FPGA-based methods for high-speed processing of video images with large brightness scatter

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The task of detecting and identifying low contrast objects by thermal imaging optoelectronic systems in a scene with a large dynamic range requires the use of special brightness conversion algorithms. However, the most popular and high-quality methods, such as Digital Detail Enhancement (DDE), introduce large frame delays and require significant hardware resources. This article presents a review of dynamic range enhancement algorithms, among which algorithms that do not require a large number of FPGA logic elements and allow for minimal frame delay. Based on them, developed mathematical models of gradational transformation of brightness, which can detect low-contrast details of the image. The results of their implementation on FPGA as a part of domestic optoelectronic module are given.

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