

TECH TRENDS

TECHNICAL NEWS AND TRENDS FROM PREVAS #2 2010



Crucial product development

Life science projects that offer patients more effective treatment and can save lives.

Helmet saves lives

Correctly diagnosing stroke patients is crucial. With Prevas' help, Medfield has developed the Strokefinder R10 measurement system.

[Read more on page 4](#)

Smart Thumb-EKG

Zenacor and Prevas have developed a unique product that can diagnose cardiac arrhythmia, simply.

[Read more on page 6](#)

No remote control

In the future, we will be able to use sign language instead of a remote control to control sound and light by making a few simple finger signals in the air.

[Read more on page 8](#)





Prevas creates innovative technical solutions

A clear trend today is that a growing number of technology-intensive product companies are recognizing the advantages of outsourcing development projects to professional product development partners. For Prevas' larger customers, this is often prompted by the need to solve capacity problems or increase innovation rates. For small and medium-sized companies, the concern is more likely to be with boosting productivity and reducing time-to-market. This is where Prevas comes into the picture.

When our customers come to us, they usually have a good idea for solving the end user's problem in a new and smarter way. Based on the customer's product idea, Prevas then contributes by creating innovative technical solutions to increase the product's effectiveness and appeal.

What the straightforward and more complex aspects of a product development project have in common is the importance of expertise in industrialization. We use the term industrialization to refer to obvious considerations, such as the fact that the product must be suitable for efficient testing, manufacturing and maintenance. The product must also be capable of meeting all the regulatory requirements necessary for it to be finally launched on the market.

Zenikor Medical Systems and Medfield Diagnostics are two of Prevas' customers who have a great deal in common with each other. Despite being relatively small organizations, both companies are incredibly innovative. Although, on the face of it, their products are extremely different – one is hand-held, economical to manufacture and easy to use, while the other is rack-mounted and focused on high performance at a relatively high product cost – there are many common denominators in the development project. The project has been run on a relatively modest budget, but it also has operational requirements, schedules and regulatory standards that cannot be compromised. As with all projects, the right combination of project groups and the right technical solutions to keep the project budget to a minimum were, therefore, of the utmost importance. In close cooperation with Zenikor Medical Systems and Medfield Diagnostics, we were given the opportunity to take part in the development of healthcare products that can save lives as well as money.

Read more about these and other exciting projects on the following pages.

You are more than welcome to come to us with your own ideas!

Jonas Mann
Business Area Manager Product Development Sweden

TECH trends

Technology trends, inspiration and news from Prevas AB.

Prevas is an innovative IT company with a strong corporate culture that provides its customers with world class competitiveness. Prevas develops intelligence in products and industrial systems. Prevas operates in nine districts throughout Sweden: Gothenburg, Helsingborg, Karlstad, Linköping, Lund, Malmö, Stockholm, Uppsala and Västerås, as well as in two districts in Denmark: Copenhagen and Århus, one district in Norway: Oslo and also United Arab Emirates and India.

For more information about Prevas, please visit
www.prevas.com



ICES



Prevas is an ICES Gold Member; ICES stands for Innovative Centre for Embedded Systems. ICES, a center of excellence at KTH (Royal Institute of Technology), collaborates with industry. ICES currently involves a large number of research groups that are active within four of KTH's Schools. Focal areas include system architecture, software verification, and methodology and tools.

Swedish Embedded Award

Prevas has been nominated for a Swedish Embedded Award for the third year in a row. Prevas and Zenicor are competing in the "Enterprise" category with a unique product, Zenicor EKG-2, which can diagnose cardiac arrhythmia in a simple manner. Read more about the product on page 6. The winner will be announced in Stockholm on October 19 during the Embedded Conference Scandinavia.

Embedded Conference Scandinavia October 19-20

Come and visit us there. Prevas is a Gold Sponsor and will have an exhibit in booths 13-14 (The Embedded Hall). We will exhibit our service offerings within embedded systems and our centers of excellence within life science and test system design. We are also offering a number of seminars with interesting topics such as wireless communication, open source software and embedded green IT.

New expert consulting company in Gothenburg

Prevas will be starting up a new subsidiary in Gothenburg, Prevas Technology West. The company offers cutting-edge expertise in system development for organizations with intensive product and system development activities in western Sweden. The reinforcement within technical IT and embedded systems, that has been missing in the customer's project, will now be offered on site at the customer's place of business.

M2M, machines that communicate with each other



M2M is when machines communicate with each other without the involvement of humans to initiate communication. Even if technology is used to enable the machines to communicate with other machines,

the primary focal point is benefit and opportunities. Many industries will be able to enhance efficiency and increase level of service thanks to M2M. Some examples include home alarm systems, quicker measures in intensive care and improved safety for firefighters. M2M is playing an increasingly important role for Swedish industry, which is constantly looking for new ways to increase productivity and improve competitiveness.

