Kontron Solutions@Work

We create digital brains for a more intelligent world

Large scale operation of JRex and JFLEX™ between cows and pigs

Optibrand uses Kontron technology for animal retina identification

Kontron corporation has introduced the standardization of 3.5“ Single Board Computers (SBC) with the new JRex CPU boards and the compatible JFLEX expansion module. The American company Optibrand uses these boards as a solution for the identification of livestock: the board`s core – a rugged handheld computer with camera for retina scan – works together with a JRex board and a JFLEX communication expansion. At the moment several thousand of these rugged computers without cooler are yet in use.
Beside the global presence and a high economics of scale, Kontron wants to top the average target growth with these new technologies: 16 per cent are Kontron`s aim. The whole market is expected to grow almost 8 per cent, considering all prospects of modules to complete industrial PCs.

In the area for compact embedded Single Board Computers Kontron basically offers three variations for OEMs which, at the same time, show the evolutionary way of development in this technology:

- The well established PC/104(plus)-platform with ISA- and PCI-bus comprises 15 free scalable CPU boards at the moment.
- The redevelopment of the speedMOPS format which is based upon the PC/104 specification regarding ISA and PCI bus but accepts the implementation of modern, high performance CPUs because the CPU board has been enlarged to form factor 3,5”: Here the CPU is taken out of the PCI/104 and can therefore be cooled perfectly.
  In comparison with PCI/104, the alternative concept of PC/104 consortium which

displaces the ISA bus, all existing PC/104 extension cards have been supported. Consequently also the ISA-bus basic cards.

- Additionally the JRex/JFLEX series. JRex/JFLEX offers more room for technical equipment within the 3.5" standard format in comparison with PC/104 boards and displaces the ISA bus.
  Furthermore, the absence of wires between CPU and extension board facilitates manufacturing.

Altogether OEM customers themselves offer solutions for nearly any kind of technical challenges: "traditional" pure PC/104 systems, speedMOPS boards with PC/104 extension cards or ISA variations and cable less JRex/JFLEX variations, depending on the field of application for the completed system with the customer and how it is produced.
The new JRex boards and JFLEX cards are Kontron´s spearhead in the compact SBC area unleashing the possibilities of today`s technology.
Completely new defined applications will increasingly jump onto JRex/JFLEX.
Therefore, Optibrand has decided in favour of JRex/JFLEX and helped this combination to one of its first large scale operations. These boards will be introduced in one of the hardest application fields: handheld & rugged in a stable used between cows and pigs.

Tracing of identification and prevention of epidemics:

Optibrand is a start-up American company which has developed an innovative procedure where productive livestock can be identified by retina-scan and their bloodlines and even medical treatment history can be retraced.
Highly developed nations worldwide rate high importance to monitor meat productive livestock from birth until slaughter to prevent destructive zootoxins and to guarantee the quality of the meat regarding consumer protection.
For this reason exists in the EU a dedicated system which consists of identification, registration and notification of animals at authorities.

In practice this means that the breeder earmarks e. g. a newborn calf with a ten-digit figure and registers it in a central database. If the calf is traded, this likewise has to be registered in this database. Therefore, any inbound and outbound animal can be enlisted consistently and their bloodline is retraceable. Additionally, every animal will get a passport in which all important information like vacancies, diseases, medical&chemical treatment, feeding etc. have to be listed and enrolled.

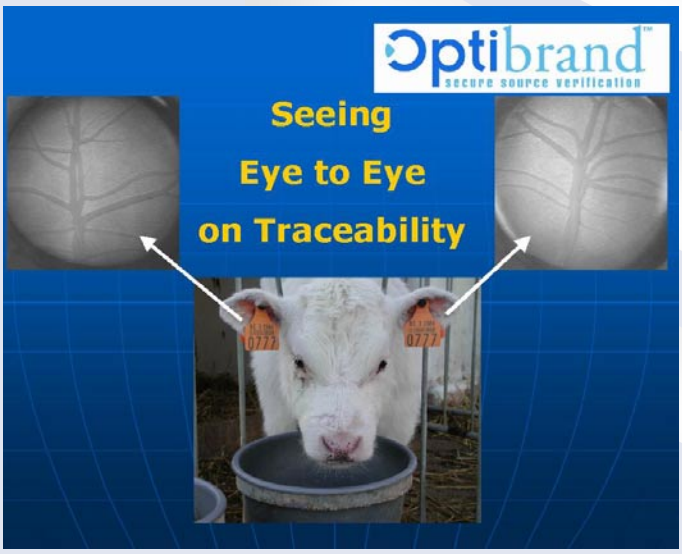
The current system`s weak spot is in fact the earmarking as such. Approximately ten percent of all earmarks disappear – simply get lost - within an animal`s life and needs to be replaced - accompanied by complex and cost intense procedures of necessary re-identification. Furthermore, the "mobility" of the earmarks opens the floodgates to deception. Animals from other countries are more often identified to be of German origin.
Another problem is that the system demands great bureaucratic efforts.
In Germany are about 13.3 million cows registered, throughout Europe even up to 78 million.
Therefore emerged the search for a cost effective and non-corrupteable identification technology which serves the following features:

