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Vicor's CEO Patrizio Vinciarelli

Talking to Tsuneo Murata



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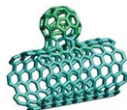
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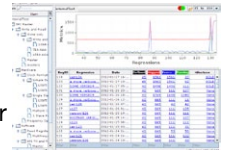
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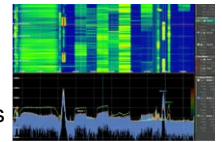
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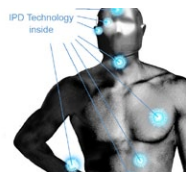


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Catcher drones to geo-fence industrial sites

By Julien Happich

ONCE MORE LAST OCTOBER, drones were making the headlines in France, with unidentified units reportedly flying over the country's state-operated nuclear power plants. The news stirred a lot of debate about nuclear plant security and highlighted the bold fact that no one had been able to prevent nor trace these repetitive intrusions.

The fact that French Gendarmerie may be allowed in the future to shoot down such trespassing drones (using firearms) may not be a deterrent against a swarm of malevolent drones and could also cause collateral damage. Securing large industrial sites against non-authorized drones is still an issue, but drone geo-fencing countermeasures are already in the making.

Just a few weeks after these events, during electronica, I stopped by the IMST GmbH booth where a radar-bearing drone was exhibited. Here, Siegfried Schulze, responsible for business development at the research-driven industrial engineering and design house, told me that an increasing amount of research was taking place to come up with preventive measures against such drone intrusions in established no-fly zones.

Talking about no-fly zones, if you buy a small drone, a notice is usually included in the box warning that it's pretty much illegal to fly it anywhere in populated areas or anywhere you could put someone at risk (the definition is as broad as it is vague except for airport routes or specific flying zones mapped in aeronautical charts). But this in itself won't prevent any malicious flights, and judging by the number of camera drones that are offered to consumers and pro-users alike to map and record their surroundings, it is inevitable that more drones will venture beyond the strictly private boundaries of a garden or a living room.

"For the next months to come, until the industry comes up with drone interception solutions, drones will represent a new potential threat to a lot of industrial sites", warned Schulze who leads a research group on special security systems and is

active in the German UAV DACH working group. According to Schulze, there will definitely be a market for catcher drones.

So what could be done to intercept a drone before it causes any harm?

"First, you want to identify it, know exactly what drone it is and what radio link it uses and possibly communicate with it. Then you want to stop it before it trespasses the site's boundaries, then you want to catch it or take it down", explained Schulze.

"Here we are exhibiting a high precision 3D radar technology light enough to be used on-board drones for anti-collision and flight control, but it could also be used to exactly pinpoint and locate simultaneously other drones, learn about their speed and flight direction."

"We are also developing sensor and radar solutions in order to determine the unique acoustic, thermal, EMI and optical signatures of any given drone", he added, "because you

don't want to raise false alarms every time a bird flies over your site".

Practically, the idea would be to record these multi-domain signatures for all known commercial drones and have their

unique signatures ready in a data base for quick profile matching and 100% physical identification.

Such detection and identification units (including the radar, a video camera and multiple sensors) could be pole- or wall-mounted at a site's periphery. Then, upon detection of a nearby drone, the actual interception step could require a specialized drone capable of getting close enough to jam the intruder's GPS signal.

"As a failsafe feature, when a drone's central unit no longer receive any radio commands or GPS signal, it hovers on site until

it recovers its communication link or until it drops dead short of battery juice", justifies, Schulze, "so by knowing what drone we are dealing with, we could launch the appropriate jamming scenario to freeze the drone in the air".



Fig. 1: At the IMST GmbH booth, a radar-equipped quadcopter.

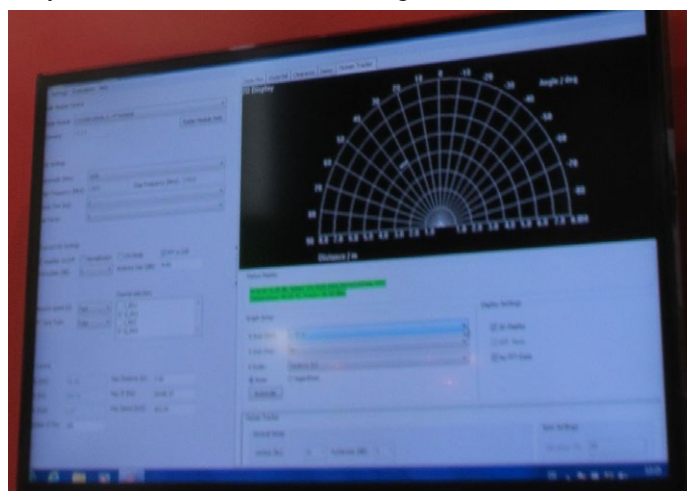


Fig. 2: Real-time radar detection of multiple objects.

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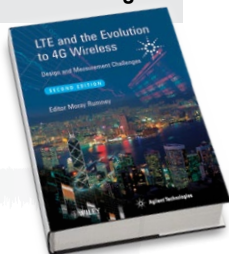
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No need to hack into the communication link or try to establish a dialogue with the pilot for that, although you could imagine a small flag popping up reading “your drone is under arrest” for the video record.

By knowing exactly what commercial drone is being used (and having studied its communication link beforehand), one could even try to hack into the system to take over flight control.

Catching the drone or taking it down is more problematic, admits Schulze. Simply taking the drone down could create accidents if it was hovering over high-voltage installations or over chemical plants.

“We would have to build an intelligent mapping system so the interceptor drone would know exactly where it is, inside or outside the industrial estate, and if there are any roads or populated areas nearby” he commented. In some cases you could just wait for the trespassing drone to drop short of battery power (typically a few minutes to around half-an-hour for most hobbyist drones), but for better control, one envisaged solution could be to equip the catcher drone with a releasable net, tied to a small parachute equipped with flashing LEDs for people on the ground.

“A Tilt-wing drone like the prototype being developed by RWTH Aachen University for the AVIGLE European research project could be a good start” told us Schulze as we asked what type of drone would be suited to the task.

The aim of the project is to come up with an autonomous flying service platform for operations within a swarm (so with anti-collision and communication capabilities).

The tilt-wing allows for vertical take-off, with the hovering qualities of a rotorcraft. It also allows a progressive transition



Fig. 3: A conceptual illustration of the AVIGLE project implementation.

to a more energy-efficient horizontal flight mode like that of a fixed wing airplane. Specs of the AVIGLE project include speed capabilities ranging from 0 to 40m/s (144km/Hour), a maximum flight time of one hour, and a payload capability of 1.5kg.