Communication between different products, both in the home and in industry,

is a strong future trend. It is estimated that in 5-10 years, 300 million units will be connected and able to communicate with each other in Sweden. According to Intel, the global figure will be 15 billion by 2015.

Prevas has been developing advanced technical solutions within product development and industrial IT for 25 years. Prevas is included in Telia's M2M partnership program, and is one of the selected technology suppliers that is able to provide tailored M2M solutions quickly and effectively.



Please contact Jacob Norrby at Prevas if you would like to learn more, jacob.norrby@prevas.se

Sustainable development, trends and directives

The issue of the climate and our chemical society have generated a long line of new legal requirements and directives for the electronics industry. We must become more "Green Lean", build and manufacture with a minimum of resources and use the least possible amount of energy and materials in order to avoid waste. It is important to consider the product's entire life cycle from the very start of a development project. Intelligent products and systems will also help us reduce energy consumption and create a more sustainable society.

Please contact Maria Månsson at Prevas if you would like to learn more, maria.mansson@prevas.se.

Embedded green technology

Consultants who work with embedded technology are faced with environmental challenges in many ways. Since Prevas supplies solutions and services within many different industries and usage areas, we are involved in different types of green technology projects. Some solutions can be used in general contexts while others are very customer specific. Examples vary from updating existing products to make them more environmentally friendly to getting involved in new green technology.



Please contact Hans Nyström at Prevas if you would like to learn more, hans.nystrom@prevas.se.

We can satisfy curiosity about what is beneath the surface of consumer products.

Prevas and Ny Teknik are digging beneath the surface of several everyday devices to see how they work. They are looking at everything from system cameras and iPads to robot vacuum cleaners. Newly purchased consumer products are being dissected and carefully examined. What is inside the product and how have the technical challenges been resolved? The results are presented on Ny Teknik's website:

www.nyteknik.se/popular_teknik/under_skalet





Helmet that save lives

Quick diagnosis with microwaves for more effective treatment.

Gothenburg-based Medfield Diagnostics is a startup company that develops micro-instruments for healthcare. The aim is to develop instruments and software that can differentiate types of stroke, and where a diagnosis with microwaves can offer more effective treatment.

A stroke that causes a cerebral hemorrhage requires one type of medical treatment, whereas a blood clot in the brain requires a completely different treatment. The problem physicians face is in choosing the right type of measure. For example, prescribing an anticoagulant for a cerebral hemorrhage can worsen the person's condition and even be life-threatening. Making the right diagnosis as early as possible is extremely important. Fast and correct treatment reduces the risk of the patient losing speech and mobility.

Medfield Diagnostics was founded in 2005. Operations are based on a research project that has been going on for several years at Chalmers University of Technology. The project works with a method that uses microwaves to make an image of soft body parts. The microwaves do not behave in the same manner as x-rays; rather, they spread in all directions, which means that measurement is made in a number of directions. The measurement results are then analyzed with Medfield Diagnostic's own algorithms (patent pending). The hope is that microwave tomography can be used to make the right diagnosis.

Patrik Dahlqvist, CEO of Medfield Diagnostics, says that their development plans can be described as a three-step rocket. The first product, which was produced

in cooperation with Prevas and National Instruments, is a research instrument for clinical tests within stroke research. The product is called Medfield Strokefinder R10, and it will primarily be used for clinical tests. Researchers will be able to test different types of stroke-related measurements to verify and analyze the possibilities afforded by microwave technology, as well as study how the technology behaves in relation to other diagnostic methods. The instrument should be available for use in hospitals in about three years, and the technology will be able to monitor and send an alarm. From a more long-term perspective, perhaps 5-6 years, it is believed that an instrument can be produced for use in ambulances, to enable early determination of stroke type.

Having a development partner such as Prevas was especially important for Medfield Diagnostics, which is financed by risk capital. The partnership meant quick product development, low development costs and a flexible, module-structured solution, that is also suitable for other applications, concludes Patrik Dahlqvist.

The equipment consists of measurement equipment and a helmet that the patient wears. The equipment uses microwaves to examine the brain. There are antennas in the helmet that, together with the

measurement equipment, act as transmitters and receivers. The microwaves are sent into the brain from various angles. The antennas work in the same frequency area as regular cell phones, but the effect is very low, just around four percent of the strength of a regular mobile antenna.

Prevas supplied measurement equipment consisting of a PXI system¹⁾ with a number of modules as well as the software that performs the measurements.

"When Medfield Diagnostics contacted us over a year ago, there was no existing commercial solution in place to suit their application," says Hans Nyström from Prevas. He continues:

"As a Select Alliance Partner of National Instruments, we cooperate when it comes to both sales and development. This means that, together, we can find new solutions based on commercial products. In this case, a compact PXI-based network analyzer, which at the time of development was not available as a commercial product, but could be made available to Medfield Diagnostics through our cooperation."

