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ProcImage500-Eagle – MONOCHROME VERSION

**505 fps
1280 x 1024
direct to PC
via
USB 3.0**

NEW

SMART HIGH SPEED CAMERA
ProcImage500-Eagle
MONOCHROME VERSION

High speed video – Smart triggers
Embedded image processing

Based on a motherboard with a FPGA ZYNQ, a 512 MB DDR3 and a USB 3.0 interface, the ProcImage500-Eagle offers all the features to perform high speed video.

It also implements smart triggers to optimize movie capture, and embedded image processing in real time to transfer only useful data.
Just use a standard PC with USB 3.0. No need for a specific acquisition card.

Main specifications

- Sensor resolution: 1280 x 1024 pixels
- 505 fps at full resolution and more with ROI*
- Configurable ROI in size and position
- Monochrome
- Real time recording on hard drive
- Abilitiy to process images in real time into the camera and/or the PC
- Embedded programmable component ZYNQ from Xilinx
- Internal memory, DDR3 of 512 MB
- Microprocesseur ARM® dual-core Cortex™-A9
- Abilitiy to implement custom IP** inside the FPGA
- I/O: Trigger In/Out, Synchro In/Out, Strobe Out
- Smart Triggers (option)
- Embedded image processing (option)
- Standard USB 3.0 interface
- Simultaneous operation of several ProcImage500-Eagle on the same PC
- Long duration recording (several hours)
- Camera control by EyeMotion Software
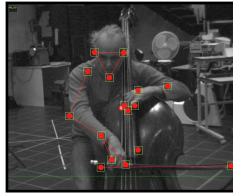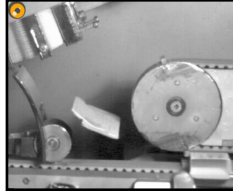
*Region Of Interest   **Intellectual Property
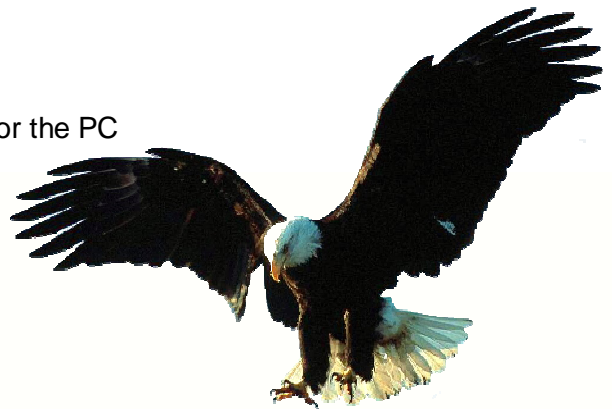
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Application area

- Production line monitoring
- Bio-imaging
- Robotics
- Research
- Biomechanics
- Medical
- Sports
- ...

Applications

- Troubleshooting
- Process and quality control
- Dynamic feedback loop for fast events
- Augmented imaging
- Tracking of points of interest
- Recognition of image with classifier
- Image stabilization
- 2D-FFT
- Development of new imaging methods
- Sports coaching
- Rehabilitation

Operation modes

- **Standard high speed camera mode :**

- Configuration of ROI, exposure time and frame rate
- Direct recording to drive or to internal PC memory
- Recording duration up to several hours according to the disk memory
- Recording either in continuous or buffer mode
- Trigger, event markers, manual / automatic start and stop by TTL signal or images analysis
- Slow motion playback
- Saving in proprietary format, .mov, .avi, images sequences

- **Smart high speed camera mode :**

The ProcImage500-Eagle integrates a FPGA with enough space and processing features to realize in real time embedded image processing on a data stream up to 625 MB/s (maximum speed of the sensor).

The Xilinx $^{®}$ FPGA Zynq ^{TM}-7020 combines both the raw real-time parallel processing power of an Artix^{TM}-7 and the flexibility of a microprocessor ARM dual-core cortex^{TM}-A9.

The internal configuration of this FPGA is not freezed. It is possible to reprogramm it to perform real time custom image processing either by our engineers or by users with VHDL skills.

