

November 2006

This newsletter is brought to you courtesy of Art of Technology, a leading European specialist for customer specific electronic system design and development in hardware, software and electronic miniaturization.

Art of Technology will be exhibiting at [electronica 2006](#) in Munich. Please visit us at our **booth 661** in **hall A1**

If you need a free guest ticket please do not hesitate to contact us at ticket@aotag.ch.



Visit also our new homepage www.aotag.ch

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Art of Technology AG

Art of Technology offers the whole spectrum of services for electronics design and development in hardware and software. We work together with our customers and support their team with exactly the processes they need, or take over a whole system as turn key project.

Especially Art of Technology's expert know-how in High Density Packaging (HDP) technologies for a cost optimized system miniaturization of electronic systems is nearly unique. This allows us to realize innovative solutions together with our customers.

Art of Technology is ISO9001:2000 and ISO13485:2003 certified

Please visit our new homepage on www.aotag.ch and learn about the services and support Art of Technology can offer you.

Yours sincerely
Rolf Schmid
Managing Director, Art of Technology AG

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Technologies

Electronic components for medical applications The crux between modern design and component availability

from Dr. Thomas Gillen and Rolf Schmid, Art of Technology AG

The development of electronic devices achieved inconceivable dynamics: New device functions are developed in ever shorter time intervals; Functions, that were inconceivable a few years ago, are available today in shortest timeframes even in inexpensive devices; Space consuming applications are miniaturized to match box size. The chip industry promotes this trend and develops constantly new and more efficient components in order to keep up with the rising requirements in terms of design security, smaller volume, less weight, higher efficiency at reduced costs. Pushed by the progress in efficiency and comfort of electronic consumer devices, the expectations of newly developed medical devices increase. Nobody wants to miss functions from everyday life electronics in medical devices.

New printed circuit board and interconnection technologies, as well as smaller but more complex components (above all processors) allow developers, to realize new medical systems which were not realizable a few years ago: intelligent implants, unobtrusive control instruments for the most diverse vital functions and -parameters, dosing systems for medicines. More and more new companies with excellent and innovative ideas advance on the medical market.

These innovative companies are confronted with a problem that threatens to nip the new ideas in the bud: Parallel with the rising offer of new and more efficient chips, the readiness of many component manufacturers to release their components for the use in medical application decreases. The rejection is mainly driven from the fear they could be held responsible for possible problems. The rejection is often not limited to the core system functions, but also applies for general use in a medical instrument.

The above rejection and the enormous regulations requirements, that a development of medical equipment has to cope with, limit the component selection to manufacturers that are open to the medical market, or which concentrates particularly on this market. Often manufacturers medical support is reflected in a higher price structure that can not be neglected. Thus, the only possibility for the developer is to either use older components or to partition the device functions in a suitable way. Nevertheless, often sufficiently compact designs can be realized with skillful combinations of system design, proven components and mounting techniques, without having to use the latest generation of highly integrated components.

The RoHS guideline, in effect since July 2006, intensifies the situation: The component manufacturers react to the higher requirements with new developments of components, that use compliant materials and that endure the higher soldering temperature or they adopt older, proven components. But, if a RoHS conversion of a component is not cost effective, these components become obsolete and disappear from the market. Since there are hardly any field reliability data present for new and/or revised components, releases for medical devices are given hesitantly.

Medical devices are explicit excluded from the RoHS guideline, but the volumes of this market are too small to guarantee long term availability of proven components. Also all processes and workflows at manufacturers and suppliers were changed for RoHS compliance and exceptions will be supported ever more rarely because of the associated increased expenditure. Thus, RoHS conformity for medical devices will soon be virtually enforced. So only existing devices can profit from the exemption for a limited time, because the non RoHS compliant components might not be available in long-term. Therefore, new developments of medical devices should be RoHS conform, if the high investments in development, documentation, qualification and certification shall not be endangered.

Similar considerations apply to the expected product life span of components. Components with simple functions show a long life cycle (if these took the RoHS hurdle) and as „standardized“ components are also easily exchangeable. The situation with innovative new developments is completely different: In particular for new powerful components (targeted for entertainment electronics, computers and telecommunication devices) the innovation rate is very high and therefore they have only short product availability. Only few of these components evolve to „industry standard“, and are available for a longer period of time and/or are maintained with pin and function-compatible successors. Ignoring these facts, quickly raises a cost-intensive re-certification or a complete new development.

For all medical developments, it's a must to follow the specifications in the data sheet closely. An all too generous interpretation of the specifications requires at least a lengthy discussion with the certification authority or can make complete redesign necessary. In order to prevent this, an early co-operation with the certification authority is indispensable. To do so, possible problems in the design and the component selection can be promptly discovered and eliminated in an early stage.