National Instrument's network analyzer is extremely compact and processes data in real time. This is exactly what Medfield

Simulators with AMOLED technology

MSE Weibull develops and manufactures training simulators for the military and civilian sectors. In order to satisfy the requirements of specific customers, the simulators are based on modules and different modules are recycled.

Microdisplays are used in several of MSE Weibull's training systems. In one development project that MSE Weibull recently implemented together with Prevas, a future-proof solution based on the new generation of OLED displays was produced. The simplicity with which the display can be built into optical systems is the main reason OLED technology was selected.

"We contacted the developers at Prevas because we needed help with producing software and hardware for a new OLED microdisplay," says Johan Schmitz, who is the marketing manager at MSE Weibull. "We needed a new type of screen that has high resolution of 1280 x 1024 pixels, despite the small format of 0.77 inches, diagonally (15.50 x 12.43 mm)."

"The technology for OLED microdisplays has many advantages. We chose this specific display technology due to the combination of flexibility and high resolution. The screens do not need an outer light source, which means optical elements can be placed very close to the picture area."

"The screen's high resolution makes it particularly suitable for our applications. The advantage is that minor details can be seen that are far away in the virtual world; that is, we can obtain a great deal of information even though the screen is small," explains Johan Schmitz. He continues:

"The operators in our simulators must be able, for example, to discern a far-away tank target. It is all about the relationships between focal distance, enlargement and pixel size.

To see as detailed a picture as possible, it is important to use a display with as high a resolution as possible."

"We buy the display from an American supplier. They only sell the screen; we develop the software and hardware for the drive electronics ourselves. Prevas

helped us make adjustments to suit our needs. The entire project has taken six months, which is, on the whole, an extremely short amount of time."

"Despite the short amount of time that Prevas had at its disposal, we have produced a functioning solution. Prevas' consultants were flexible and very perceptive to our needs. They also put a great deal of energy into making the solution function well."

"We are counting on being able to use the OLED technology in several of our applications. The investment has also allowed us to expand our product range since we can offer several new solutions to both new and existing customers," concludes Johan Schmitz.

Ola Augustsson, who made the sale and has monitored the project, says that MSE Weibull needed a partner that could supply a combination solution including software and electronics. Prevas put together a project team of specialists including software developers and electronics designers from the Malmö and Linköping offices. The project team produced the layout for the scorecard and hardware.



"The greatest challenge was time pressure. The card was delivered late. At the same time, we had to make minor adjustments to a new, improved version of the OLED display that was delivered over the course of the project. Despite the delays, we were able to keep our promised delivery dates and used fewer hours than we estimated we would need when we started the project," says Ola Augustsson.



owave-based diagnostic information to differentiate between different treatment.

Diagnostics needed for the measurement system. As a result of Prevas' cooperation with National Instruments, the first system was delivered to Medfield Diagnostics before the product was formally launched.

"The greatest advantage of the solution we produced for Medfield Diagnostics is that it is based on finished modules, both hardware and software. This minimizes development time at the same time that equipment can easily be rebuilt or modified for new needs that arise. Our development also becomes very effective as a result of using the LabVIEW²⁾ graphic environment. This leads to great savings for the customer in terms of both time and money," says Hans Nyström.

1) PXI is an industrial standard for PC-based instruments that are often used to build individual systems in which modules from many different suppliers can be combined into one unit.

2) LabVIEW is a graphic development environment with many finished modules that support programming of regular PC applications, as well as real time programming and FPGA programming. The graphic development environment allows developers to focus on the task the program is to perform, which means software development is both quicker and more cost efficient than traditional programming.



From left: Robert Tönhardt (Prevas), Mats Palerius (Zenicor), Sonny Norström (Zenicor) and Håkan Johansson (Prevas)

Thumb-ECG from Zenicor can cut the number of stroke patients in half

A disturbance in heart rhythm is usually noted when the heart beats harder or more irregularly than usual. ECG measurements enable certain types of heart defects such as atrial fibrillation or different types of short and prolonged attacks to be diagnosed in time. Zenicor Medical Systems, together with Prevas, has now developed a unique product that can diagnose cardiac arrhythmia, simply.

Zenicor is launching a new version of its hand-held ECG device that was produced in cooperation with developers from Prevas. Using the device is simple, and it consists, for example, of a display, two measuring electrodes and an integrated GPRS modem. Measurement begins by the patient placing his or her thumbs on the electrodes. The microvolt ECG signal is measured and stored in an internal memory, and measurement results are transferred when the patient presses the “send” button.

