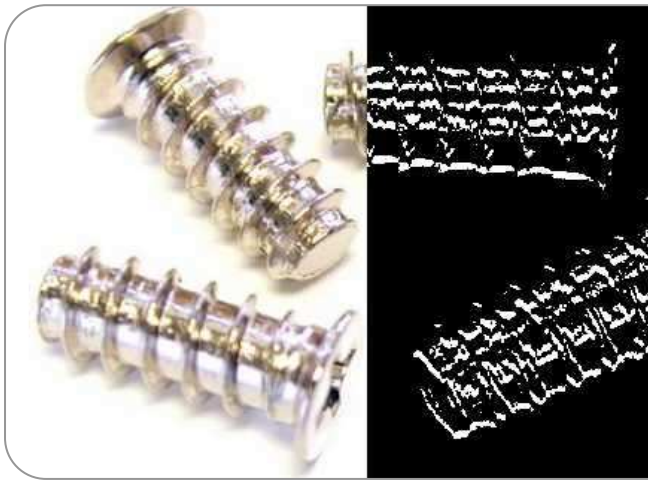
Mikrotron FPGA Sobel Filter

Faster through Focus on the Essential

- **FPGA onboard algorithm for MC1324 Camera**
- **Data reduction by more than 80%**
- **Increased transfer rate via GigE: 500fps* at 1280x1024**
- **High speed analysis via standard network**
- **Real time object identification, structure, position and motion analysis**
- **Parameterizable for a wide range of applications**



Less is More

At high speed imaging, normally incurred data amount is enormous. A single full frame at 1280 x 1024 resolution requires 1.3 MB of data capacity. 80 frames per second mean a transfer rate of 660 Megabyte per second. Using standard hardware equipment, the limits of what is technically possible are reached soon.

However, full picture information is not always essential in industry and research. Applications as movement analysis, position determination or object identification often require not more than certain defined specifications, as edges, object areas or coordinates. Anything else would deflect from what is really important, extend time-to-effect, and unnecessarily require valuable PC performance.

Data Reduction by Onboard Analysis

The Mikrotron FPGA-Sobel Filter reduces the information given by a full resolution monochrome image to what is really important. Programmed by Mikrotron as efficient algorithm directly to the camera's FPGA (field programmable gate array), it performs essential analysis tasks as edge-, object- and position determination, real time within the camera.

Data transfer from camera to PC is considerably minimized: While 80 frames per second at full 1280 x 1024 resolution is maximum rate via GigE in non-filtered modus, FPGA-Sobel filtering increases data rate up to 500 frames per second at full resolution. That enables real time processing by PC with no frame grabber required.

Mikrotron Sobel Filter is activated by just one click, and easily parameterized by user interface.

3 filter modi are provided:

- **Edge mode for determination of object structures**
- **Object fill mode for object classification**
- **Coordinate mode for object position and motion analysis**

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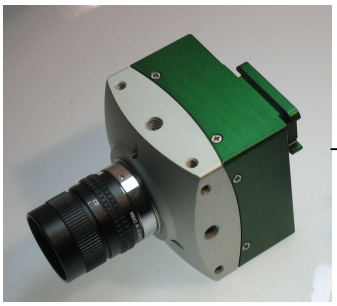


Grey value
intersections
parameterizable

8 bit/pixel

1.3 MB / frame
Max 80 fps*
104 MB/s

From 8 Bit down to 1 Bit: Edge and Object Fill Mode

3x3 Sobel filtering analyses an image's grey value intersections and reduces them to binary object edges. Sensitivity of intersections can be freely parameterized by user interface.

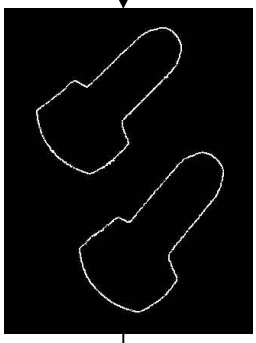
Pixel contents are reduced from 8 bit per pixel down to 1 bit, resulting in a binary image with data amount minimized by a multiple.

At binary object fill mode, coherent edges are filled automatically to fast classifiable objects.

Binary edge image
parameterizable for
object determination

1 bit/pixel

162,5 KB / frame
max 500 fps*
81 MB/s



As Matters Stand: Real Time Object Coordinates

In motion and position analysis of fast moving objects, speed is more than essential.

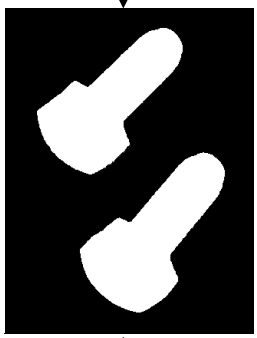
The Sobel Filter's coordinate mode achieves unprecedented transfer and performance speed by further reducing image data to the core that matters.

For up to 512 objects, coordinates are onboard calculated by object area, centroid, and left upper/right lower object edge. For each object, coordinate information is transferred from camera to pc in 20 byte clusters, at 500 frames per seconds.

Filled objects binary
image
object classification

1 bit/pixel

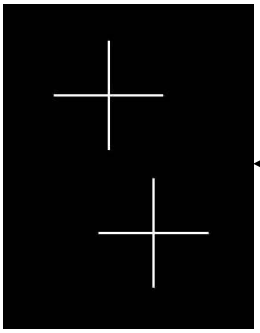
162,5 KB / frame
max 500 fps*
81 MB/s



Binary image
object coordinates
motion analysis
position determitation

20 byte / object
max. 512 objects

10,2 KB / frame
max 500 fps*
5,1 MB/s



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