

KAWASAKI STEEL TECHNICAL REPORT

No.27 ( November 1992 )

Hot-Rolled, Cold-Rolled and  
Surface Coated Steel Sheets  
and Electronics and Instrumentation

---

Image Processing System with a New Systolic Array LSI

Akira Ichinose, Kenji Suzuki, Yoshinori Wakimoto, Mitsuru Yanagisawa, Yuichiro  
Asano

---

Synopsis :

# Image Processing System with a New Systolic Array LSI\*

*Synopsis:*

*Abstract: This paper describes a new systolic array LSI for image processing. The LSI is designed to process a 2-D image in real time. It consists of a 2-D systolic array and a control logic. The LSI is fabricated in 1.5- $\mu$ m CMOS technology. The LSI is capable of processing a 256x256 pixel image in real time. The LSI is used in a real-time image processing system. The system is capable of processing a 256x256 pixel image in real time. The system is used in a real-time image processing system.*

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

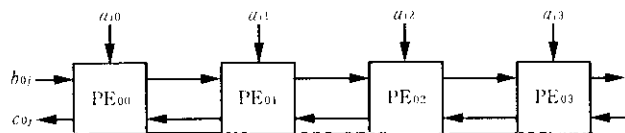
[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]



user of an image processing board employing such an LSI can obtain high performance, until the limit of the array size is reached. Once this limit is exceeded, however, performance suddenly drops. As a result,

Table 1 LSI function list

previous processing. The processing proceeds as follows:

(1) The image data are read from a memory block;

Two-dimensional convolution

(2) the image data are processed by the convolution operation;

Matrix-vector multiplication

array to carry out the convolution operation; (4) the

Gray scale transformation with look-up table

output level is adjusted by the parallel shift register.

Table 2 Performance comparisons—image processing time for convolution of  $512 \times 512$  8-bit

Kernel Size	Iterations	Time (ms)	Time (ms)	Time (ms)	Time (ms)
$3 \times 3$	2000	6.6	13.1	13.1	6.6



tical, the architecture could be simplified and independent operation of Dr. IMAGE II became possible. Communication between the WS and Dr. IMAGE II are

Dr. IMAGE II, which has the following features:

- (1) The image size and kernel size are variable so that a

large image size can be 4,000 x 4,000 pixels.