Measurements are sent to a central database via a regular cellular network. The caregiver can then review the results via a web interface and make a clinical assessment. The device also has a symp-

tom button with which the patient can signal that the situation is more acute.

The unit fits in a pocket, enabling the patient to take it anywhere. The unit fulfills the requirements set out in IEC 60601-1, a safety standard from the International Electrotechnical Commission (IEC) that was specifically produced for medical device products.

Zenicor’s ECG -2 is intended for diagnosis and follow-up of primarily two categories of cardiac patients. The first group consists of patients who can feel their cardiac arrhythmia. They might feel uneasy and visit their clinic, only to learn that their heart is functioning normally. An ECG device can be borrowed

to use at home, and when the patient feels the cardiac arrhythmia, he or she places both thumbs in the device to send signals to the hospital. Doing so enables diagnosis to determine whether the cardiac arrhythmia is merely stress related or if treatment is required.

The second large patient group consists of risk groups that run an increased risk of stroke. In Sweden, about 15 people per day have a stroke due to atrial fibrillation. This type of hidden heart defect is primarily present in older patients, sometimes in combination with diabetes. Using the ECG device would enable the highest-risk individuals to be pinpointed and treated in time.



Brief information about Zenicor Medical Systems

The company was founded in 2003 and works with remote cardiac diagnostics. The company's main product is Zenicor-ECG, equipment for diagnosing cardiac arrhythmia. Their device is currently being used in more than 100 hospital clinics in Sweden, Norway and Finland.

Mats Palerius, CEO of Zenicor, explains that using this type of active pinpointing could cut the number of strokes in half, which would be fantastic considering

We began with a pilot study in which we asked Prevas three questions. The questions concerned the quality of the ECG signal, cellular coverage and antennas,

Several improvements were introduced as compared to the previous version of the ECG device. Amongst other things, there is an integrated cell phone for automatic data transfer (machine-to-machine – M2M), a memory in which to store ECG data, optional length of registration time, use of dry thumb electrodes and a separate button for symptom marking.

■ ■ ■ **“Measurements are sent to a central database via a regular cellular network. The caregiver can then review the results via a web interface and make a clinical assessment.”** ■ ■ ■

the reduced level of suffering on the part of patients. Another effect of successfully locating individuals in time who run a risk of stroke is that society would save billions.

Prevas’ participation

“When we, together with Prevas, started developing the new generation of ECG device, it was important to produce a product within the framework of our development budget and on time,” says Mats Palerius.

as well as if the device could be operated with regular batteries. The actual development work did not begin until we had received responses to the questions.

Robert Tönhardt, who was responsible for the commercial aspects at Prevas, says that Zenicor contacted them with a product specification for a more modern and simpler product. We sketched out what the product could look like, produced a design proposal and drafted a detailed system specification.

The result was an ECG device with high performance. It is robust and reliable, as well as extremely easy to use.

“One of the greatest challenges involved sticking to the development budget. At the same time, I have to commend Zenicor. We have had open discussions and worked closely together over the course of the entire project. The greatest challenge, which I think together we have successfully resolved, has been to produce a well-functioning product at a reasonable price,” says Robert Tönhardt.

Sign language replacing remote controls

In the future, we will be able to use sign language instead of a remote control to control sound and light by making a few simple finger signals in the air. Infrared cameras will interpret our sign language alphabet.

We have all experienced it – frantically looking for the remote control to turn down the volume or change the TV channel. This will soon be a thing of the past. In the future, we will



not need a remote control for simple functions such as changing the channel or controlling volume. Apparatus will be equipped with infrared cameras that recognize a sound/image, which enables them to interpret different signs that control functions such as turning on/off, volume increase/decrease and changing channels.

For example, a sign to increase volume might be a horizontal V-sign that motions upwards; downwards would mean the volume should be turned down. In the same way, a vertical V that motions from right to left might remotely control a channel change. An OK sign with the thumb against the index finger might mean turn on/off. Using an infrared camera will also make operating apparatus easier at night.

It is easy to imagine a long line of products that can benefit from being controlled by signs. Regulating light sources, for example, is becoming an increasingly important development area since they are responsible for a relatively large proportion of CO2 emissions. Temperature fluctuation is another area that is suitable for finger-sign control. Water faucets that are currently sensor-controlled and touch-free are set to a specific, fixed temperature. Sign control will enable users to set the temperature as they please. Sign control might be appropriate for devices and machinery within industry that may not be physically touched for reasons of hygiene.

A solution with a camera and computational ability in the form of FPGA can produce a remote control for sign language in a very small amount of space and with low energy consumption. It will also be possible to teach the apparatus additional special signs for each individual situation.

Prevas' product development team has produced innovation with sign-controlled products, and solutions that utilize sign language can be adapted to customer need with a suitable sign language for a specific area of usage.

