

**GigE**<sup>PRO</sup>

*Onboard processing power.*

GIGABIT ETHERNET CMOS CAMERAS FOR INDUSTRIAL VISION

**neto**  
NEW ELECTRONIC TECHNOLOGY

# GigEPRO – ONBOARD IMAGE PROCESSING

GigEPRO – re-defining “efficient image processing”.

## GigEPRO - GigE/CMOS SERIES

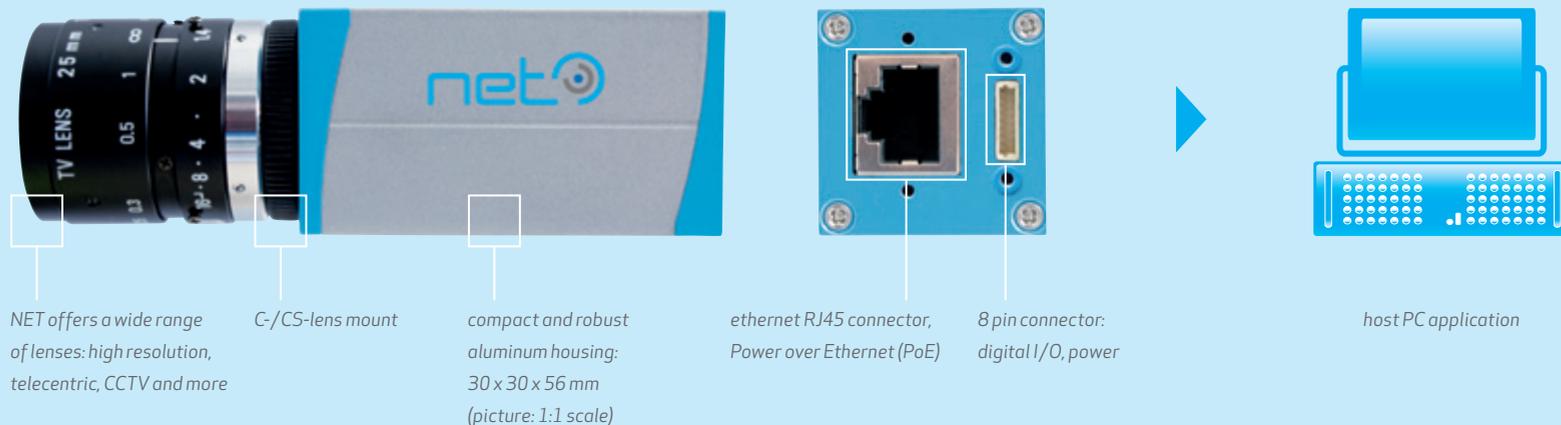
NET's GigEPRO cameras feature advanced real-time image processing functionality and full GigE Vision standard, GenIcam and GenTL compliancy to serve most different industrial applications. With GigEPRO cameras customers can choose from already available NET image processing functions, apply own image processing functions or even decide for a combination of all in order to achieve efficiency improvements in image processing. GigEPRO delivers great benefit to industrial applications by adding image processing functionalities

to a solid and compact digital camera. The cameras can realize performance improvements in any industrial application which uses the GigE Vision standard. The NET image pre-processing library offers a set of image processing functions fully described in the GenIcam compliant XML standard. Additional specific image processing tasks for custom applications are available on request. The industrial camera is also offered as “open camera” allowing the customer to add image processing functionalities to the camera by himself.

When applying high performance and cost effective microelectronics there is great potential to balance image processing tasks between the camera and the host PC in a more efficient way. The camera is able to take over image processing steps, like pre-processing and extraction, from the host PC and set free or minimize additional processing demand. This applies especially in operations running on full sensor size.

Efficient partitioning of image processing tasks between camera and PC: GigEPRO takes over pre-processing and extraction steps from the host PC

sensor processing >>> customer specific processing >>> GigE transmission up to 100m >>> pre-processing >>> extraction >>> interpretation >>> decision



# TECHNICAL DATA - GigE/CMOS CAMERAS

## PRODUCT OVERVIEW

GigEPRO cameras are equipped with color, mono-chrome and high quantum efficiency (NIR) CMOS image sensors with resolutions from 0.36 to 10 megapixel. These sensors allow high speed frame rates at full resolution. Its sensors comprise global shutter for fast moving objects and rolling shutter,

also with global reset image readout, to capture images with outstanding signal quality. As sophisticated image analysis functions, and overall or global image processing functions become quite complex and might be impossible to perform on a host PC at reasonable cost, the camera is offered

with different FPGA options. GigEPRO customers are free to decide on the optimal software and hardware configuration which really improves their specific application goal. Thus, there are virtually no limits to the advanced image processing capabilities of GigEPRO.