A more specific goal of the AVIGLE project is to build a 3D virtual reality environment based on the acquisition of near-real time 3D pictures by a swarm of unmanned flight platforms. The data would be transferred via a high performance LTE radio network (pico-cells that could also serve as on demand radio networks in situations with insufficient cell coverage), to cloud computers in order to generate a virtual world almost in real time.

These pre-requisites would suit very well the context awareness that a fleet of interceptor drones would need in order to safely catch or power-freeze other drones.

Korea, France join forces on driverless cars R&D

By Christoph Hammerschmidt

THE GOVERNMENTS OF KOREA and France decided to conduct jointly funded R&D projects to develop software and parts for driverless cars, reports newspaper Korea JoongAng Daily. Other topics for the joint R&D efforts are wearables and digital medical devices.

Through the joint R&D projects, the two countries hope to become market leaders in the new business areas. The projects will be successful with Korea's strong information and communications technologies (ICT) and manufacturing technologies, and France's wide pool of basic science and source technologies create synergy, said the assistant ministers at a forum earlier this week where more than 200 government officials, researchers and private sector executives from Korea and France discussed project details and schedules.

Three working groups of scholars and private companies were formed in each of the three areas. Korean auto parts and telecom device developers including LG Electronics, Renault

Samsung Motors and Hyundai Mobis, and Renault Motors from France, will jointly develop radar and communication modules, key parts of driverless cars.

Researchers from Korea's state-run Electronics and Telecommunications Research Institute and Geneva-based STMicroelectronics agreed to participate in a joint project to develop a system semiconductor required in communication among wearable mobile devices and a central processing chip in cars.

Korea's top medical schools and French health care software developer Voluntis will jointly develop personalized medicine, consisting of treatment regimens based on genetic traits, DNA analytics technology and a big data management system that can quickly analyse patient's genetic information.

The projects will start next year with €2.17 million from the two countries and € 7.45 million from the European Commission's Eureka program fund.

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Communications become mission-critical

By Christoph Hammerschmidt

DRIVEN BY NEW APPLICATION fields in the Internet of Things (IoT) and machine-to-machine (M2M) context, communications technologies are undergoing massive changes. This goes along with enormous challenges for vendors of test and measurement equipment. EE Times Europe discussed the matter with Rohde & Schwarz, one of Europe's leading T&M companies. Dialog partners were Jörg Köpp, Market Segment Leader M2M/NFC and mobile communications technology expert Meik Kottkamp from R&S' Strategic Marketing.

EE Times Europe: The Internet of Things (IoT) is currently a much-discussed topic and certainly won't be ignored by a manufacturer of advanced Test and Measurement equipment such as Rohde & Schwarz. How does this topic affect your business, and which measurement challenges will IoT confront you with?

Jörg Köpp: Rohde & Schwarz mainly focuses on test and measurement for wireless communications. For us, IoT communications normally means M2M communications, so this has various aspects. First, there is the technological aspect. We observe that to some extent in the IoT context the technologies in use are well established – technologies we have known for years. This primarily holds true for the cellular technologies like 2G, 3G and increasingly LTE. However, M2M applications and their diverse requirements sometimes lead to the emergence of new technologies that for instance address power efficiency requirements. For us, this situation creates new business opportunities, of course, but we also have to assess what is “the hype of the day” and what will prevail in the market and remain attractive for us in the long run.

Another aspect that IoT brings to test and measurement is that communications increasingly plays a role in mission-critical or life-critical applications – and these applications have to be tested. The certification tools needed for this purpose are an interesting field of future business for us. An example is car-to-x communications. In the USA and Europe, the standardization of this technology has already reached an advanced stage. With IEEE 802.11p, a kind of modified Wi-Fi standard that originally was not designed for this type of application is now in use. For this reason, issues such as fading, concurrent handling of multiple requests, etc., have to be resolved. We are collaborating closely with the respective industry players to develop test methods and to simulate realistic environments like fading profiles to ensure that these devices work reliably under all circumstances.

There are also application-related aspects. In safety-relevant applications, the test effort can become very large. However, in IoT, with billions of connected devices anticipated, not all applications are safety-relevant. Consumer applications will be produced in high quantities and must be very low cost. This raises the question of what can be tested with these applications and who is willing to pay for it. This cost pressure is causing the test ecosystem to shift. Manufacturers often do not own the test equipment and do not use it on site. And, by the way, the tendency is that they no longer have the required expertise. Instead, the design and test activities are largely being outsourced.

EE Times Europe: Does the shift of testing activities towards specialized service providers lead to consequences for the design of the test equipment?

Köpp: For many test houses, IoT and M2M are becoming increasingly important business opportunities. However, there are different constraints than with OEMs, since these test houses in most cases are well established in the test business and have the required experience. But there is still a demand for more cost-effective, specialized test solutions as opposed to versatile, multifunctional equipment for broader markets.

EE Times Europe: Does this shift generate new business opportunities for you?

Köpp: From our perspective the question is: how can we address this fragmented market with its many small players, and which test solutions are best suited for this market? And is it necessary to create specific M2M test solutions? We have to consider cost aspects as well as technology. One can expect the test effort for many IoT devices to increase. But also at the other end of the spectrum, in the bulk business where cost pressure is extreme, the test ecosystem is undergoing massive change. This holds true for the actors as well as for the technology to be used. Currently under discussion, how entirely new technologies can achieve maximum coverage with minimal effort?

EE Times Europe: Does this mean that the test equipment must become more intelligent? Does it have to be connected to the Internet or to a GPS receiver, for instance for the purpose of finding the correct working frequencies?

Köpp: Yes, but there are more aspects to be considered. For instance, in the mobile phone business, testing has up to now focused on cellular technologies. Now GPS technology is added to the picture as well as the testing technology for globally dispersed TV channels with their different frequencies. The same holds true for M2M applications. Plus, tests today frequently include higher OSI layers. For this reason, we integrate deep packet inspection functionalities into the test instruments to enable test engineers to examine, for example, signalization and traffic behavior. This can be very relevant, for instance when it comes to power consumption.

EE Times Europe: One would expect that power consumption is typically addressed at a higher level, close to the application level. This would put power consumption into the responsibility of software developers, not of test equipment designers.

Köpp: The matter is a bit more complex. In the M2M realm, there are indeed features at the network layer that can reduce power consumption. A typical example: if I have a sensor that sends its data once every ten minutes, then such a sensor does not need to be in active state all the time; in between the transmissions it can be switched to some form of power saving mode supported by the network.

You see that this way power consumption can be linked to the network parameters.

EE Times Europe: What expectations does Rohde & Schwarz have regarding the IoT business market? Can you share some figures?

