DVS128

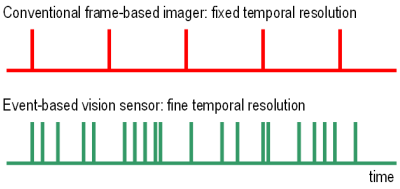
Dynamic Vision Sensor

with USB 2.0 or AER interface

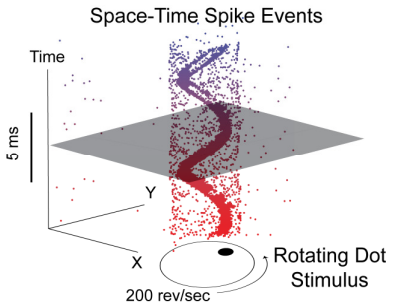
Freeing Vision from Frames

Conventional vision sensors see the world as a series of frames. Successive frames contain enormously redundant information, wasting energy, computational power and time. In addition, each frame imposes the same exposure time on every pixel, making it impossible to process scenes containing very dark and very bright regions.

The DVS (Dynamic Vision Sensor) solves these problems by using patented technology that works like your own retina. Instead of wastefully sending entire images at fixed frame rates, only the local pixel-level changes caused by moving in a scene are transmitted – *at exactly the time they occur*. The result is a stream of events at microsecond time resolution, equivalent to or better than conventional high-speed vision sensors running at thousands of frames per second. Power, data storage and computational requirements are also drastically reduced, and dynamic sensor range is increased by orders of magnitude due to the local processing.



Temporal resolution advantage of DVS event-based vision sensors



DVS in use: events from a spinning dot stimulus, displayed in space-time. The DVS records movements smoothly and continuously, not in a stroboscopic fashion like classical frame-based cameras.

DVS Advantages

Conventional high-speed vision systems	DVS128	DVS Benefits
Requires powerful PC	Works with any laptop	Lower costs Lower power consumption
Extremely large (many TB), highly redundant data sets	Minimal data size No redundant data	Lower costs More portable Easier data management
Custom interface cards	USB 2.0 or Address Event Representation (AER); Java API	More portable Easier programming
Batch-mode acquisition Off-line post-processing	Real-time acquisition Extremely low latency	Continuous processing No downtime, lower costs
Low sensitivity; need special lighting (lasers, strobes, etc.)	High sensitivity; no special lighting needed	Lower costs Simpler data acquisition
Limited dynamic range, typically 50 dB	Very high dynamic range (120 dB)	Useable in challenging real-world situations

Application Areas

- Machine vision
- Robotics: real-time, mobile, fixed
- Microscopy
- High-speed tracking

iniLabs

info@inilabs.com
www.inilabs.com

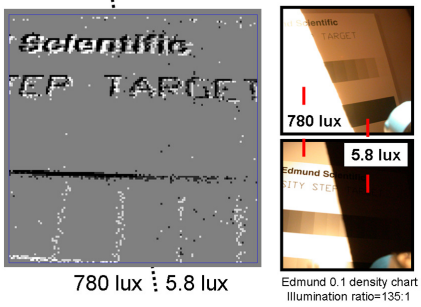
Case Studies

Case Study 1: Vision in Challenging Environments

Problem: You need to recognize objects in an environment with very bright lights and dark shadows. Conventional video cameras either over-expose or under-expose part of the scene, losing important objects in the process.

Solution: The DVS automatically adapts to differing lighting conditions in different parts of an image without any calibration. Its high dynamic range reveals details that cannot be detected with conventional vision systems.

Contrast sensitivity under wide illumination.

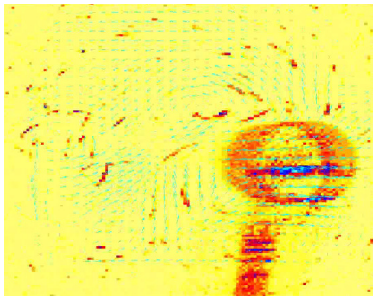


Edmund 0.1 density chart
Illumination ratio=135:1

Case Study 2: Fluid Particle Image Velocimetry

Problem: You are analyzing turbulent fluid flow. Your conventional high-speed vision setup requires a cumbersome and expensive high-speed PC, lots of hard disk space, custom interface cards and high-intensity laser strobe lighting to illuminate the fluid. After each test run you have to wait minutes or hours while the data is processed.

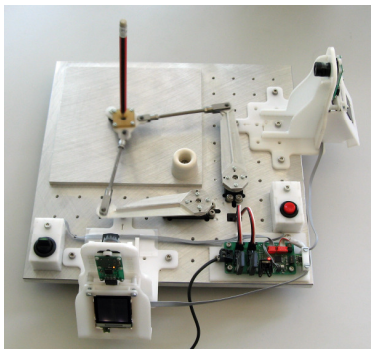
Solution: The DVS enables you to replace your entire system with a single standard PC with a USB connection. Normal collimated light is sufficient to illuminate the fluid. The low-bandwidth data flow can be processed in real time, enabling you to work continuously and adjust experimental parameters on the fly.



Case Study 3: Real-Time Robotics

Problem: You are developing a robot that needs to rely on visual input and react fast to changes in the world. You are operating under tight constraints of power consumption, space and weight. Conventional vision processing systems consume far too much power to fit on the robot platform. The standard method is to send the images for off-line processing, requiring a separate server, increasing response times and limiting the range of the robot.

Solution: The DVS does all of the front-end processing, giving you only the “interesting” events in a scene. You can integrate all of your processing hardware on-board.



Specifications

Resolution	128 x 128 pixels
Fabrication	Standard CMOS
Dynamic range	120 dB
Power consumption	5 VDC, <0.5 W total (USB bus powered)
Latency	15 µs
Time resolution	Down to 1 µs per event
Interface	DVS128: USB 2.0, Windows XP driver DVS128-AER: Address Event Representation output Java API (Sourceforge) & Matlab output file format
Optics	Standard C-mount or CS-mount lenses Other custom mounts available
Synchronization	Several DVS128 can be synchronized for multi-camera systems. Timestamp synchronization to external clock is also possible

About Us

iniLabs Ltd is a spin-off company of the Institute of Neuroinformatics of the University of Zurich and the ETH Zurich. We design, produce and sell neurotechnological systems.

iniLabs

info@inilabs.com
www.inilabs.com

 1/9/2013 ke