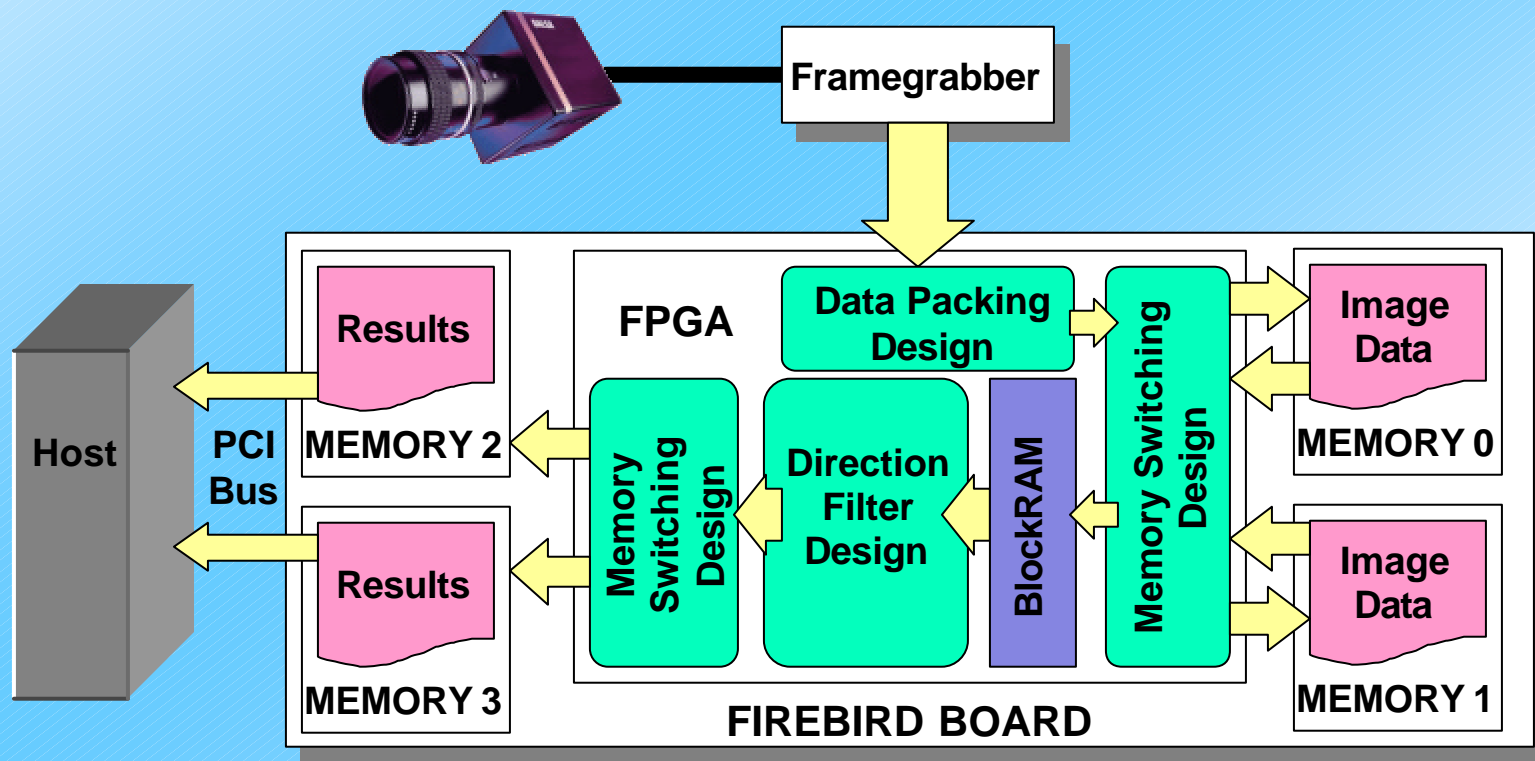


Acceleration of the Retinal Vascular Tracing Algorithm using FPGAs



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Shawn Miller

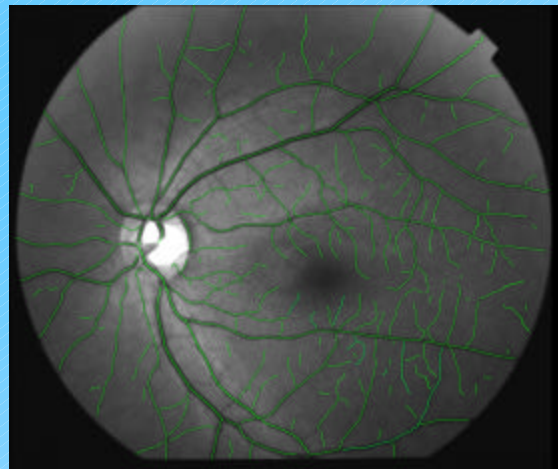
Smart Camera: Provides Host PC with image data along with image processing results at frame rate with low latency



Retinal Vascular Tracing Application

Goal: Detection and enhancement of the vascular structure of a patient's retina from a live video feed

Latency and throughput requirements of real-time image processing cannot be provided by software on a general-purpose processor



Timing Issues

Return results for each pixel at frame rate of camera

Very Low Latency

- Surgical laser must be shut off immediately after detecting that it is aimed incorrectly
- Cannot tolerate 1 frame delay (33msec at 30 frames/sec)
- Complex memory management required to achieve minimum latency

Storage of a 5x5 pixel image

Memory 0					Memory 1				
0		2		4		1		3	
	6		8		5		7		9
10		12		14		11		13	
	16		18		15		17		19
20		22		24		21		23	

Latency currently on the order of 100? sec