



Case Study

Advantech

Intel® Pentium® 4 processor-M

Intel® Pentium® M processor

Intel® Celeron® M processor

Intel® 855GME, 852GME and ICH4 chipsets

Embedded Terminals for Point-of-Care

Applications

Moving More Technology to the Point of Care

Universal Terminals Integrate with Existing Networks; Aid in Observation, Diagnosis and Treatment

Summary

Business Need

Health care providers increasingly rely on computers for access to medical data, such as patient records and drug facts. They are also using computers as diagnostic tools and treatment aids. Yet there are few systems that do it all. The computers used for diagnosis and treatment don't always readily integrate and talk to a hospital's network. The ideal solution is a fully integrated system that connects the network to point-of-care systems, providing continuity of data at all stages of health care.

Challenge

The challenges to building such a solution are many. For starters, systems used in a medical environment must comply with safety and emission standards, which vary by country. Integrating with a general purpose network means they must use standard networking hardware and software and be able to recognize common desktop applications. These systems must also withstand harsh environmental conditions, where humidity and constant cleaning are the norm. The ability to run a variety of specialized health care applications means the platform must be robust, with strong graphics capabilities.

Solution

Advantech provides scalable and versatile medical-grade computing platforms that facilitate real-time monitoring and high quality patient care. Advantech's medical and healthcare platforms comply with all of the vital medical technology standards, including UL60601-1 and EN60601-1, to ensure safety and reliability. Advantech's platforms also have the ability to run a wide variety of software, which can extend the use of these systems to multiple environments with new—as well as existing—system configurations.

Why Intel?

The full line of Advantech point-of-care terminals are medical grade panel PCs powered by Intel® processors and chipsets. Advantech chose the Intel components "because they provide the optimum combination of high performance at the lowest possible power consumption, which allows us to build very efficient systems, including one product with a fanless design," explains Charlie Wu, Product Design Manager at Advantech.

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—Charlie Wu
Product Design Manager at Advantech

Challenges in Health Care Computing

Computing technology has tremendous potential to improve the quality of patient care. Yet there are few systems that are suitable for a medical setting, where special regulations and environmental conditions call for systems that meet several unique qualities.

For example, there are special regulations governing safety and emissions for systems deployed in a hospital, clinic or other medical facility. These regulations differ by country, which makes it difficult for one developer to provide a global solution.

Consider too how the need to maintain a germ-free environment means that all equipment must undergo frequent cleaning with isopropyl alcohol and other germ-killing agents. Computers used at the point of care are no different, and must be sealed to prevent such solutions from harming the keyboards, touch-screens, motherboards and other essential elements of a platform. Humid conditions are also the norm in many clinical settings, where temperatures are kept high to aid in patient care.

Some developers build specially designed, rugged computers that can be used for diagnosis and/or treatment in such settings. But they are often proprietary designs that don't integrate with a hospital's or provider's network. Nor can they be easily upgraded to take advantage of new technology or align with new medical discoveries. Many of these systems run only one kind of application, or just a few applications, further limiting their ability to provide continuity of care.

Advantech sees the need for a universal platform that complies with all of the existing medical regulations around the world. Such a safety certified system would be application-agnostic in order to run almost any health care software. Based on common computing standards, such a computer would also readily integrate with a provider's existing network and software.

Advantech lists these requirements for such a universal medical system:

- Ability to withstand humid conditions and frequent cleaning—common characteristics of a hospital or clinical setting.
- Low power consumption to lengthen battery life and enable a low-noise fanless design, making such systems portable and less bothersome.
- Strong system-level and graphics performance to run the most advanced health care applications.

How Technology Aids at the Point of Care

Computing technology is a valuable tool in health care today. Every aspect is affected—from patient record-keeping to systems that help physicians diagnose illnesses and provide treatment.

Observation: The observation stage deals with the collection of patient information—a combination of health history and physiological or biochemical data. Since a patient's health status is changing constantly, it takes a lot of care and effort to organize and interpret the details needed to make a diagnosis or prescribe therapy. Data organization is a prime role for computers, although human interaction and decision-making are still the primary roles of the clinician. What's important here is having immediate and complete access to relevant patient data.

Diagnosis: Computers can aid in diagnosis by organizing relevant data and presenting that information to health care providers. Human thinking always precedes a diagnosis, but it can be aided and speeded by better access to information. Comparing data to known illnesses can also help clinicians shorten the time it takes to interpret the data and develop a diagnosis. Computers might also present facts in a way that triggers new thinking, because software can be continuously updated—faster than providers can study new medical science.

Therapy: Typical therapies involving computer support include the administration of drugs (dosage, delivery) and monitoring of severely ill patients. Computers can also be used to analyze large collections of data derived from many patients to help draw conclusions. This is a type of medical data mining and is often seen in epidemiology, decision analysis modeling and general health care statistics.

- Compliance with the UL60601-1 and EN60601-1 regulations to enable customers to apply for FDA certification of the system.
- System validation with existing networks and standards, enabling providers to integrate new terminals with their existing solutions.
- Completely scalable architecture so that customers can select the right performance and features for their environments.