Köpp: We see, of course, that the industry is getting ready for IoT, and are aware of these well-known figures of 50 billion connected devices. We also know that the total available market in 2020 is estimated to be around \$800 billion. These are enormous abstract numbers that help to understand that communications technologies are being used in more and more industry fields and applications.

With our test and measurement competence, we can contribute to make these new applications become reality. Two examples of application-specific markets are eCall and car-to-X. We are very active in these markets, and of course we also cover the cellular technologies with all the test cases associated with them.

EE Times Europe: Which RF technologies do you think will prevail in IoT in the long run?

Meik Kottkamp: There won't be one single RF technology to cover all requirements. Based on the requests we receive for test equipment, we see that the range of technologies is currently expanding at a rapid pace. And so is the range of applications. Customer requests show us that set-top box vendors and cable network operators are interested in entering the home automation markets and that they plan to use existing remote control solutions for this purpose.

But it is hard to judge what will prevail in the future, since there are lots of alternatives – ZigBee, Bluetooth low energy and, of course, Wi-Fi. In addition, there are significant regional differences, for example when it comes to the future usage of TV white space. Our standard solutions enable users to solve a very broad range of measurement challenges. For specific customer requirements, it is necessary to map out multiple relevant aspects – such as how big the market is and who will really need this solution.

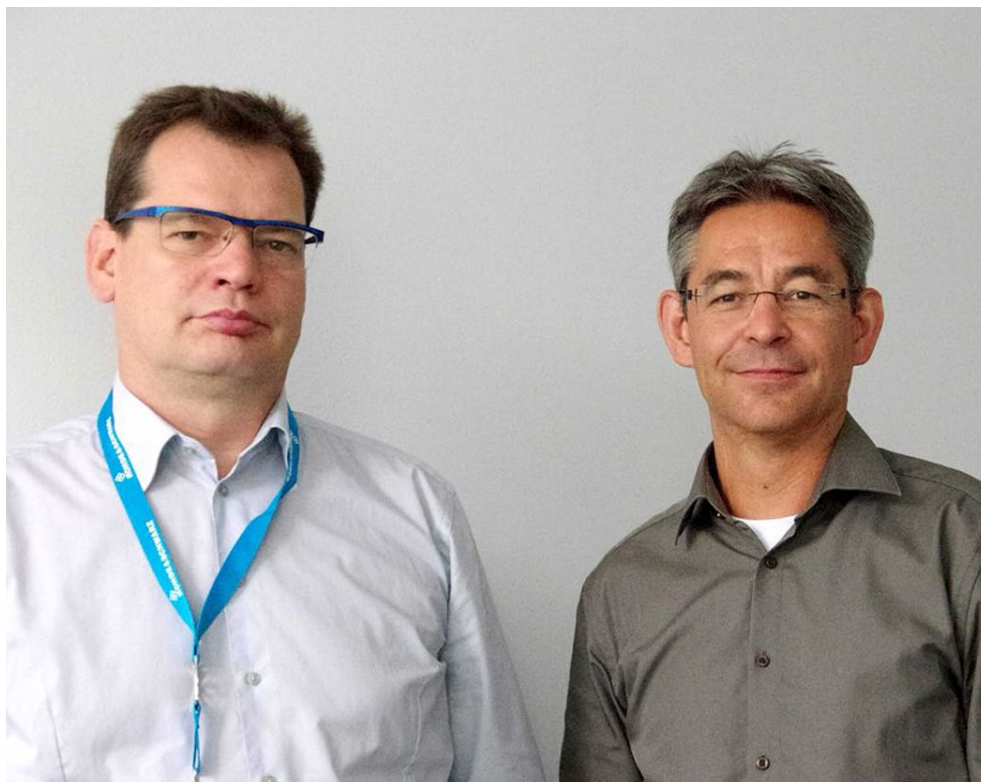
EE Times Europe: A technology that already has been hyped a lot is NFC. But it seems like the hype has now quieted down. Based on the demand for test equipment, can you perhaps determine if this technology has a chance to survive?

Köpp: I don't believe that NFC is doomed to fail. Although it has not yet found widespread acceptance in Europe, it is rather popular in Asia, and large credit card organizations there are about to upgrade their card terminals with NFC. Worldwide there are 275 million NFC-enabled handsets in use, and Apple's new iPhone 6 also supports NFC. So the technology is here, but perhaps it is not yet widely utilized. We are aware of new developments in the medical domain that involve NFC – for example

to enable communications with cardiac pacemakers and other implants. The range of potential applications is huge, and it is constantly growing. We also have test solutions for NFC in our portfolio and see steady demand for them.

EE Times Europe: How is the situation in 5G networks? It is expected that this technology will take the interests of IoT into account – for example by supporting decentralized network structures. Where does the development of 5G technologies stand today?

Kottkamp: The 5G developments reflect many requirements from IoT. While cellular networks – 2G, 3G, 4G – were being developed, the discussion widely focused on data rates and bandwidth. Among the requirements we see today are very short latencies and long battery life, as well as the need to have many more devices connected without causing overload scenarios.



Insights of a changing industry: Jörg Köpp (left), and Meik Kottkamp from Rohde & Schwarz.

All these requirements originate from IoT and can be defined at the 5G network level. A complete list of requirements has not yet been defined, but 5G is currently a very large research topic, also at the EU level. We expect the results of these research activities to be included in the standardization process. But this is still some time away. If we assume that 5G will be ready for commercialization by 2020, we should anticipate that the specs will be finalized around 2018.

Topics currently under discussion are individual technology components like large bandwidths, high frequencies and new, light protocol structures to enable fast access times and long battery life. Some of these topics are discussed in the LTE camp as well, such as power saving and device-to-device communication. Plus, the optimization of LTE is also determined by M2M and IoT requirements.

Vicor powers after higher volume applications

By Peter Clarke

PATRIZIO VINCIARELLI, is one of the longest serving CEOs in electronics, having founded Vicor in 1981 and led the company ever since. At Electronica he told EE Times Europe that his company is investing to broaden its horizons.

Vicor Corp. (Andover, Mass.) is looking to manufacture its power supply components in Asia, either by building its own factory or by licensing its technology and allowing another company to manufacture there.

But most importantly the company wants to build out from the large numbers of high value, relatively low volume applications that have been its traditional home ground and into larger volume markets in computing, automotive and even consumer electronics.

So said CEO Patrizio Vinciarelli when EE Times Europe called to speak with him on the Vicor booth at the Electronica exhibition in Munich, earlier this month.

Vicor emerged in the 1980s with what was, at the time an innovative brick-like approach to high-efficiency switch-mode power conversion called zero current switching. Since then the company has expanded and enhanced its offering to cover a complete range of power products from the wall plug and ac/dc conversion via one or multiple dc/dc conversion stages to regulation at the point-of-load.