| MONOCHROME/COLOR        | GP1041M   | GP1041C        | GP4136M   | GP4136C | GP4136IR | GP4206M  | GP4206C | GP1305C                   | GP1503M                | GP1503C      | GP11004M                | GP11004C |
|-------------------------|---|----------------|---|---------|----------|--|---------|---------------------------|------------------------|--------------|-------------------------|----------|
| Resolution (H x V) [px] | 752 x 480 / WVGA  |                | 1280 x 1024 / SXGA                                    |         |          | 1600 x 1200 / UXGA                                 |         | 2048 x 1536 / QXGA        | 2592 x 1944 / QSXGA    |              | 3840 x 2748 / WQUXGA    |          |
| Sensor                  | CMOS  |                | CMOS  |         |          | CMOS   |         | CMOS                      | CMOS                   |              | CMOS                    |          |
| Image sensor            | MT9V032   |                | EV76C560  |         | EV76C661 | EV76C570   |         | MT9T001                   | MT9P031                | MT9P001      | MT9J003                 |          |
| Sensor size             | 1/3"  |                | 1/1.8"  |         |          | 1/1.8"   |         | 1/2"                      | 1/2.5"                 |              | 1/2.3"                  |          |
| Pixel size [µm]         | 6.00 x 6.00   |                | 5.30 x 5.30   |         |          | 4.50 x 4.50  |         | 3.20 x 3.20               | 2.20 x 2.20            |              | 1.67 x 1.67             |          |
| Frame rate [fps]        | 86  |                | 60  |         |          | 50   |         | 12                        | 15                     |              | 7.5                     |          |
| Shutter                 | global  |                | global; rolling; global reset                         |         |          | global; rolling; global reset                      |         | rolling with global reset |                        |              |                         |          |
| Shutter speed           | 24 µs - 763 ms  | 62 µs - 745 ms | 31 µs - 1030 ms                                       |         |          | 31 µs - 1030 ms                                    |         | 56 µs - 50 s              | 85 µs - 89 s           | 74 µs - 77 s | 146 µs - 135 s          |          |
| Dynamic range [dB]      | 55  |                | 62  |         | 63       | 62   | 61      | 70                        |                        | 65           |                         |          |
| Binning                 | 2 x 2 / 4 x 4   |                | 2 x 2   |         |          | 2 x 2  |         | 2 x 2 / 4 x 4             | 2 x 2 / 4 x 4          |              | 2 x 2 / 4 x 4           |          |
| Skipping                | -   |                | 640 x 512 / 320 x 256<br>multiple ROIs / user-defined |         |          | 640 x 512 / 320 x 256<br>multiple ROIs / user-def. |         | 1024 x 768 /<br>512 x 384 | 1280 x 960 / 640 x 448 |              | 1920 x 1344 / 960 x 640 |          |
| Aspect ratio            | 14:9  |                | 5:4   |         |          | 4:3  |         | 4:3                       | 4:3                    |              | 4:3                     |          |
| Gain [dB]               | 12  |                | 24  |         |          | 24   |         | 18                        | 18                     |              | 18                      |          |
| Lens                    | C- / CS-mount   |                |   |         |          |  |         |                           |                        |              |                         |          |
| Scanning system         | progressive scan  |                |   |         |          |  |         |                           |                        |              |                         |          |
| Trigger                 | external, software, timer based, counter based  |                |   |         |          |  |         |                           |                        |              |                         |          |
| Strobe                  | sensor, trigger, software, timer based, counter based                                     |                |   |         |          |  |         |                           |                        |              |                         |          |
| Interface               | Gigabit Ethernet according to GigE vision standard / 1Gbps                                |                |   |         |          |  |         |                           |                        |              |                         |          |
| Dimension (WxHxD) [mm]  | 30 x 30 x 56  |                |   |         |          |  |         |                           |                        |              |                         |          |
| Power consumption [W]   | 2.5 to 4 (depends on hardware option)   |                |   |         |          |  |         |                           |                        |              |                         |          |
| Operating temperature   | 0 to +45°C  |                |   |         |          |  |         |                           |                        |              |                         |          |
| Power supply            | PoE or 9 - 24VDC on AUX connector   |                |   |         |          |  |         |                           |                        |              |                         |          |
| Cable connector         | 8 pin (power supply 9-24 V + digital I / O)   |                |   |         |          |  |         |                           |                        |              |                         |          |
| Digital input / output  | opto decoupled (5 to 24 V) single input (hardware trigger), dual output (hardware strobe) |                |   |         |          |  |         |                           |                        |              |                         |          |

# APPLICATION & SOFTWARE

Ask us for a matching vision solution!

