

Case Study  
Bulpitt-V

## Intelligent IP Video Encoder Platform Delivers Digital Security Surveillance Solutions

Using the Intel® Atom™ processor, HuperLab Co., Ltd builds intelligence, remote management and reduced power consumption into a small form factor solution for digital security surveillance systems. HuperLab is a leading developer of intelligence video surveillance systems, and a technology innovator on computer vision, video/audio codec and streaming technology.



## Challenges

Surveillance system intelligence is seeing mass adoption across a variety of market segments including retail centers, public, government and educational facilities, transportation hubs and factory/industrial/warehouse sites. Businesses want response in real-time, not only to guard against theft and security threats, but to provide sales data—for example, how many people visit a store, traffic patterns, timing of visits, etc. To save time and money, and to gather data more efficiently, businesses are looking to automated building management where security and surveillance are integrated into a single platform, consolidating multiple surveillance applications into a single video device.

Businesses are also looking for ways to make surveillance more affordable. Reliability and operation of surveillance systems are a top priority, thus system and device management must be flexible and fast enough to react to system failure almost instantaneously. Remote management is much quicker and less expensive than sending technical personnel out for on-site maintenance and service and is, therefore, a valuable feature.

In addition, the complex algorithm of intelligent surveillance can be extremely power-hungry, consuming much of the processor cycle. Platform-level power consumption management is critical to on-going sustainability, as hundreds of thousands of security and surveillance-edge devices are running 24 hours x 7 days, making power consumption very high and very expensive. For example, if total platform power consumption for a single-edge device is 100 watts, running 24 hours at a US national average electricity rate of 9.49 cents per kilowatt hour, the resulting cost is 22.776 cents per day. However 100K units could cost the operator \$22,776 per day.

Security and surveillance-edge devices must also address small form factor requirements to simplify and increase the flexibility of equipment installation. This is particularly important for edge devices such as IP camera, IP video encoder, network video recorder and IP video detector solutions.

## Solutions

HuperLabs used the Intel® Atom™ processor Z5xx series to create a digital security surveillance solution with intelligence, remote management capabilities and efficient power consumption in a small package. Using video analytics, these systems can provide surveillance intelligence for retail industry, building management, home surveillance, digital signage and point-of-service terminals. Intrusion and loitering is tracked through video intelligent algorithm, providing real-time alert to the central management system.

**Intelligence:** The Intelligent IP Video Encoder / Detector platform uses software encoding with intelligent video analytics able to run smoothly on the Intel® Atom™ processor with extended Intel® Streaming SIMD Extensions 3 (Intel® SSE3) instruction and Intel® Hyper-Threading Technology<sup>1</sup>. Having an intelligent surveillance encoder, powered by the Intel Atom processor at the edge, it acts as an intelligent video hub for several surveillance cameras with instant response and reaction as the incident takes place. The platform can support real-time 4-channel QVGA or CIF resolution MPEG4 encoding, as well as real-time 1 - to 2-channel intelligent video analytics applications, capable of live streaming to a remote terminal.

**Remote Management:** The huperLab Central Management Solution (CMS) enables remote manageability using a server-client model with debugging and configuration capabilities. Surveillance reliability and operation is a top priority, consequently the system as well as system management have to be flexible and fast enough to react to system failure. With huperLab remote management tools running on server-client model, the huperCenter and huperRemote applications can easily debug, reconfigure, and reboot an application or system, pull out recorded video data, view log files, and take control remotely of the digital video recorder, network video recorder and camera at the central site. This helps keep the system running without interruption and avoids the hefty costs of on-site maintenance and service calls.

**Power Consumption:** With the Intel Atom processor, total platform power is less than 10 watts, saving the end customer considerably on electricity bills. Lower power consumption also supports easier and more eco-friendly power management.

