Kontron Solutions@Work

We create digital brains for a more intelligent world

Redesign with ETX® implemented efficiency

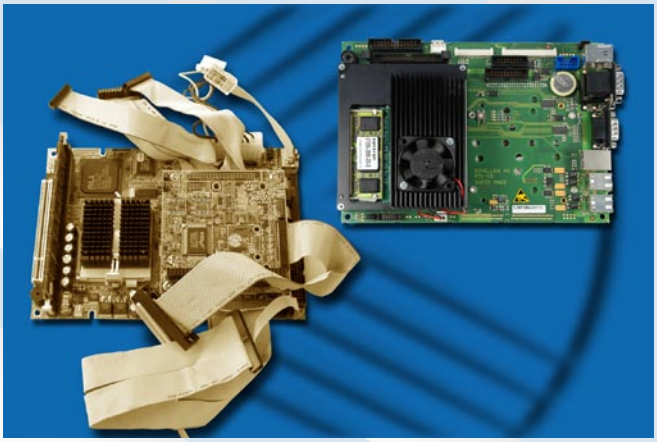
ETX® fits where others form factors do not

In 2002, the medical technology manufacturer Schiller adopted the latest proprietary 5¼ inch quasi-form factor for the launch of its CardioLaptop AT-110. The new design is based on ETX® modules with a baseboard whose footprint was designed to fit the CardioLaptop's casing and interfaces.

Costly redesigns of the electronics in existing products are rare, but they do happen – particularly in products with long-term demand. This includes the CardioLaptop AT-110 from the specialized Swiss medical technology manufacturer Schiller, a company whose products are used in clinics and medical practices around the world for heart and circulation diagnostics, patient monitoring and defibrillation. The device, which is designed for heart examinations, is used in cardiology clinics and for EKG diagnostics in medical practices. The system also offers numerous features that efficiently handle everyday tasks: in addition to providing a conventional printout, the AT-110's software can also evaluate measurements (for both adults and children), which simplifies the diagnosis. Digital ergometer/treadmills and blood pressure gauges can be connected for exercise EKG purposes. The spectrum of applications can be expanded modularly. An integrated hard drive and interfaces for hospital-internal networking (SEMA-200 connection via Ethernet as well as PCMCIA) allow for the flexible management and storage of patient data. Backup batteries ensure that the unit remains operable even in the event of a power failure. Finally, different user levels make it simple for particular users to operate the functions they need.

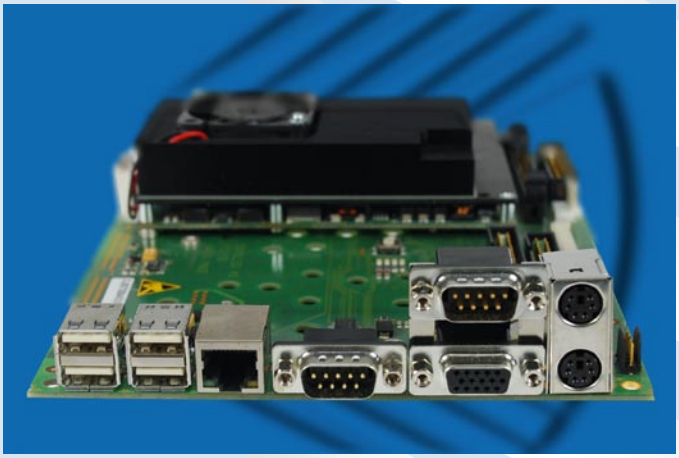
The change of the CardioLaptop AT-110's electronic design was necessary because the IT landscapes in hospitals are consistently developing and system administrators are striving to create homogenous IT structures. As part of this effort, Windows XP is becoming a standard feature in the hospital IT landscape. The CPU previously used in the CardioLaptop AT-110 did not offer high enough performance for this operating system. For this reason, a more powerful and more efficient processor became essential. Schiller had to address the question of which CPU would replace the previous 266 MHz Intel® Mobile Pentium® Processor (released in 1998) with its 1.8 V power supply. The Intel® Pentium® III-M processor launched in 2001 (the completely revamped successor of the Intel® Mobile Pentium® III), was chosen due to price/performance considerations and with regard to power loss thresholds. In addition to higher clock speeds, this processor is distinguished above all by its greater efficiency, which enables considerably lower power consumption while offering the best price/performance ratio that was available when it was chosen (in 2004-2005). Today, Intel® Pentium® M processors offering better performance are now available at comparable prices, although this was not yet anticipated in 2004. In the future, systems based on Intel® Core™ Duo technology or even the forthcoming processors that Intel® has recently announced under the code name "Tolapai" will be the standard. The situation is constantly changing with regard to users' requirements on the one hand and to the most useful processor technology on the other hand. Therefore, devices intended for long-term availability must be designed with particular care and precision.

