

## **Comparative Study of Parallelism and Pipelining of RGB to HSL Colour Space Conversion Architecture on FPGA**

### **Abstract**

RGB colour model is a basic colour model and complements together to produce full colour range but it is unable to produce sufficient information for digital image analysis. However, HSL is capable to provide other useful information such as colour in degree, saturation of the colour and brightness of colour. In this work, RGB to HSL mathematical conversion algorithm is implemented on FPGA chip. Parallelism and pipelining capabilities of FPGA helps to speed up conversion performance. The RGB to HSL equation is implemented by using two architectures which are parallel and 7-stages pipeline architectures. The designed parallel and pipeline converters have one clock and seven clock cycle of data latency respectively. The parallel and pipeline architectures for RGB to HSL converter have been achieved rate of accuracy by hardware verification up to 99% and 98% and possessed maximum operating frequency merit of 50 MHz and 120 MHz respectively.

### **Keywords**

HSL (Hue, Saturation, and Luminance); Parallelism; Pipelining; RGB (Red, Green, Blue)