In this case, we can supply to users a HDK (Hardware Development Kit)
to give access to the FPGA and implement their own custom IP.
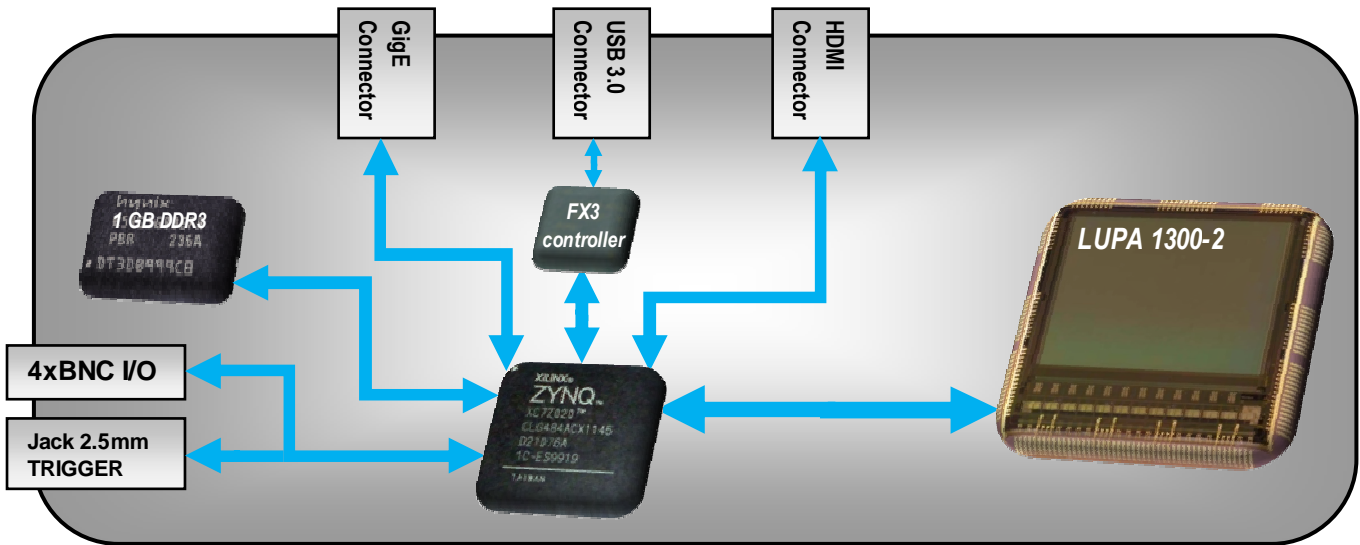
- **Stand alone camera mode :**

In this mode the ProcImage500-Eagle can can make in real time an embedded image processing previously recorded in the FPGA without any connection with a computer.
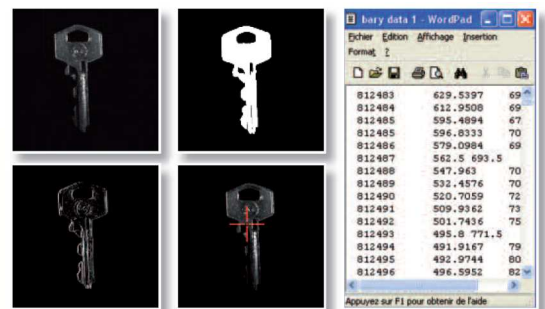
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ProcImage500-Eagle architecture

These abilities are used to realize image triggers, lossless compression and as example binarisation of images, on the fly data generation like blobs edge or barycenter coordinates.

Frame rate vs resolution (pixels) :

typical resolutions	A_1 – fps	B / C_2 – fps
1280 x 1024	250	505
1280 x 512	500	1000
1280 x 256	990	1980
1280 x 128	1930	3870
648 x 518	840	1680
312 x 250	2770	5540
1008 x 1008	300	610
768 x 768	500	1000
504 x 504	1040	2080
240 x 240	3320	6640

A : Direct recording to disk of 8 bits-images.
B : Direct recording to disk of lossless compressed 8 bits-images.
C : Direct recording to disk or transfer the image processing outgoing data to a program with a data rate < 350 MB/s.

[1] Because of the USB 3.0 bandwith and the drive write speed, the maximum frame rate is limited.

[2] In lossless compression mode, images presenting high noise areas can lead to trouble and limit this mode use.

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Sensor specifications :

- Sensor : CMOS LUPA1300-2
- Resolution H x V : 1280 x 1024 pixels
- Pixel size : 14 x 14 µm
- Sensor size / diagonal : 17.92mm x 14.34mm / 22,.95mm
- Frame rate at full resolution : 505 fps and more with ROI.
- Global shutter
- Minimum shutter time : 2 µs
- Wavelength range : 400 – 1000 nm
- 8 bits monochrome
- 10 bits with HDK

Hardware specifications :