Vinciarelli who founded Vicor in 1981, has served as president, CEO and chairman of the board ever since.

Having received a doctorate of physics from the University of Rome Vinciarelli worked at the European Organization for Nuclear Research known as CERN before becoming a Fellow at the Institute of Advanced Studies in Princeton, New Jersey from 1977 to 1980.

Vinciarelli told EE Times Europe that Vicor is in a transition phase as it seeks to build out from its origins in high efficiency, highly-featured power supplies for professional applications. While it wants to continue to serve, communications, defense, mil-aero and industrial applications it is making ground into data centre server racks, in automotive and other higher volume applications, said Vinciarelli.

Here comes the VIA form factor

However, the company is also in the process of introducing a new form factor for “front-end” power component at Electronica.

The VIA range for Vicor Integrated Adaptor package was on show at Electronica and builds on the established ChiP (Converter housed in package) approach and have a standard

width of 35.3mm and a height of 9.3mm. The units will come in lengths varying from 72mm to 141mm. The VIA range combines multiple ChiP packages inside a machined metal housing and adds filtering, surge suppression, control, monitoring and bus interface functions to create something that should be easy to design in. VIA will support a broad range of voltage I/O and power handling including isolated, non-isolated, ac-input and dc input, regulated and non-regulated.

Vicor describes VIA as “an IC approach to higher power system integration and it will cover from 25W to 1kW and input operating voltages from 8V to over 420V. The first product, expected early in 2015, is likely to be a 400W, ac/dc input block.

The VIA package is a machined metal housing that can be attached to heat-sink or equipment cold wall.

“We were an early innovator with ‘bricks’ in communications. It solved a problem in communications but it was not general purpose enough,” said Vinciarelli

Vinciarelli said that had then become important for Vicor to build out its range across the various levels of ac/dc conversion to 48V, 12V, 5V and dc/dc conversion from these dc voltages using standard component foot prints. That involves a wide range of input voltage ranges, output voltages and power conversion specifications along with variants on cased and board-mounted form factors, power-factor correction isolated, and non-isolated, regulated and telemetry and control functions.

“You need all the complementary blocks. The approach becomes more powerful when you offer all the blocks

for an end-to-end solution.”

“With VI-Chips we got close in high-end applications. Those applications included communications, defense and industrial applications,” he said referring to one of Vicor’s established product ranges but one that still needs a certain amount of designing in.

Vinciarelli makes the point that Vicor is moving in to larger markets such as computing and moving down on to the printed circuit board with smaller footprint and lower height power conversion systems in package.

With regard to power components for x86 server computers Vicor is already manufacturing in volume and meeting Intel server specifications. “We are doing very high volume – 15,000 units per week – that convert from 48V to 1.2V or 1.8V with isolation and current multiplication.

One of the ways Vicor achieves this within its smaller components is by using printed circuit board technology to create the transformer winding “The transformer structure is embedded in 14-layers of high-temperature PCB. Magnetic core assemblies



Patrizio Vinciarelli, Chairman of the Board, President and Chief Executive Officer of Vicor Corp.

are dropped into apertures within the PCB assembly,” said Vinciarelli. The company is also using ARM microcontrollers for command and control functions within some of its more fully featured converters, Vinciarelli said.

Cultural battle









With power supply manufacturer Vicor going on PCB and adding intelligence it seems likely that it is going to meet competition from power semiconductor companies coming in the other direction.

“We have a strategy. Semiconductor companies tend to have a different strategy. They tend to look at the low-end dc and be very application-specific. Power supply companies have the R&D background and can take a holistic view. We are saving companies the utility cost of energy,” said Vinciarelli, referring to the fact that the highest efficiency conversion may drive up component cost but also increases the electrical efficiency of equipment.

What about companies that are looking to do transformer topologies in the back-end of line of silicon? Is it something Vicor is researching?

“It can work. But does it make sense to do it? The big issue is efficiency and the problems of introducing magnetic materials in the back-end of line and finally I don’t think they can provide isolation. We can provide 10kV isolation,” said Vinciarelli. “So ingenuity on a very focused application might work. It may even lead to a successful company, but it is not a general-purpose solution,” he concluded.

VIA Family Front End Components

2223 / 72. mm		DCM
3623 / 86 mm		DCM
4623 / 95		DCM
6123 / 110.6 mm		DCM, BCM, PFM
2361 / 110.6 mm		BCM
6123 / 124.8 mm		PFM
9223 / 141.4 mm		DCM, PFM
2392 / 141.4 mm		DCM, PFM

The VIA family of power supply components with common height and width. Source: Vicor.

Investing in R&D

“We invest 16 or 17 percent of revenue into R&D. We are in an investment phase. Therefore new products are the result,” said Vinciarelli who also indicated that the company is looking to go to do more manufacturing to serve higher volumes in more cost-sensitive applications.

“Asia is growing substantially, Europe less so,” he said. “We have 250,000 square feet of automated manufacturing in Boston and we are looking to set up another facility, probably in Asia.” However, the exact business model for how such an Asian factory would be funded is not yet fixed. “We do have talks with companies particularly interested in taking licenses to do their own manufacturing,” said Vinciarelli. One possibility is that Vicor could use excess capacity at such a customer-owned facility for its own requirements while the customer ramps production for its own use. “Having that captive demand may help us,” Vinciarelli said while declining to name any potential licensees or locations.



More new products
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Consumers have a say at Cartes

By Julien Happich

THIS YEAR, THE CARTES Secure Connexions exhibition was hosting a Start-up Challenge, offering new players to pitch their business cases and product ideas, with a 10,000 euros check for the winner. Software was the name of the game, in particular for three start-ups that caught my attention.

In a show where the word freedom is only associated with the right to spend, most ideas revolved around faster payment and better user experience to comfort consumers into impulse buying patterns.

Created in 2012, ScanPay had already launched a first application last year, enabling users to scan the details of a credit card by simply holding it in front of their smartphone's camera, for faster credit card entry into online payment gateways.

Based on the same image processing and optical character recognition principles, French Cofounder and COO Kevin Guieu presented two novel applications that he said will be ready for 2015, ScanFill and ScanCheck.

While ScanFill will have extended image processing capabilities to turn smartphones and tablets into data extractors for all types of documents (utility bills, ID cards or driving licenses to name a few) and speed up online registration, ScanCheck will take this data extraction further and match it with certified databases for a strong authentication of the users, say to open a bank account remotely.

