gray scale values are eliminated and the image becomes clearer.

A closer look makes differences in quality visible:

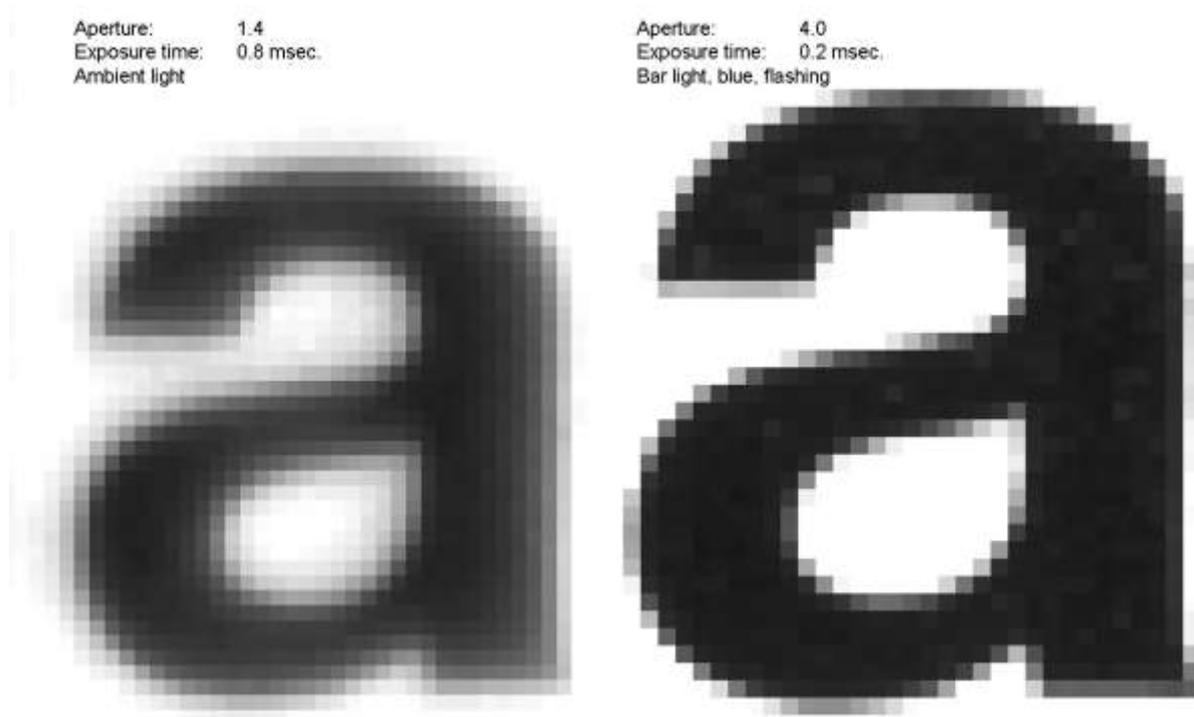


Figure 4 Comparison of the acquired images

Because of the flashing, it is possible to adapt two parameters of the acquisition. First of all, it is possible to reduce the exposure time (in the sample 0.2 milliseconds), which **minimizes outside interferences like vibrations**. Secondly, a smaller aperture or a larger aperture value (4.0) can be used. I.e. less light reaches the sensor which leads to a **better depth of field**. And by the way, the effect of extraneous light is reduced.

Conclusion

Applications which use a flash supply a better basic material for the downstream image processing. The sample images clearly show the effect. By using a digital lighting controller it is possible to control the lighting exactly. Constant currents guarantee constant illumination and as a result constant images.