

Embedded Image Preprocessing Module for Asphalt Surfaced Pavement Crack Detection System

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Abstract

Embedded systems give a great opportunity to implement complex, time consuming algorithms in small, portable devices. This paper presents a portable subsystem dedicated to an automatic system of asphalt surfaced pavement crack detection [1], [2]. Road pavement condition assessment is an important issue, especially in countries, when new highway infrastructure is still developed. The proposed algorithm can be implemented in the previously presented on this Conference, extensible processing platform (EPP) [3]. This board consists of an ARM embedded processor running Linux kernel and a co-processor implemented in FPGA. The input of the system is a set of pictures collecting from the mobile camera system installed on a 'car. That is why the power consumption and small size is required for the system's components. The presented module is responsible for a preprocessing of the input images. The final goal of the whole system processing is to detect cracks which, in the images, are represented as high frequency components. Hence, the preprocessing algorithm, should maintain all the high frequency components. We have chosen an image deblurring /enhancement procedure and adaptive global luminance correction as first preprocessing procedures. Next step is to exclude any non-pavement objects from the orthogonal image obtained after the initial preprocessing. For this task we have applied Gabor filtering combined with Fast Fourier transform. The elaborated system has fulfilled all requirements to make it suitable in the mobile system dedicated to pavement cracks detection and is preparing for the industrial application.

References

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