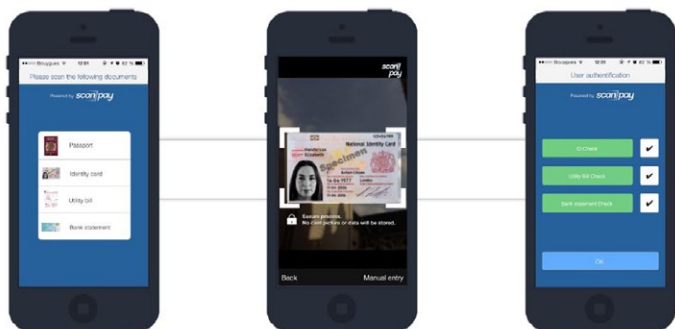
"Registration procedures for loyalty schemes are often too time consuming and can put off consumers", explained Guieu, "With ScanCheck, you no longer have to scan or copy your documents and send them through the post with your signature, authentication and online registration is all done in a few seconds" he added.

In order to perform the authentication, the company has to access a remote database and find a 100% match. That database is something ScanPay has to build through agreements with utility providers and officially certified ID databases.

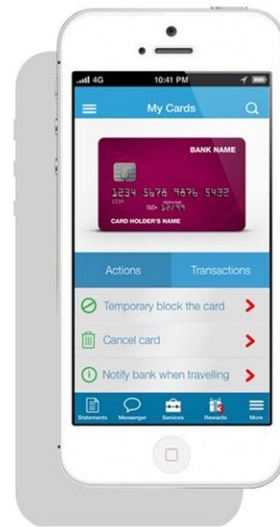
"To make sure that the card holder is really who he/she claim to be, and also to prevent a static photo to be presented instead of the real document, we'll ask users to hold their ID document under the camera in video mode and then to perform a selfie for comparison" told us Guieu.

"Our vision processing algorithms will perform real-time facial matching thanks to the detection of facial movements".

All applications will be iOS & Android compatible and licensed for shop-owners or banks to integrate them into their web portals (for faster registration and verification).



ScanCheck in operation on a smartphone.



Fintech-Labs' Card Management Module offers one-time virtual card numbers.

Fintech-labs' Director Parinda Kularatne had been developing secure card and banking applications for a number of years before starting up his own company with several of his colleagues in 2012.

"Often, banks miss the consumer bit, their secure portals are not interactive enough and bank accounts typically lack the flexibility that consumers are used to have with their mobile phones applications", explained Kularatne during a one-to-one interview with EETimes Europe.

The Card Management Module that Fintech-Labs has launched last year (deployed by Metro Bank last summer), allows users to temporarily block and unblock their cards.

So in the case you lose your card, instead of having to call a special number and go through ID verification to block it and wait a week for a new one, only to find out an hour later that you only had misplaced it, you can just select the corresponding card from your smartphone app and block it.

"This is particularly interesting for banks since over 60% of bank cards that are reported lost are in fact only misplaced by the user. So you save time and money on not systematically issuing new cards", commented Kularatne.

But what's clever about the Card Management Module is that you can temporarily block all your credit cards to unlock them only during a purchase, or you could geo-fence your spending (based on geolocation data provided by the smartphone) so as to prevent internet frauds from places where you are not present.

The application allows you to momentarily program a lower spending limit, or even better, to get a virtual card number with a one-time use to make card payments in untrusted environments (when you fear data skimming, online or in the real life).

On top of all these options, the application leverages all of the smartphone's sensors to create unique user behaviour patterns, so in case an unusual form or context of spending is detected, it could alert the user and ask for authorisation.

There is some similarity here with Syniverse's Fraud Management System, one of the finalists for the 2014 Sesames awards in the Trusted Internet / authentication category.

Of course, geolocation goes together with target marketing,

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a service that Fintech-labs also has up its sleeve, enabling banks to send their customers personalised offers based on time, preference and customer location (and they know how much you can spend).

In a lighter context, truRating's Founder & CEO Georgina Nelson wants to re-conciliate consumers with the on-line ratings you typically find associated with real products, shops, restaurants, hotels or other services.

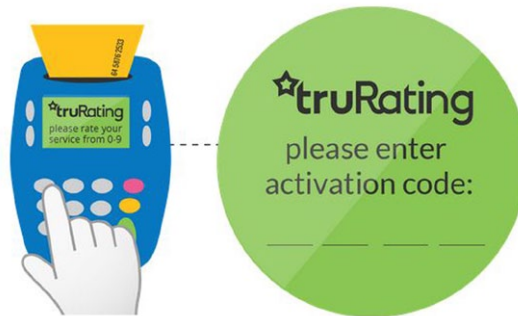
Nelson's idea is that for a service or product rating to be meaningful, it should come from as many consumers as possible, at the moment they pay (and conclude the interaction with your business).

"Typically, 90% of consumers never leave reviews online. Then you have about 9% of them who only write a review when they are either very pleased or very angry. And among those, you'll find the 1% from which comes the vast majority of online comments and ratings" explained Nelson.

"If you consider online ratings as a democratic way to rate a level of service, sadly they reflect only the opinions of less than 1% of consumers, and you're not even sure that these don't come from the suppliers themselves", she added.

Often, ticking the feedback boxes is too long or does not come at an appropriate time (once you've paid, you just want to pack and go). With simple cores question rotated from one customer to the next, truRating offers businesses the chance to get feedback from their customers at the point of sale, right before they enter their PIN code.

The questions are pulled from a server, depending on the business type, they can also be customised and rating is performed with one click (0 to 9 on the keypad).



truRating's questions pop up just before entering your PIN number.

As a customer, you only get one question (for example, Service? Value? Products? Atmosphere? Recommend us?), but as a business, you can access the ratings data within a few hours, so you can react to any feedback before there's an impact on your reputation and bottom line. With mobile POS, this could translate into staff monitoring and trends comparisons from one branch to another.

truRating doesn't collect any payment details, only the amount spent and the product, basically what's on the receipt, so there are no security or privacy risks. The service is available to in-store merchants from as little as £15 per month per outlet, with a one-off £50 sign-up fee.

Created two years ago, the startup hopes to establish a strong-enough presence online for consumers to recognize its value and consult its website for meaningful ratings aggregated from thousands of real customers. Nelson won the check.

the ratings revolution



Software has the last word for PIN entry

By Julien Happich

THE CARTES SECURE CONNEXIONS exhibition has had its fair share of hardware exhibitors, but authentication is at the core of every transaction and software solutions are increasingly taking centre-stage while secure chips move from smart cards to more capable and user-friendly mobile and embedded devices.

According to Eurosmart, over 8 billion secure elements will be shipped this year, growing 9% in 2015 and possibly reaching 12 billion units in 2020. Secure elements mostly come in the shape of SIM cards for telecom applications, representing over half of the total shipments, followed by secure chips for banking (actual smart cards, authentication dongles and payment terminals) at less than a quarter of the global volume.