This brings us to the actual problem: the choice of the appropriate embedded form factor able to provide for all of these processors in the long term, with the least possible design cost for the OEM. The first design of the CardioLaptop AT-110 is based on the quasi-5¼ inch form factor that was popular at the time. This only offers standard dimensions, however, which are derived from the hard drive dimensions. The result is that the pinout of the interface can vary from board to board. This poses a particular problem for tightly packed designs such as the CardioLaptop AT-110. The changing positions of the interfaces requires the cables to be re-specified and tailored since the casing must remain unaltered, but space for components is very limited. So, depending on the design a new board, its cabling might not fit in the new system. Expensive cabling is a cost factor that can be avoided if the external interfaces are directly available onboard.



For this reason, Moritz Bossert, development engineer at Schiller, took the selection of form factor into consideration during the redesign. The greatest possible effort was made to preserve the electronics design, including identical positioning of the peripheral connections, to provide for nearly any scalability of performance. However, it was not possible to guarantee this with an SBC form factor. Instead, a COM (Computer-On-Module) design was chosen because having an identical footprint and pinout always at the same spot guarantees the greatest standardization potential. This option was not available at the beginning of the design phase of the CardioLaptop AT-110 because COMs

were not yet common at the time (in 2000-2001). ETX® was officially introduced in 2000 and was known only to a few developers. Today, COMs are an established part of the market and leading manufacturers now include COMs alongside SBCs in their product portfolios. From among the potential COM standards available at the time, Bossert settled on the ETX® that Kontron introduced in 2000 and that has become the leading COM standard worldwide. The trademark is licensed by Kontron exclusively for members of the ETX® Interest Group (www.etx-ig.com) and is now available in version 3.0. This made it possible in the current design to replace numerous whip connectors with directly soldered interfaces, without having to modify the mechanical design of the casing. In addition, performance upgrades can be achieved simply by replacing the ETX® module. This adds long-term investment security to the individual baseboard. As an electronics developer, Bossert greatly appreciates the value of this unique advantage provided by the free positioning possibilities on the baseboard.



"No SBC that I know – with the exception of SBCs that have only embedded plug-type connectors – allows me to position the outward-directed peripheral interfaces freely and adapt the electronics design to get the ideal mechanical design exactly. In contrast, with COMs like ETX® and the matching baseboard, a custom design is always possible with a minimum of internal wiring required. Depending on the model, I don't even need a cable for the hard disks or power supply because I can design these directly into the baseboard as necessary," explains Bossert.

Therefore yet another important application of COMs, that previously received little attention, becomes apparent: small, compact forms whose design of the peripheral interfaces so often seen in medical technology, for example, can be highly customized. In this respect, COMs are not only ideal for all types of custom design and for applications whose developers possess special expertise in I/O integration, but they are positioned quite clearly in this large segment of custom, compact design with a level of performance scalability suitable to the given need. The Kontron ETX®-PM3 (Intel® Pentium® M and Celeron® M processors) and ETX®-CD (Intel® Core™ Duo or Core™2 Duo processors) COMs now support all the potential successors of the processor used at present. And the success story of the customer-specific interfaces PCI and ISA-based COM standards will not end here, as underscored by the latest ETX® 3.0 specification and the many supporting providers that are members of the ETX® Interest Group.