- Built to the most common industry interface and software standards so that the system can run almost any health care application.
- Long product and component lifecycle so that customers don't need to switch out their systems every few years, providing a better ROI.

Advantech POC Medical Terminals

Such are the rigorous standards that Advantech uses when building its point-of-care medical terminals. "The idea is to build a universal platform suitable for all health care environments around the globe, capable of running almost any application," explains Charlie Wu, Product Design Manager at Advantech. "We must consider all of the possible situations where our terminals might be deployed and then make sure they will integrate with existing networks."

And so they do. Advantech produces two kinds of point-of-care terminals as part of its complete family of medical computing systems. The Advantech POC-174* and POC-S175* slim series terminals are both medical grade panel PCs designed for use in hospitals and clinics. All of their systems run on Intel processors and chipsets, varying the performance and power requirements to meet the different features of each Advantech design.

About the Advantech POC-174* and POC-S175* Medical Terminals

The POC-174* is a medical-grade Point-of-Care Panel PC with a 17" display optimized for minimal power leakage and low EMI. It is approved according to EN60601-1 and UL2601-1 standards. This certifies that there is no interference with medical equipment that can pose a health risk for patients. The POC-174 has also been approved with IP65/NEMA 4 and IPX1 for dust-resistance and water spills. Like the other products in the POC series, the POC-174 has all the characteristics needed for use in critical medical environments. Its high brightness, resolution, and contrast ratio LCD display is especially suitable for medical diagnosis and treatment methods. With a wide range of I/O options, the POC series supplies full connectivity and offers a full range of secure and practical healthcare terminals for patients and practitioners.

The POC-S175* is a medical grade multimedia Panel Computer. This medical system is UL60601-1/EN60601-1 approved. Low-audible noise supplies an ideal point-of-care solution for patients and hospital practitioners. The POC-S175 is specially designed to resist spills and water damage, and ensures dust resistance with its protected LCD, sealed ports and card slots.

"High reliability, high performance, low power consumption, and long lifecycle—those are all hallmarks of the proven embedded Intel® processor family."

—Charlie Wu
Product Design Manager at Advantech

Advantech's highly efficient designs are impervious to dirt, humidity, and the kind of damage that can occur from being bumped and jostled frequently. They also stand up well to frequent cleaning and resist abrasion that comes from almost continuous use. The low-power requirements of the Intel chips mean that Advantech's systems offer long battery life to facilitate better portability.

"Our products meet the stringent requirements of the medical market segment, and especially the medical safety standards UL60601-1 (the US version) and EN60601-1 (the European version) to ensure that our systems will not pose any health risk to patients," explains Wu. Meeting both standards enables Advantech to market its terminals around the globe. "We have satisfied customers everywhere—from Australia to the US to Europe to Asia."

Advantech also explains that their terminals are built more like embedded systems rather than desktop PCs, using embedded Intel processors and chipsets to ensure a long lifecycle. "High reliability, high performance, low power consumption, and long lifecycle—those are all hallmarks of the proven embedded Intel processor family, which includes the Intel® Pentium® 4 processor, Intel® Pentium® M processor, and the Intel® Celeron® M processor—all of which are in use in Advantech's designs," says Wu.

The lowest power version of the Advantech POC-S175 slim series point-of-care terminal is a fanless design created for use on a mobile cart or at a nurses' station. It runs on the Intel Pentium M processor with the Intel® 855GME chipset. The fanless design reduces the noise and improves reliability of the system even while enabling greater portability through a longer battery supported operation time.

Why Intel?

"We have found that the performance of Intel processors is one of the best in the marketplace, especially in the low power segment," Wu says. "The embedded Intel roadmap is also an advantage, ensuring the long-term availability of the chipsets we use in our products. Long life support is very important in the medical market segment, and we can see by their roadmap that Intel is committed to meeting that need."

Wu also believes that the Intel brand is of high value to their customers. "They request Intel components in our designs," says Wu. "We even completed a customized board level project recently where the customer actually selected Intel to be the processor provider. That was a project for a medical application as well."

Advantech points to the following qualities as reasons why they standardized their medical systems on Intel® Architecture:

- Scalable performance to meet a variety of application and customer requirements.
- Lowest possible power consumption at the highest possible performance, enabling delivery of a fanless solution.
- Proven, long-term product reliability and quality.
- Well-defined embedded roadmap allows for long product life cycles, which is very important to the medical community.
- Intel processors and chipsets are optimized and validated to integrate with a wide variety of Intel-based platform solutions from other developers, enabling faster time-to-market.
- High-quality graphics performance needed to run some of the most robust health care applications.
- Strong technical support to help Advantech engineers during development of their systems.

Real Benefits in Health Care

Advantech's designs are proof that universal, standards-based platforms are quickly gaining acceptance in some very interesting market segments, like the medical industry. One can only wonder about the potential advancements in health care that will be made possible by such seamless designs.

Look for Intel, Advantech, and the entire Intel® Embedded and Communications Alliance to continue developing communications and embedded systems that will allow technology to penetrate more aspects of our daily lives. Moving computing technology to the point of care is but one marvelous result.

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