Interestingly, among all secure elements, NFC-enabled SIM cards are the fastest growing, set to nearly double from 350 million units shipped in 2014 to 600 million for 2015. This is probably what made Oyvind Rastad, chairman of Eurosmart, say for the third year in a row that "Next year will be the year of NFC", and NFC-based Apple Pay and Google Wallet touch-and-pay solutions will certainly boost consumer awareness and drive the demand

Until recently, PIN entry was only certified secure through hardware entry solutions including a bulky physical keypad. So far, PCI-compliance restrictions have prevented the design of sleek touch-screen only point-of-sale terminals, something that would better reflect today's modern smartphone designs. At Cartes, Danish exhibitor Cryptera A/S (recently acquired by Diebold Inc. for its expertise in the manufacture of secure PIN entry pads) announced CryptoTouch, claimed to be the first encrypting PIN touch screen application to comply with Payment Card Industry (PCI) security requirements.

The CryptoTouch application encrypts all PIN entries users make on touch screen interfaces, from automated teller machines (ATMs) to point of sale (POS) devices and other unattended payment terminals. Here is an opportunity for terminal manufacturers to move away from the traditional mechanical keypad to a more versatile and adaptive touch screen interface. The solution relies on a purpose-built secure module, the ETS 6200, combining logical and physical security measures. The polymer-enclosed unit includes a PCI-approved encrypted touch sensor for standard screen sizes from 12" to 24",

It also supports 3DES and remote key loading. The company also claims that the use of touch screens also mitigates the risk of fraudsters replacing or tampering with mechanical encrypting PIN pads.

But what about camera skimming and shoulder surfing on such touch screen PIN interfaces?

This is an area that German startup siOPTICA GmbH is addressing with a switchable privacy optical filter. As Dr. Markus Klippstein, CEO of siOPTICA GmbH told us, siOSwitch combines a passive polymer display overlay designed with proprietary patterns that affect the optical path in such a way (a bit like the simpler parallax barriers used on cheap animated postcards) that dedicated display software can be used to scramble the side views only both from specific horizontal and vertical viewable angles.

The overlay is 90% transparent, maintaining a bright crisp image, yet it completely blocks unauthorized side views and the privacy effect is switchable by software and on-demand for either the full screen or part of it. This has to be compared with existing privacy filters that typically darken the whole screen (about 40% of brightness loss) but still fail to completely block side-views as a faint image can still be seen under the restricted angles.

For battery-operated devices, this is a clear winner as it allows the reduction of the display illumination. The software solution can even take eye tracking into the equation to implement a sweet privacy spot (scrambling the display just outside the first user's direct view angle). What's more, the PIN pad can easily be moved around the screen or scaled to increase anti-skimming protection.

One of the finalists for this year's Sesames Awards both in the Identification/ID cards/health/e-government and the Banking/payment/e-transactions categories, Norwegian startup Zwipe AS was exhibiting a mockup of its biometric payment card. Mid-October, the company announced a partnership with MasterCard for the launch of the world's first contactless payment card featuring an integrated fingerprint sensor. To eliminate privacy issues, cardholder fingerprint data is stored directly on the card's secure element, not in an external database. The card is activated by pressing your thumb (or any other previously enrolled finger) during the swipe over an NFC card reader. Here the biometric authentication replaces the PIN entry, securing payments of any amount, wirelessly.

The card is built from commercially available components but the real breakthrough came from software, told us Gildas Chabot, lead technical developer at Zwipe.

"By developing proprietary biometric algorithms and by pushing NFC-based energy-harvesting beyond what is commercially



siOPTICA' siOSwitch combines a passive polymer display overlay and special software.

harvesting solutions. It could also deliver embedded modules for medium volume orders.

It took seven years of development at Card Tech, an Italian company created in 2005 to focus on mobile security, before it was ready to unveil its biometric credit card. Compliant to ISO 7810ID-1, the international standard of most payment cards, the 0.76mm thin smartcard integrates IDEX's flexible polymer capacitive fingerprint sensor for user authentication.

The smart card is powered by an internal thin-film rechargeable battery.



The Zwipe card runs its fingerprint authentication process battery-less.



Card Tech's fingerprint-enabled card is ready for mass production.

available, we were able to design a contactless card that is also battery-less", explained Chabot, "something that a lot of other companies have tried to do before without success".

Naturally, the card has no battery lifetime limitations either and is more reliable than battery-enabled alternatives.

"It took us five years of development to optimize our fingerprint processing algorithms in such a way they would be power efficient enough to run from RF-energy harvesting", added Chabot. The company is ready to licence the IP on both its software and RF-energy

While the biometric system is totally powered by the reader's external supply in contact operations whilst the battery recharges, it is assisted by the battery when used for contactless operation (in that case, the battery can still benefit from the contactless interface for RF energy harvesting).

An argument that Card Tech likes to put forward is that the battery-assisted operations of the Biometric System-on-Card allows the usage of the card with any RFID or NFC reader (access control, POS, mobile devices, ecc.), regardless of the RF field strength. That may be a small punch at battery-less Norwegian competitor Zwipe AS. First, the user presses a power-up button, then he/she authenticates, and the card is activated for payment (a green LED signals when it is ready for transaction).

The biometric sensor is tied to IDEX's authentication algorithm running on a low power micro-controller to reconstruct in real-time the fingerprint image and compare it with the user's enrolled fingerprint. The verification of the user's biometric data is performed on the card, without the need for an external database.

The card can be manufactured with a standard hot lamination process, using PVC foils, ensuring a tamper-resistant construction together with a low production cost. Card Tech says its card is now ready for mass production, with an undisclosed first-tier manufacturing partner in the loop for the industrialization and PCBA manufacturing.

No-lag turbo, virtual car key: Valeo drives automotive industry

By Christoph Hammerschmidt

FRENCH AUTOMOTIVE SUPPLIER Valeo S.A. is rather seldom searching for the glare of publicity. Recently however it stepped into the limelight by introducing its developments and R&D activities to the press at the Hockenheim racetrack. And voilà, the tier one from Paris proved to be at eye level with the premier league of automotive electrics and electronics, and to be a serious contender to the likes of Bosch, ZF and Continental.

With sales of more than 12 billion euros (2013) and almost 80.000 employees in 29 countries, Valeo is truly a global player. The company's 51 R&D centres share out an R&D budget of €1.1 billion. Driven by strong demand in all automotive electronics segments from connectivity to powertrain and lighting, the company experiences strong growth; by 2020 it expects sales of € 20 billion, explained Alexander Ziems, Group President Germany, at the event. The tier one is committed to developing technologies that deal with reducing CO2 emissions by improving fuel efficiency. Other strategic fields of activity are the connected car as well as driver assistance systems and HMI.