**Smaller Form Factor:** A total area of 120mm x 120mm or 144cm<sup>2</sup> of nano-ITX board size is the core engine for this intelligent IP video encoder platform, and the Intel Atom processor, in a small-die package, enables board developers to meet the small form factor design requirements of these surveillance-edge devices. The processor is validated with the Intel® System Controller Hub US15W (Intel® SCH US15W), which integrates the Intel® Graphics Media Accelerator 500 (Intel® GMA 500), memory controller, and I/O controller in a single chipset. This two-chip platform solution is ideal for small form factor designs targeted at surveillance-edge devices where easy, flexible installation and placement are needed.

## Performance

The Intel Atom processor is suitable for both the Surveillance IP Video Encoder and Intelligent Surveillance IP Video Detector. The **Surveillance IP Video Encoder** consolidates analog video stream

from multiple camera channels, encoding them into IP form with higher transfer bit rate, so the video streams can travel over a distance.

This type of application has no video analytics intelligence at the edge and no viewing at the encoder, however it performs the functions of MPEG4 or H.264 video encoding and remote streaming. The performance data on the 4-channel QVGA (320x240) resolution Real Time IP Video Encoder with Intel® Atom™ processor Z530<sup>f</sup> is shown in Table 1.

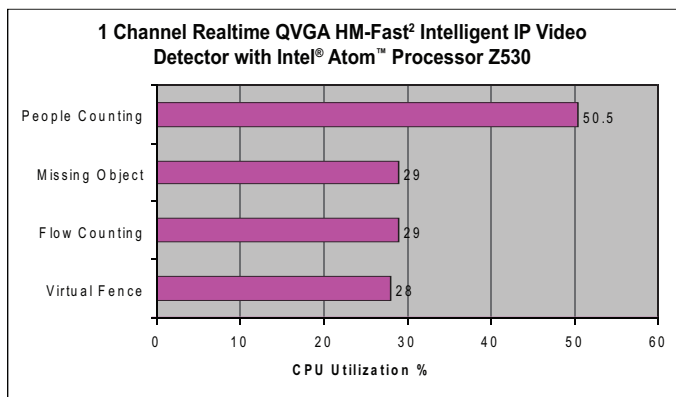


Table 1

**The Intelligent IP Video Detector** acts more like a virtual sensor which can replace physical sensors for doors, windows and other intrusion locations that apply in home, business, store room or warehouse security. Furthermore, it can gather data in a retail environment such as counting human traffic to estimate business metrics for the shop. It can also be deployed to determine road or highway traffic flow to estimate usage levels. The nature of this application has no recording function and no viewing at the detector, but it performs real-time intelligent video analytics functions on site, providing live video and metadata streaming to a central management system. Performance data on the 1-channel QVGA resolution Real Time Intelligent IP Video Detector with the Intel Atom processor Z530<sup>f</sup> is shown in Table 2.

