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Night Vision Algorithm

The Technology provides a new and outstanding method for the enhancement of the quality of dim images. Inspired by the spatial integration of visual information in nocturnal insects, the algorithm successfully enhances the contrast and brightness of dim images and removes noise while preserving fine details and object contours. The patented system is applicable to field programmable gate arrays (FPGA) or image processors, which offer parallel computing capabilities. A wide variety of capabilities and markets from automotive sector to the enhancement of diagnostic images can be addressed.

BACKGROUND

There are many methods available for contrast enhancement and noise reduction of image data. However, most of these algorithms are rather complex and operate at the spatial and frequency domain of images. To dramatically increase the computing speed, this image enhancement algorithm operates at the pixel level and can be implemented on an image processor chip (e.g. FPGA chip) to enable parallel computing.

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The method improves the contrast and brightness of under-exposed images and removes the noise. The method is based on the combination of two spatial domain filters and the logarithmic transformation of spatially-averaged gray values. So-called "receptors" process the luminance values of surrounding pixels in a parallel manner. All parameters for the image enhancement algorithm can be derived from global image statistics such i.e. mean gray value and its variance. This algorithm can be used to develop digital night vision devices that are useful for vehicles, aircrafts, surveillance systems and wearable night vision devices. To reduce x-ray dosis, it can be used for the enhancement of diagnostic images.

ADVANTAGES

All parameters for the image enhancement algorithm can be calculated from the global image information and subsequent calculation steps are rather simple and can be processed on the level of "receptors". The performance of this innovative image enhancement algorithm is similar to common complex de-noising methods (BM3D, TV, MLS and ATVM).

The technology offers the following benefits:
- Parallel Implementation in FPGA chips
- Rather simple implementation in embedded systems.
- Wide variety of applications
- Parameters can be derived from global image statistics

left: image taken with a mobile phone camera, right: image processed with Night Vision algorithm
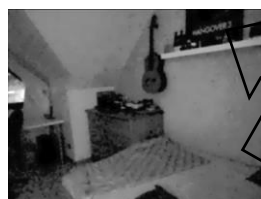
Details such as the word „hangover" here are still visible after processing

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KEYWORDS:
NIGHT VISION
MEDICAL IMAGING
X-RAY
SPATIAL INTEGRATION
CONTRAST ENHANCEMENT
NOISE REDUCTION
DENOISING
IMAGE ENHANCEMENT
IMAGE PROCESSING

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COOPERATION OPTIONS:
LICENSE AGREEMENT
R&D AGREEMENT

DEVELOPMENT STATUS:
PROOF OF CONCEPT →
PROTOTYPE

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US PATENT FILED (US2019340738)
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