Besides ever faster design cycles developers of medical devices must be aware of the "component availability hurdle" already in the earliest design phases, in order to fulfill the increased requirements with a limited set of components. An agreement with the component manufacturers and the certification authority is recommended. A careful system design, combined with a deliberate component selection, and the use of optimal printed circuit board and interconnection technologies, attains the goals even under these adverse circumstances. Space and performance constraints, can be fulfilled without having to utilize high-specialized ICs of the latest generation or to develop an ASIC.

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What's System Miniaturization?

The need and the potential to miniaturize electronic systems has inspired many companies to create new or to miniaturize existing electronic applications. Very often system miniaturization is equated with ASICs. That is only one option. There are many other approaches for system miniaturization and the most appropriate combination shall be selected.

System upgrading

Often a system can be "miniaturized" by upgrading the system, using new and improved components that combine analog and digital functions. Besides that the area of the electronics, the number of components and board layers are reduced and therefore the system cost in production.

System partitioning

For new electronic applications, system partitioning is important. Partitioning the system into logical and functional blocks sets the base for the further steps "repartitioning of electronics and software" and "technology selection".

Decision criteria are:

- Reuse of a system part in multiple applications (e.g. amplifier circuit, communication circuit)
- Very high complexity of a small system part (e.g. one component with several hundreds of pins in an otherwise relaxed system),
- Different technologies (e.g. high power and memory)
- Security or environmental conditions (e.g. parts that have to be especially encapsulated) and others.

Repartitioning of electronics and software

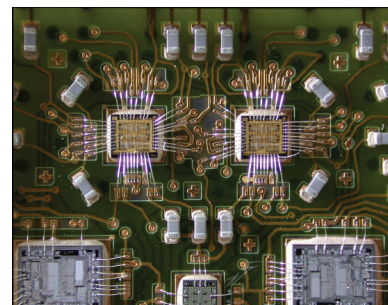
Another possibility to reduce the size of a system is to use micro controllers, processors, FPGAs to integrate discrete and analog electronics into "software" running on those ICs.

Technology selection

Last but not least is the selection of the appropriate technology. Based on the analysis above, the size requirements and the expected production volumes, a whole range of electronics implementation technologies can be chosen:

- SMD (down to 0201, BGAs and CSPs),
- HDP (different substrate and assembly technologies)
- One or several ASIC (analog, digital or mixed

High Density Packaging



Usually, packaged integrated circuits (ICs) are soldered on printed circuit boards (PCBs). In this soldering process, known as surface mount device (SMD) fabrication, the ICs are all placed sequentially on the PCB, then soldered/connected in parallel. Each IC-package bridges the fine pitches of the IC connection pads (down to 75 μm) to the rather coarse pitches on the PCB, where there are several hundred μm between interconnect lines. These packages increase the size and weight of a system. HDP now uses unpackaged ICs (so-called bare dies) to reduce size and weight. The bare dies are placed onto substrates that have a smaller line pitch (20–80 μm) than standard PCBs. Also, the ICs are not soldered, but connected in a different way. With wire bonding, small wires are used to connect every single connection pad from the IC to the substrate. Or by using flip-chip, the IC is turned over, thus the connection pads are pointing towards the substrate. Either small solder balls or conductive gluing make the connection.

signal).

Art of Technology has a long experience especially in system miniaturization and in HDP technologies to support its customers with the appropriate, standard or customized solution.

We are able to find the appropriate manufacturers in terms of technologies and production volumes in or outside our broad manufacturing network.

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Application

World's smallest GPS Data Logger

The Miniature GPS Data Logger is a complete system including antenna, battery and charger. It logs GPS data to a non-volatile memory, read out over USB. The route is graphically displayed in Google™Earth. It can be used wherever GPS data is logged on the fly.

Key features

- World smallest GPS-Logger
- Size: 60 x 35 x 15 mm³ case
- Weight: 28 grams
- Runtime ranges from 5 hrs "continuous" (2.5Hz) sampling up to several days in adaptive modes
- Up to 80'000 position fixes with time stamp. Equivalent to one month with one fix per 15 seconds logging 11 hours per day.
- Flexible configuration
- 16 channel low power LEA-4A GPS Receiver Module from u-blox AG (see www.u-blox.com)
- Internal battery charger
- ATmega128L processor
- 8Mbit Data Flash
- 230 mAh battery



Purpose

The Logger has been developed as a base for other/advanced applications where GPS data are needed. The GPS logger could be extended to various different systems. In combination with communication (RF, Bluetooth, ZigBee, GSM), further sensors (movement, temperature, humidity) and/or intelligent software the device can be used not only for logging and communication data but also to trigger alarms.

