

CASE STUDY

Switching Platform Architecture for a Better Medication Label Safety System

Case Overview

Computing technology is everywhere in our daily life; from personal handheld devices to machinery for industrial use. Today, even the medical and health care industries are increasingly dependent on computer technology as caregivers are expected to attend to more patients without compromising the quality of care. Central to this need is the ability to provide clinicians with easy-to-use technology that improves the efficiency, accuracy, documentation and regulatory compliance of services delivered. One such area involves the identification, preparation and administration of medications that have long been recognized as inherently high risk, requiring vigilance by clinicians. This has prompted the adoption of standards of care to improve patient safety by properly labeling syringes with labels that identify the general classification of the medication by the label color and additional printed information identifying the specific medication, concentration, individual who prepared the syringe and when the medication expires. Accordingly, a system was created to automate the process of medication identification, syringe labeling and medication administration tracking to reduce human errors and improve the overall efficiency, accuracy and reporting documentation of drugs usage in the healthcare environment.

Axiomtek's customer, Codonics, Inc., is a medical device manufacturer headquartered in the USA. They are the world's leading manufacturer of multi-media medical imagers, as well as medication safety solutions for hospitals and healthcare centers around the globe. Codonics wanted to create an integrated system-level solution that improved medication safety in the operating room or anywhere syringes are prepared and administered, and thus developed the Safe Label System SLS 500i. **The competitive medical market continually pushes for higher performance products with better efficiency and greater cost savings. Realizing specific limitations of proprietary hardware and software technology used in RISC-based systems, the customer chose the powerful yet flexible Intel® Atom™ processor based on Intel architecture (IA) for building new generation embedded SLS equipment.**

Intel® Atom™ processor as the core

Intel® Atom™ is one member of the fast growing product line of ultra low power world-leading 45nm single core processors. Launching its Atom™ processor and associated chipsets, Intel® significantly reduced thermal output and power consumption, which frequently cause issues in embedded computing. With the assistance of Intel® technical consultants, shortly after the Intel® Atom™ processor announcement, Axiomtek successfully launched the PICO821 (based on Intel® Atom™ processor Z510 1.1 GHz) which was well suited for this customer's specific design.

Challenges

Codonics met several challenges in putting advanced technology into medical care.

- Fanless, small footprint size to fit into light weight medical equipment
- Minimal energy consumption, very low thermal generation while providing the highest performance capability
- Maximum scalability to meet current and future needs
- Ensuring stable and reliable operation in a demanding application

Solution

Intel® architecture platforms boast numerous benefits; excellent scalability for smooth technology upgrading, remarkable flexibility for easy expansion, trusted long product life cycle commitment, and broad software compatibility. The PICO821VGA-1.1G (based Intel® Atom™ processor Z510 1.1GHz) supported everything the customer needed; the graphics capability and Linux support to drive their 7" LCD, extremely small size (Pico-ITX) to help keep the product footprint to a minimum, USB Boot Security, excellent processing performance, and an acceptable price point. Axiomtek provided another layer of value with a custom BIOS and unique splash screen.

In a typical equipment-crowded healthcare environment, space is at a premium. The SLS (Safe Label System) is designed to fit into the operating room on existing drug carts, so the small size of the PICO821 was a critical attribute. The Pico-ITX form factor is only 10x7.2cm, making it a great choice for this application. Based on an ultra low power Intel® Atom™ processor, PICO821 is the customer's best choice for an excellent heat-dissipating platform where a fan is not an option in the small, highly integrated, rugged solution. Regular cleaning and disinfection of medical equipments is essential for providing patients with a safe environment for care. During development phase, Axiomtek's technical engineers have optimized PICO821 to withstand a wide range of various operating conditions. This exceptional feature makes it a perfect match for demanding hospital-based environment.

Safe Label System SLS 500i

Operating rooms are frequently fast-paced environments with multiple distractions that can result in incomplete or poorly hand-written labels being applied to syringes, greatly increasing the chance that drug vials can get confused or syringes can be labeled incorrectly. The Codonics Safe Label System SLS 500i, honored for its innovation, is a complete solution to enhance healthcare by improving patient safety and labeling compliance in the operating room (OR) or anywhere syringes are prepared. This system greatly reduces the three most common drug errors made in the operating room, such as drug ampoule/vial swaps, label swaps and syringe swaps. Acting as an electronic "double-check", the system helps to remove the element of human error by incorporating machine-readable technology. This innovative system improves the syringe preparation workflow by automatically printing ASA (American Society of Anesthesiologists) compliant full-color labels containing all TJC (The Joint

Commission) required elements while the syringe is being filled.

Labels produced by the SLS 500i include a bar code that can be integrated with the hospital information system to provide more accurate documentation. SLS complies with the medical safety standards UL60601-1 and EN60601-1 and is an FDA class 2 medical device.

Axiomtek PICO821 – Pico-ITX Embedded Platform

Axiomtek brings Intel® Atom™ processor to a series of embedded single board computers; the PICO821 is a member of this embedded application product line. PICO821 supports ultra low power Intel® Atom™ processor Z510 1.1GHz and Z530 1.6GHz at 400/533 FSB with the Intel® System Controller Hub US15W. It is an incredibly small 10x7.2 cm embedded board based on Pico-ITX form factor, the world's smallest x86 embedded board. Instead of building-up a full set of I/O connectors soldered onto the board edge, the PICO821 provides internal connectors for COM, Gigabit Ethernet, USB, audio, video and more, providing embedded developers with flexibility. This extremely small form factor embedded platform can meet today's customer needs of fanless operation, low power consumption, compact-size, flexibility and versatile I/O. Its applications include in-vehicle PCs, in-flight entertainment systems, industrial automation systems, and portable devices.

The Intel® System Controller Hub US15W features the Intel® GMA500 graphics engine which utilizes up to 256 MB frame buffer and supports DirectX 9.0E and OpenGL 2.0. Graphic output is 18/24 bit single-channel LVDS. Moreover, the Intel® Atom™ processor Z500 series supports SSE3 (Streaming SIMD Extensions 3) that improves performance on multimedia and gaming applications, as well as, Hyper-Threading technology and Intel® Virtualization technology (Intel® Atom™ processor Z530 only), and has a low thermal design power (TDP). In a small rugged form factor, the PICO821 provides a full set of I/O features including one 10/100/1000 LAN, one COM port, four USB 2.0 ports and one USB client port, one IDE (PATA-100), one CompactFlash™ Type-II socket, one PS/2 keyboard/mouse, and HD audio. Additionally, the PICO821 features DDR2 400/533 memory up to 2GB.

Why Axiomtek?

As one of the major design and manufacturing companies in the industrial PC field, Axiomtek develops Embedded Board & Technology (EBT), Applied Computer & Network Devices (AND) and Touch Panel Computers (TPC) to deploy eWorld (embedded world) solutions. Axiomtek's vertical market knowledge helps simplify the technology needed to support important open standards and enable OEM/ODM innovations.