At the event, the company showcased a number of design and studies at all stages of development, from technology study to near-series maturity.

Here are three examples I found particularly striking:

InBlue: This virtual car key is a technology that facilitates car sharing, be in a business context or among friends or in the family. The system turns the smartphone into the car key, enabling car owners to share and distribute a virtual vehicle key to family members, friends, or business partners by means of a smartphone app which interacts with a backend software operated by the OEM or a service provider. InBlue also allows the owner to manage the virtual keys including defining limitations in terms of time, and to revoke the permission. The receiving

persons cannot pass on their virtual key - they just get a digital token that is valid only in connection with their smartphone. "This system is already reality, it will enter series production at a major OEM in 2016", explained Valeo R&D Vice President Jean-Francois Tarrabia. The system connects to the vehicle via a Bluetooth link and anticipates that the vehicle is equipped with a keyless entry system.

Electric supercharger: in contrast to conventional turbochargers driven by the engine's exhaust gases, Valeo's supercharger is driven electrically, allowing car designers not only to avoid the infamous turbo lag, but also to completely change the torque characteristics of the motor. This property can be used to

add extra horsepower to the engine - but also to reduce fuel consumption. At the media day, Valeo illustrated the spectrum of the options by demonstrating two vehicles that could not be more different. One was an Alfa Romeo sports vehicle, the other one the Duster SUV from low-cost vendor Dacia. In the Alfa Romeo,

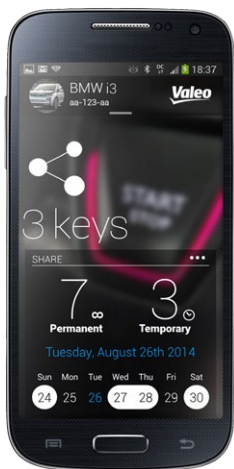
the electric supercharger provided 70 additional horsepowers to the already vivacious standard version with 280 hp. In the Duster, the supercharger moved the torque characteristic of the gasoline engine, enabling designers to equip it with a "longer" transmission originally developed for a diesel engine, resulting in about 7 to 10 % lower fuel consumption without compromising the (albeit humble) temperament of the original vehicle.

The supercharger by itself exhibits stunning technical data: Once activated, it reaches full speed of 70.000 rpm within 250 milliseconds. During this period, it however loads the supply with a whopping 2 kW. The charger can be modified according to customer requirements - be it for a 48V supply, or for a different power characteristic. In such a version, the supercharger is integrated in Audi's V6 Biturbo engine developed for the RS5 TDI Concept.

Lidar sensor: Valeo has developed a lidar sensor that offers an aperture angle of 140°, enabling it to use in automated driving schemes like a "parking lot assistant" that autonomously drives the vehicle to a parking lot. As to the price of the sensor, Valeo was not overly talkative, just saying that it will be "much



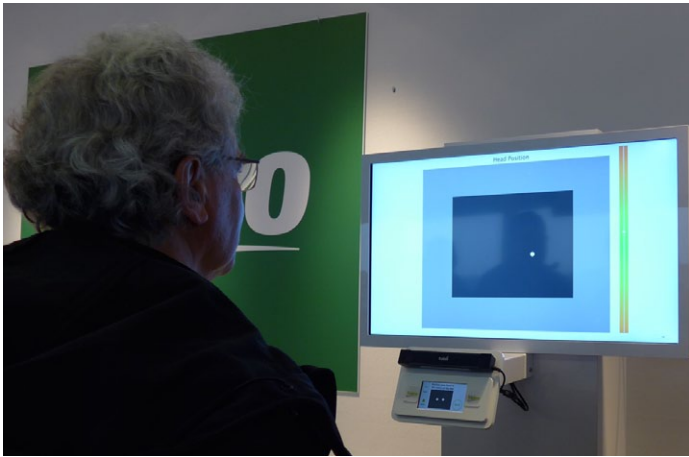
Instant horsepower, no turbo lag: the electric supercharger.



Who gets the car today? InBlue manages vehicle usage rights by an app.



Valeo's Lidar sensor offers high resolution in a compact form factor.



Calibrating a test person for eye tracking.

cheaper” than the rotating sensor from Velodyne, known from the “Google car” and currently said to be something like the “gold standard” in the Lidar market.

The wide aperture angle is achieved through rotating mirrors inside the casing; nevertheless the sensor has about the same compact size as standard radar sensors today in use.

Its infrared beams however create a much more clear and detailed image than radar sensors. At the event, Valeo demonstrated its use in a working zone assist, where the lidar sensor detects the lateral limitations of the driving lane with very high precision.

In the pursuit of developing intuitive ways to control functions in the car, eye tracking seems to emerge as a future-prone technology. Valeo is among those probing out the potential of this principle. At the Hockenheim event, the company demonstrated its research activities in this area. Once the system is calibrated to the respective user’s facial characteristics and thus can determine where the person is looking, it is capable of identifying viewing direction at surprisingly high precision and speed - it takes less than half a second to find out which control element or button is selected. A potential application could be selecting music titles from a playlist. However, the researchers so far have not yet found out which criterion has to be created to activate the respective function - after all, it could be possible that the user needs more time to read the list entries. “This is where we are right now with our investigation”, a Valeo engineer explained. “We need to continue our research”.



A potential eye tracking application: messages appear in the head-up display; the driver decides with a glimpse how to handle them.

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Murata succumbs to IoT temptation

By Julien Happich

WELL KNOWN FOR its capacitors which account for nearly a third of its total revenues, Murata has been quietly reinforcing its sensor division to expand its offering into higher revenue-generating fields such as medical electronics, home automation and automotive electronics, with an IoT twist to it.

At electronica, EETimes Europe caught up with CEO Tsuneo Murata for an update on the company's plans for the future.

With a net income of 93.2 billion yens last year (ended March 31 2014), the Japanese company gets over half of its revenues from the communication market, mostly with passive components and RF modules that make it into mobile phones.

Then three years ago, Murata acquired VTI Technologies Oy, in Finland for the high precision MEMS gyros it produces for the automotive market.

"We used to develop piezo-ceramic gyro sensors for image stabilization in handy cams and stereo cameras, but this business has been displaced with MEMS gyros. We had also developed MEMS gyros for the automotive industry, but we needed to achieve better precision and VTI were doing things better" Tsuneo told us, adding that "because 70% of VTI's business is in automotive for electronic stability control (ESC) applications, with Europe hosting many key automotive OEMs, we won't be moving production outside Finland". "We will rather expand our MEMS capacity in our Finnish fab". Murata's MEMS also find their way into industrial applications and in medical applications, especially pacemakers.