- Fast, automated and electronic identification of animals and explicit marking
- Security against fraud and unambiguous marking of animals
- Consistent retracing from birth to slaughter
- Connection of identification features with health data and data of the covered dis-

tance in an animal´s life
- animal-friendly marking (no harm)
- simple handling identification technology suiteable for unskilled staff
- immediate data availability

Identification through biometric features

Alternatives to current optical marking technologies offer electronic and biometric procedures. Electronic methods like RFID on one hand simplify the administrative process through automated identification, on the other hand further depend on additional markings. When fixing them externally, the problem of losing and necessary replacing is still unsolved. If implanted into the animal`s body, it requires a surgery which may weaken the animal very strong if i.e. applied right after its birth. In a worst case it could even lead to its death. Biometric processes, which identify animals via biologic "markers", are way more secure against fraud and do not request any markings. But for larger factory farming they are partly too expensive - e. g. DNS profiling - or the "markers" are not stable enough e. g. the iris, which is changing from birth during growth and illnesses.



Retina identification

Optibrand focuses on a stable biologic marker, yet stable from birth on. The procedure uses the structure of the retina as the identification feature. The company has developed a complete application on the basis of "Retina Imaging" which, at the same time, ensures absolutely secure identification, security against forgery, as well as a consistent traceability of animals during their whole cattle lifetime.
The breeder simply photographs the cattle retina via a mobile handheld computer. This systems name is "OptiReader" and it consists of a rugged "single-hand chassis", suiteable for use in stables, which is connected to a cylindrical outdoor camera which could also be held and handled with a single hand. The user simply puts the OptiReader and shock proof camera in front of the animal`s eye and snapshots the cattles retina.
The exact position of the cow will be registered via an internal GPS receiver simultaneous when the retina image is recorded and saved. To this dataset any information could be added directly on site via the OptiReader e. g. reselling, artificial insemination, vaccination.

With the aid of a special transfer software and a search engine, which finds the right entries by comparing the retina images, the breeder transfers the information into his database. He himself or organisations, which are authorized with registering and retracing of livestock, get a consistent report with details of location and medical treatment of the "photographed" animals as a result.

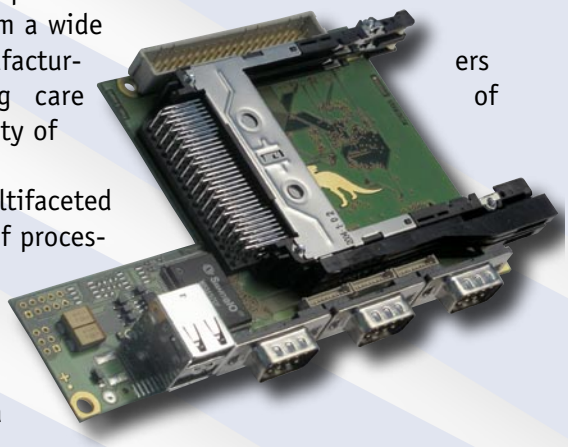
Optibrand and current procedures

Although the Optibrand system works as the only identification and retracing solution, it is designed to work together with the existing and legally prescribed marking systems. Barcode readers and RFID receivers - for the handling with normal and electronic earmarks respectively transponders - can be simply connected wireless to OptiReader via Bluetooth or via USB port by cable. The current earmark system and future solutions with electronical marking can be optimized as follows:

- If earmarks are registered and saved together with retina images, the earmark number can always be clearly assigned to an individual animal and deception will expire.
- Plausibility checks, which devour resources, can be set aside if earmarks are lost. The breeder transfers the retina images of the animals having lost their earmarks and gets new earmarks with the right figures. Later, it will be possible anytime to check if the earmarks hang at the "right ear".
- The connection of number, retina image and GPS information allows to retrace the animal`s geographical distance and historic route (import / native).