ETX® 3.0

Two SATA interfaces were among the significant additions to the previous specifications. ETX® 3.0 computer-on-modules are 100 percent backwards compatible with the preceding ETX® specifications. The integration of 2 x SATA was even implemented by placing SATA connectors on the ETX® module so that existing baseboard designs did not have to be modified to support SATA hard disks. ETX® 3.0 also handles USB communications via the existing ETX® connector.

The success story of ETX® 3.0

March 2006: Adoption of the ETX® 3.0 specification Kontron, Adlink and MSC support the new specification

April 2006: Evalue joins up

June 2006: Aaeon, Seco, Arbor, Axiomtek and Blue Chip Technology also declare their support for ETX® 3.0.

October 2006: Advantech, founding member of the ETX® Industrial Group, adopts support of ETX® 3.0 and works with Kontron on the forthcoming revision 3.01.

Moritz Bossert on ETX® and ETXexpress®

"We will continue to use PCI as well as ISA-based peripherals well into the future. This is why it is ideal that Kontron offers long-term availability for ETX®, particularly when, together with ETX®, the new ETXexpress® standard with PCI Express and PCI is an attractive solution for new designs. But, it will be years before exclusively PCI Express-based solutions are available. When PCI Express becomes an issue for us, we will be sure to use the new COM Express PICMG standard for the corresponding solutions offered by Kontron under the ETXexpress® name."

Moritz Bossert on the appeal of working with COMs

Moritz Bossert on the appeal of working with COMs instead of developing the entire board independently: "I am a medical technician. I'm interested in everything involved with hearts. So, for me, computer hardware is merely a vehicle for developing current medical technology. If I were a computer fan, I might work for Kontron. That's why I think that every developer who loves his business is eager to use COMs in order to bring his custom new solution to the market as quickly as possible."

ETX® for Medical Devices

The ETX® form factor was not designed specifically for medical devices. However, it is a component that has been found to successfully fulfill the prerequisites for use in devices like the CardioLaptop AT-110 from Schiller, which are certified in accordance with EN60601-1 and EN 60601-1-2. DIN EN 60950 is the standard manufacturing specification for most PCs, permitting up to 3.5 mA earth leakage current. This means that a system made up of PC, monitor and printer may produce up to 10.5 mA leakage current. In comparison, EN60601-1 permits only 0.5 mA (normal case) or 1 mA in the first case of error. As such, medical devices are more expensive to develop, and in ideal circumstances, they must also offer an additional balance of connection options. The power supply must also exhibit a 4 kV dielectric strength. Depending on requirements, isolation transformers should also be used in the infrastructure to decouple IT from the medical devices in close proximity to the patient. If a medical PC is developed with its peripherals to comply with EN60601-1, it can also be directly combined with medical electrical devices to make one system in close proximity to the patients.

About Kontron

Kontron designs and manufactures standard-based and custom embedded and communications solutions for OEMs, systems integrators, and application providers in a variety of markets. Kontron engineering and manufacturing facilities, located throughout Europe, North America, and Asia-Pacific, work together with streamlined global sales and support services to help customers reduce their time-to-market and gain a competitive advantage. Kontron's diverse product portfolio includes: boards and mezzanines, Computer-on-Modules, HMIs and displays, systems, and custom capabilities. Kontron is a Premier member of the Intel® Embedded and Communications Alliance. The company is a recent three-time VDC Platinum vendor for Embedded Computer Boards. Kontron is listed on the German TecDAX stock exchange under the symbol „KBC". For more information, please visit: www.kontron.com.

Corporate Offices

Europe, Middle East & Africa
Oskar-von-Miller-Strasse 1
85386 Eching/Munich Germany

Tel.: +49 (0)8165/ 77-777
Fax: +49 (0)8165/ 77-279

sales@kontron.com
www.kontron.com

North America
14118 Stowe Dr
Poway, CA 92064-7147

Tel.: +1 (888) 294-4558
Fax: +1 (858) 677-0898

sales@us.kontron.com
www.kontron.com

ASIA PACIFIC
17 Building,Block #1,ABP.
188 Southern West 4th Ring Road
Beijing 100070,P.R.China
Tel.: + 86 10 63751188
Fax: + 86 10 83682438

kcn@kontron.cn
www.kontron.cn