- Motherboard for :
  - image processing : image A → image B
  - data analysis : image A → data
  - image understanding : image A → high level description output from image or data
- FPGA : Xilinx® Zynq™-7020 with ARM dual-core Cortex™-A9 and Artix™-7
- Memory : 512 MB
- Communication interface : - USB 3.0
  - Ethernet
- I/O : Trigger In/Out, Synchro In/Out, Strobe Out
- Opto-coupled inputs, TTL max 5V
- Trigger mode : internal, contact closure, TTL (max 5V)
- Internal slot for Pmod board
- External power supply : Input AC 100-240V Output DC 12V / 500 mA
- Option: supply of an HDK : Hardware Developper Kit with drivers for SRAM, sensor and USB 3.0, example code included. Enables the implementation of embedded proprietary IP in the FPGA
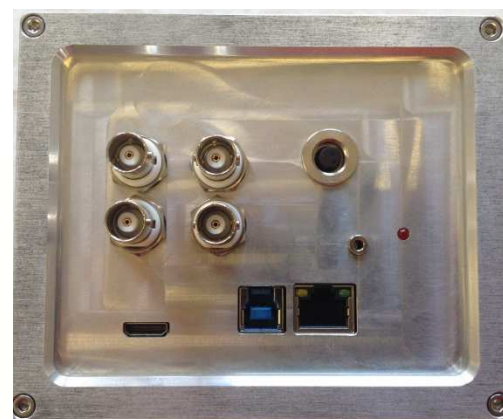
Mechanical specifications :

- Camera size : 12.5 x 10.1 x 10.2 cm (without connectors and lens)
- Camera weight : 1.4 kg
- Lens mount : F or C-mount
- Threaded holes for camera tripod or M4, down-side, upside
- Working temperature : +5°C…+40°C
- 4 BNC connectors for I/O
- 1 mini-jack 2,5 mm connector for remote switch trigger
- 1 USB3.0 type B connector
- 1 HDMI connector
- 1 Ethernet connector
- 1 power supply connector

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EyeMotion software specifications

- Camcorder function : camera setup, acquisition, save, playback
- Save format : .eye, .mov, .avi, .bmp, .tiff, .png, .jpeg / quick save : .qye
- Factory setting ROI* or user adjustable in size and position
- Setting of the HDR** parameters
- Histogram display
- Management triggers : hardware, software, UDP (data packet), others ProcImage cameras...
- Trigger setup : rising/falling edge, event marker
- Trigger position in the sequence : start, stop, frames before or after
- User adjustable display parameters: brightness, contrast, gamma, white point, black point
- Simultaneous displaying of synchronized videos
- Overlay of videos with opacity adjustment
- Selection of discontinuous frame ranges
- Compatible with Windows XP (SP3 required), Vista, 7, 8
- Supports native 32-bit and native 64-bit to handle memory spaces larger than 4 GB
- Software Development Kit (SDK) available on request
  * ROI: Region Of Interest   ** HDR: High Dynamic Range

Options

- Scheduler : integrated software tool in EyeMotion to schedule your video captures

- External cameras :
  - management of Webcams compatible with the OpenCV library
  - management of IP camera JVC VN-H37U

- Smart triggers
  - from a sound taken by the computer's microphone
  - image trigger

- Embedded image processing
  - image processing carried out in real time at high speed in the camera's FPGA
    · thresholding / binarization   · profile (surface), (edge), (center)   · multi centroid
- Post-processing (EyeMotion 2D)
  - graphical tools with dynamic overlay of data, text, shapes, images and films for tracking and reporting
  - calculation and export of positions, speeds, accelerations, lengths, angles
  - automatic recognition of markers, blob type, disc type
  - user configurable skeleton tracking

- Lens calibration
  - correction of lens image distortion [1]

[1] Camera and lens return is required as calibration takes place in the factory.

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Related services

FPGA programming service for development and implementing of custom IP*.

From your images and a description of your image processing needs, our study team can assess the feasibility of your requirement and send you a quote.
* Intellectual Property

Based on the ProcImage500-Eagle, custom high speed intelligent camera manufacturing.
Contact us.

References order

Reference camera : ProcImage500-Eagle

- All options listed previously can be ordered individually.
- After purchasing the camera, adding an option is possible at any time.
- Graphical tools and EyeMotion2D can be provided as single license per seat.

Items supplied with each camera

- "EyeMotion" software
- Camera licence
- High speed USB cable, length 2.0 m
  (USB type B male – USB type A)
- Remote switch trigger with mini jack connector
  2.5 mm
- Installation manual

Minimum recommended PC configuration

- 7200 rpm hard disk, or SSD
- For long duration recording,
   write speed > 315MB/s
- 4 GB RAM
- 2 GHz processor
- Windows 7 or later
- USB 3.0 native interface

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