Possible application areas could be:

- Tracking of security patrol
- Surveillance of animal behavior
- Together with tools like RoboGEO www.robogeo.com the generated GPX file can be used for logging digital photo position, display tracks or photos in Google™Earth or Google™Earth

Already planned is a GPS Logger for small animals (goal: approx. 15g, half the Volume).

For further information visit us at electronica 2006 in Munich, November 14th-17th 2006, Booth 661 in hall 1 or see: www.aotag.ch

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Industry News

New Managing Director at Photonfocus AG

Daniel Straub, born in Switzerland in 1966, joined Photonfocus AG in October 2006 as Managing Director. He graduated in mechanical engineering (Dipl. Ing. ETH) as well as in economics (lic. oec. HSG). He has several years of experience in different positions in the management of small and medium sized companies, all of them acting worldwide.

Photonfocus AG, is a dynamic, solidly founded start-up company. Photonfocus combines solely leading expertise in designing CMOS sensors with sound vision camera engineering. Photonfocus sells standard cameras and OEM vision modules for the industrial market. Besides standard products Photonfocus offers solutions adapted at customer's needs.

For further information see: www.photonfocus.com

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New A2X-Bus Technology – Mixed-Signal Single-Wire Bus-System from Miromico AG

At the electronica 2006, Miromico will present a new and innovative mixed-signal single-wire bus-system for microcontroller based applications.

This new bus system allows the microcontroller to control multiple analog peripheral IC's using a single pin, as well as to read out their analog outputs via the same pin in order to digitize them with the internal ADC.

This innovative technology enables the realization of lowest-cost intelligent sensor systems by eliminating expensive external precision components and reducing μC pin-count, allowing to use lowest-cost controllers.

A first programmable instrumentation amplifier IC with integrated A2X bus technology will be presented at the exhibition.

For interested users in the sensorics, automotive/industrial and consumer electronics area, Miromico offers a full set of products and services, ranging from standard products to application and customer specific IC's.

For further information:
visit Miromico AG at electronica 2006 in Munich November 14th-17th 2006, Booth 661 in hall 1
or see: www.miromico.ch

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New u-blox 5 GPS / Galileo Positioning Engine

u-blox, the leading Swiss provider of innovative GPS receiver technology, will be presenting its fifth generation of GPS & Galileo-ready chips and chipsets at the electronica 2006. This breakthrough technology generation, called u-blox 5, offers acquisition times of under one second and -160 dBm sensitivity, but requires less than 50 mW and less than 100 mm² space. That performance combined with energy and space efficiency means that u-blox' latest generation has opened the door to an entire new generation of GPS-enabled devices, particularly in the rapidly expanding handheld market including mobile phones, PDAs, personal navigation devices, watches, media players and cameras.

For further information:
visit u-blox at electronica 2006 in Munich, November 14th-17th 2006, Booth 661 in hall 1
or see: www.u-blox.com

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New GPRS/GPS module from Telit Communications S.p.A.

The new GE863-GPS is the smallest combined GPRS/GPS module on the market! It combines Telit's proven GSM/GPRS core technology with the latest SiRFstarIII™ high sensitivity Single Chip GPS receiver. The unique Ball-Grid-Array (BGA) package enables a very low profile and small product size to design extremely compact applications using location technology. Since all connectors are eliminated, the solution cost is significantly reduced compared to conventional mounting concepts.

Features:

- SiRF Powered
- BGA Package
- 20-Channel GPS Receiver
- High Sensitivity
- GSM Quad Band
- RoHS Compliant
- Embedded TCP/IP Stack
- GPRS Class 10
- PYTHON Script Interpreter
- Embedded FTP and SMTP Client
- Extended Temperature Range
- Extended RF Sensitivity

For further information see: www.telit.com

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Upcoming Events

electronica 2006

(AoT booth 661 in hall 1)
November 14th-17th 2006
Neue Messe München, Germany
www.electronica.de

Wireless Congress 2006

November 15th-16th 2006
Neue Messe München, Germany
www.electronica.de

Nanofair 2006

November 21st-22nd 2006
VDI, Karlsruhe, Germany
www.vdi.de/nanofair

Medtec 2007

(AoT will be exhibiting)
February 27th – March 1st 2007
Stuttgart, Germany
www.medtecshow.de

SMT/HYBRID/PACKAGING 2007

April 24th-26th 2007
Messago, Nürnberg, Germany
www.messago.de/smt

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