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MPR Innovation Award: Eutecus

Superfast Sensor-Processors Break New Ground in Digital Imaging

By Tom R. Halfhill {2/26/07-03}

Microprocessor Report is presenting an ***MPR* Analysts' Choice Award** in the Innovation category to Eutecus, Inc., for designing a digital-imaging sensor-processor architecture that can capture and analyze up to 100,000 frames per second.

Eutecus is headquartered in California but was founded by scientists and engineers from Hungary, Spain, and the U.S. With grants from the U.S. Missile Defense Agency and the U.S. Office of Naval Research, the company has developed Cellular Visual Technology (CVT).

CVT combines a massively parallel processor architecture with optimized image-processing software. As Figure 1 shows, some implementations use an innovative semiconductor fabrication process to bond the image sensor directly onto the parallel-processor array, creating a multilayer chip. The company's main goal, however, is to license CVT as intellectual property for integration into custom ASICs and FPGAs. (See *MPR 2/12/07-01*, "Faster Than a Blink.")

Using this technology, engineers can design superfast imaging systems with adaptive vision. Such systems will not only capture thousands of frames per second but can also intelligently respond to what they see, using custom software written with libraries of low-level functions that Eutecus provides. With the right software, a camera could automatically detect and respond to specific movements, shapes, and events within its visual field. Possible applications include robotic vision, video surveillance, scientific analysis of momentary events, monitoring of industrial processes, interactive games, and guidance systems for unmanned vehicles and missiles.

Bonding a sensor array directly to a processor array is a particularly impressive technical achievement, because it can make image processing as massively parallel as image sensing. Although Eutecus makes some compromises to achieve its spectacular frame rates—the pixel resolutions are low, and the images are monochrome—developers can write software that makes the most of these limitations. Eutecus has described techniques that mimic human vision by rapidly evaluating small points of interest within a larger area. Superfast adaptive imaging could reinvent photography for the twenty-first century.

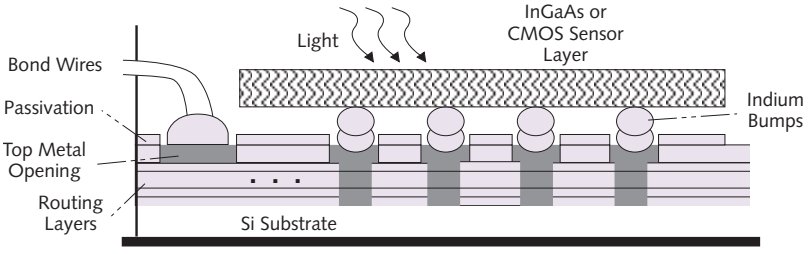

Figure 1. An innovative semiconductor-fabrication process distributes thousands of indium bumps over the surfaces of the image-sensor and processor dies, bonding them together. This tightly couples the sensor to a massively parallel array of image processors, allowing the sensor sites to pour image data directly into the processor fabric.