## APPLICATION OVERVIEW

NET's GigEPRO cameras target a wide application range in industrial vision. The camera design qualifies i.a. for alignment control, surface- and printing inspection, edge and contour analysis, bar code and data matrix, access control, security encryption, traffic control and many others.

## IMAGE PROCESSING FUNCTIONS

The NET image pre-processing library offers a set of image processing functions to GigEPRO. All library functions are described in the GenICam compliant XML standard camera description file:

- high end de-mosaicing/de-bayering
- full color matrix and color correction
- geometric correction
- gain offset correction
- flatfield correction
- temporal noise reduction (TNR)
- 1D and 2D image filtering

Many image processing tasks can't be carried out with a single generic function covering all customer needs. Therefore NET offers specific

image processing tasks on request, amongst others the following typical classes of image processing tasks:

- image segmentation: thresholding, boundary based, region based, template matching, texture based, color based
- binarization: global/local linear or adaptive threshold, edge level
- laser 3D algorithms: threshold, maximum and COG
- barcode & 2D matrix detection
- image compression: JPEG and RL (Run Length)

## CAMERA CUSTOMIZATION

GigEPRO features the concept of an "open camera". This allows experienced customers and system integrators to customize the camera with proprietary in-house algorithms and the development of products targeted for niche machine vision applications. The development and test of customer algorithms takes place on a development platform, which NET supplies together with a development toolkit to program embedded core within cameras.

## SOFTWARE DEVELOPMENT KIT (SDK) & 3<sup>RD</sup> PARTY SOFTWARE

SynView, the included SDK, is compliant with GigE Vision, GenTL and GenICam (with XML files) standards and runs under Win XP/7 and Linux. It supports the programming languages C, C++, .NET environment and enables quick integration into existing customer systems. The setting and evaluation of image data is achieved by means of various functionalities for camera calibration, preview, image evaluation and code examples. NET supports all GenTL consumer image processing libraries, i.a. Adaptive Vision Studio, Halcon, VisionPro, LabView Vision, and MATLAB.

SynView – quick image setting and evaluation



before/after: 3-step face detection

### NET New Electronic Technology GmbH

Lerchenberg 7  
86923 Finning, Germany  
Tel: +49 8806 9234 0  
Fax: +49 8806 9234 77  
info@net-gmbh.com  
www.net-gmbh.com

### NET Italia S.r.l.

Via Carlo Pisacane, 9  
25128 Brescia, Italy  
Tel: +39 030 5237 163  
Fax: +39 030 5033 293  
info@net-italia.it  
www.net-italia.it

### NET France

a branch of NET New  
Electronic Technology GmbH  
Tel: +33 450 45 22 92  
Fax: +49 8806 9234 77  
info@net-france-sas.fr  
www.net-france-sas.fr

### NET USA, Inc.

3037 45<sup>th</sup> Street  
Highland IN 46322, USA  
Tel: +1 219 934 9042  
Fax: +1 219 934 9047  
info@net-usa-inc.com  
www.net-usa-inc.com

### NET Japan Co., Ltd.

2F Shin-Yokohama 214 Bldg.  
2-14-2 Shin-Yokohama, Kohoku-ku,  
Yokohama-shi, 222-0033, Japan  
Tel: +81 45 478 1020  
Fax: +81 45 476 2423  
info@net-japan.com  
www.net-japan.com

**NET - We simplify complicated technologies by making them easier to use.**

Our strengths are the close understanding of the industrial and medical image processing field and the in-depth application knowledge which we have acquired over many years. Camera technology, CCD and CMOS technology, FPGA programming, hardware and software design are our core skills which we can tap within the company. Our innovative portfolio is supplemented by a wide range of standard and customized lenses and light systems.