Ideal reading with JRex and JFLEX

Optibrand uses JRex/JFLEX platform as technical base for the OptiReader. JRex and JFLEX together form a new standard for 3.5" single board computers. With JRex CPU boards and JFLEX extension cards OEMs form individual solutions by simply "sticking together" modules of different manufacturers. Board and extension card can be combined without cables like it is still necessary with PC/104.
Interfaces 2x USB, LAN, compact-flash, keyboard/ mouse, VGA and COM1 are always put at the same place at JRex boards. Power supply is carried out by ATX-standard which fulfils different current voltage requirements and comprises e. g. stand-by, power-good and cooler control functions (for JRex Boards with active cooling). JRex modules apply with cheaper standard desktop SDRAM DIMMs as working memory instead of the common expensive SODIMMs. By choosing JILI the panel interface will be standardized. JILI is a universal usuable "Plug&Display" adapter which is available for all common panel kinds. With this adapter OEM can chose an appropriate monitor for this application from a wide range of manufacturers without taking care of the compatibility of the panel port.
Volitionally multifaceted is the variety of processors.
Available are the following fanless variations without a system cooler:



JRex-GX1: Geode with up to 300 MHz
JRex-C3: Intel Celeron 300 MHz
JRex-VE: Via Eden 300/600 MHz

More performance (with active cooler) offer the following products:
JRex-P3: Intel Pentium 700 MHz

JRex-VC: Via C3, 1,0 GHz
JRex-PM: Intel Celeron/Pentium M 600/1000/1100/ 1600/1800 MHz

As an extension, JFLEX modules are footprint compatible plugged to the 3.5" form factor of JRex boards. They offer wireless PCI performance and are in comparison to PC/104 extension boards very attractive, regarding the price, because no press-fit connectors and cables are necessary anymore. JFLEX Interface possesses the AC97-, LPC- and the full PCI-bus. A JRex board can administrate several JFLEX modules (up to three PCI master devices). The existing JFLEX product portfolio is already now designed for all common applications. Additional to standard PC features like WLAN, miniPCI, Sound, USB, Firewire, Multi-LAN, Multi-Serial, modem, Bluetooth etc. also industrial JFLEX modules for analog and digital I/O as well as the common field bus systems and multiaxis controllers are planned.

The OptiReader is run by a JRex-CPU board called "JRex-GX1" with National Geode GX1 processor without cooler and Kontron`s JFLEX communication module. The processor of GX1 has a 300 MHz frequency and up to 256 MByte working memory. The JFLEX extension card offers two USB ports, a firewire access (IEEE 1394) and twice 10/100 BaseT LAN.
Optibrand`s decision and choice for JRex/JFLEX and Kontron is based on two aspects:
First, the decision for JRex and JFLEX as technical base for the OptiReader;
Second, the decision for Kontron as a supplier for technology.
From Optibrand`s point of view the following reasons favoured the use of JRex/JFLEX:

- Since there is no cost for cabling, JRex/ JFLEX modules are perfectly appropriate for bulk production. In the USA, by now, several 1000 OptiReader are in use. If the Optibrand solution will follow its way in the USA and also becomes successful in Europe, then, it´s a matter of six and seven digit numbers of pieces.
- By standardizing hardware elements, Optibrand will be able to migrate easily and quickly to other processors without having redesigned the whole system. This is an existential feature for the future success and investment security.

Besides, another reason for Optibrand to decide in favour of Kontron has been the matching of offered technology to planned solutions. The demands to the potential supplier have been high: various solution possibilities for a complete range of products throughout any technologies and form factors, extensive services for system developments (Design-In, tests etc.), worldwide presence and the ability to produce reliantly big numbers of pieces have been important reasons for Optibrand.

Grow faster than the market

Applications for special branches like Optibrand has created it for meat production, arise in any economic sectors in which the application of digital intelligence enhances the efficiency. In the beginning they create high demand in case of success, then demand reduces but stays continuous in the aftermath. If all branches are cumulated, from stock farming to industrial roboters, the result for Kontron is a stable and altogether independent market growth.

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