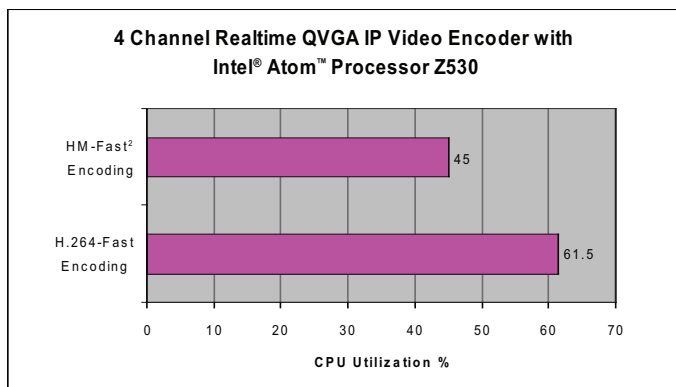


Table 2

**Intelligent IP Video Encoder / Detector Platform Specifications**

**Processor** Intel® Atom™ processor Z510<sup>f</sup> or Intel® Atom™ processor Z530<sup>f</sup>

**Chipset** Intel® System Controller Hub (SCH) US15W

**Memory Type** Up to 2 GB DDR2 400/533 MHz SDRAM (1 SODIMM socket)

**Graphics** Intel® Graphics Media Accelerator 500 (Intel® GMA 500)

**Storage** PATA Hard Drive, SD Card, Compact Flash

**LAN** Single 10/100/1000 LAN

**Audio/Video Inputs** Supports 1-4 channels with hyperLab® HM4604Q-PCI Express\* Video Capture Card

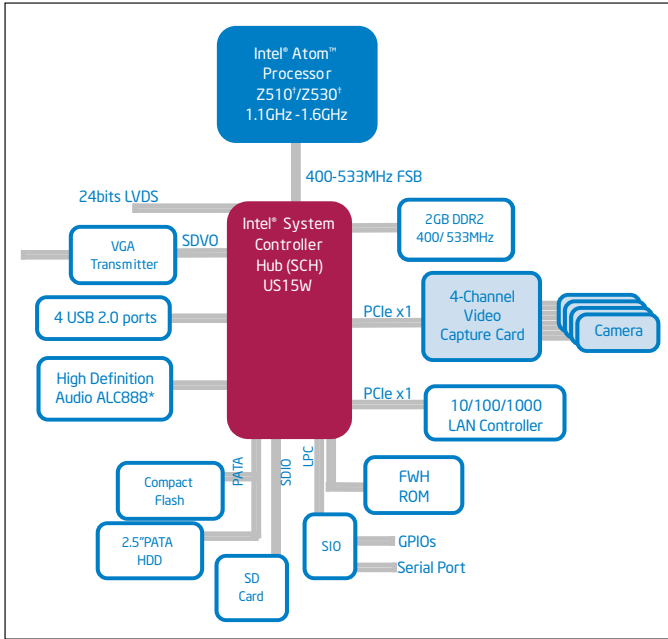
**Video Resolution** 720x480HD/720x576HD, 720x480/720x576, 720x240, 640x480, 640x240, 320x240

**Intelligent Features** Bi-Direction People Counter, Virtual Fence Detection, Secure Zone Detection, Missing & Left Object Detection, Flame Detection

**Operating System** Microsoft Windows XP\*, or XP embedded, or Vista\*

**Highlights: Intel® Atom™ Processor Z5xx Series**

- Eco-friendly design with Intel's smallest processor. Built with 45nm Hi-k metal gate silicon technology, it delivers a low-power platform solution ideal for surveillance- edge devices
- Intel® Streaming SIMD Extensions 2 and 3 (Intel® SSE2 and Intel® SSE3) and Supplemental Streaming SIMD Extensions 3 (SSSE3) enable surveillance applications to achieve greater performance in video intelligence and encoding process running on the Intel Atom processor
- A small form factor processor package and two-chip platform solution make it easier to design into a smaller board size, which ultimately saves overall BOM cost.



Intel® DSS Intelligent IP Video Encoder Block Diagram

## Customer Testimonial on Intel® Atom™ Processor Z5xx Series

The Intel Atom processor Z5xx series provides an excellent solution for the digital security surveillance market segment, including low-power consumption and small form factor design capabilities. With such an affordable price point, HuperLabs is impressed by its computing power which allows H.264 software encoding and video analytics to run simultaneously without performance degradation.

We appreciate the benefits that the Intel® Atom™ processor Z5xx series provides, which enable us to design smaller but powerful surveillance products at reasonable prices. We are delighted to have made the right decision to use Intel® processors in our intelligent surveillance solutions.”

Albert Yang  
President at Huper Laboratories Co., Ltd.

<sup>1</sup>Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. See [www.intel.com/products/processor\\_number](http://www.intel.com/products/processor_number) for details.

<sup>2</sup>Hyper-Threading Technology requires a computer system with a processor supporting HT Technology and an HT Technology-enabled chipset, BIOS and operating system. Performance will vary depending on the specific hardware and software you use. For more information including details on which processors support HT Technology.

<sup>3</sup>HuperLab's proprietary HM (MPEG-4 like) software codec, optimized for multi-core CPU, can efficiently compress video with extremely low CPU usage, yet keeps its high quality. Until now, HM is the only solution in the market for 16CH, full D1 DVR system with pure software codec.

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