"We don't plan to produce MEMS for the consumer market. With well-established players such as ST or Bosch in this low-cost market, it's a dead end" Tsuneo added boldly.

Looking at Murata's most recent acquisition, Peregrine Semiconductor for its SOI RF front-end technology, only two years after the company acquired RF Monolithics for its know-how in M2M radio module design, both acquisitions comfort the company's strategy to address the IoT market whether it be industrial or medical.

"We have a long history of developing wireless modules, initially using traditional diodes, now with SOI RF switches. Effectively, 60% of Peregrine's sales have been passed on to



Mr Tsuneo Murata, President and Representative Director

Murata to integrate its RF SOI technology into our front-end modules" said Tsuneo.

"With the acquisition of Peregrine Semiconductor, we have a good chance to shorten our development times in this field. Murata is the only company to have the internal capability for such large product integration, including passives and power supplies".

"Where Murata is growing the fastest is in the telecoms and the automotive sectors, and product wise, RF components represent our biggest sales. We plan to tie sensors to this growth, adding temperature and humidity sensors to Bluetooth or WiFi modules for IoT applications".

According to Tsuneo, one growing area of interest for such modules would be health care and the many medical applications that require patient monitoring. Here, VTI's MEMS sensors are so precise that they could be used to detect

blood pressure (as per the strap-on device the company was exhibiting at the show). The company is also considering the design of such combination modules for the smartphone industry, where not only Bluetooth, WiFi or both connectivity standards are a must, but where sensors are taking centre-stage in mobile applications.

Energy management systems and home automation calling for connected sensors is another sector of interest for the company, for which it is actively developing energy-harvesting solutions.

"IoT is already generating some revenue, but it is still comparatively small and it will take time to attain a certain level of business", conceded Tsuneo, unwilling to reveal any specific figures. "Until then, passives will remain our bread & butter" he concluded. And regardless of the company's direction, it will always need the passives.

Some of the company's efforts to break into the health care IoT market could be seen at the Embedded Technology 2014 conference in Yokohama, where Murata was reportedly exhibiting a baby monitoring bracelet (reporting on activity through an accelerometer, a humidity/temperature sensor, and an IR temperature sensor) together with a logging tool able to push notifications to a smartphone (through Bluetooth LE). The company also exhibited there a WiFi-based mesh network solution tied to a solar-powered power supply.



Murata's "logging tool" keep a record of your baby's activities.



A WiFi-based mesh network solution tied to a solar-powered power supply.

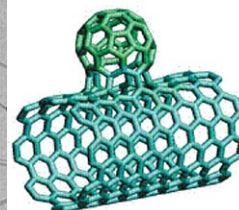
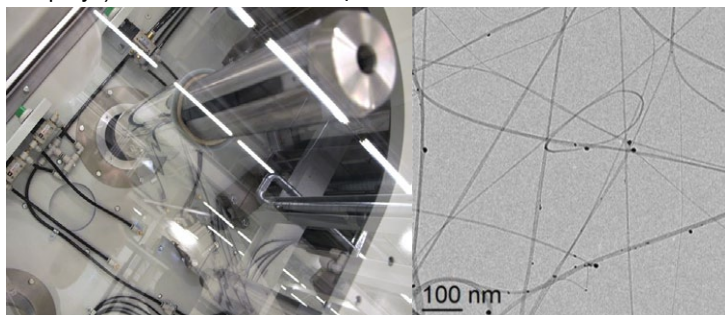
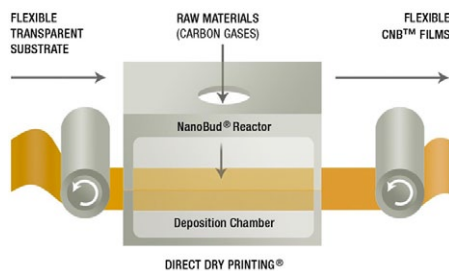
Exit indium tin oxide!

Here come carbon nano buds

By Julien Happich

FINNISH STARTUP CANATU OY believes it is onto something big with its carbon NanoBuds (CNBs), a hybrid nanomaterial combining the conductive properties of carbon nanotubes (CNTs) and the chemical reactivity of fullerenes (hollow carbon molecules). Officially launched in 2004 as a spin-off from the Helsinki University of Technology, the company's real breakthrough is its proprietary NanoBud manufacturing and Direct Dry Printing process (DDP), all done in one-step. The unique process performed at ambient temperature and pressure from raw gas materials enables the direct synthesis and patterned deposition of NanoBud films, a few nanometres thin, on any substrate material such as the PET or glass.

In 2008, the company received its first seed funding to further develop the material and process, identifying many potential applications in electronics where the NanoBud films could offer better conductivity than indium tin oxide (ITO) while being thinner and truly flexible (beyond the limits of all other materials currently used in the manufacture of flexible displays).



"A lot of laboratories offer carbon nanotubes, but typically, their results are not so homogeneous, with large fractions of impurities that must be removed through additional processes", told us Canatu's CEO, Risto Vuohelainen. "Then special inks are made from these CNTs to dispense them as an ITO alternative, but the films obtained are not so uniform and not suitable for displays", he added.

"We are able to tune the thickness of the layer we deposit to achieve resistance levels from a few Ohms to several kOhms. In fact our electrically conductive films could also find use in flexible batteries or in supercapacitors, but since 2012, we've decided to focus our commercialization efforts towards the capacitive touch-screen industry where our solution could be 20 to 30% cheaper than ITO".

Another claim the company makes is that the NanoBud films have a refractive index of 1.55, closely matching that of both PET and glass, which means less optical reflectivity and better picture contrast when implemented in touch-screens. To reduce unwanted glare, the use of ITO typically requires additional refractive index matching layers which also reduce light output.

Canatu is in business to manufacture coated PET and glass sheets



in volume, for touch-screen manufacturers to process (patterning the electrodes through laser removal). The electrodes are then connected to off-the-shelf capacitive-touch driver ICs the same way they would with ITO.

Earlier this month, the company revealed Santa Clara-based TouchTurns

as its official partner for producing CNB film based touch sensors, with high-volume manufacturing facilities in China.

Now the company is exploiting the mechanical properties of these films further by announcing its CNB In-Mold Film for transparent touch on 3D surfaces.

"Because the deposited NanoBuds form a random network on the surface of the substrate, they can easily be stretched in any direction" explained Vuohelainen.

"In fact, the nanotubes are not chemically bonded, they can slide and form new connections through Van der Waals interactions, so there are no breakpoints" he added.

This makes the film stretchable up to 120% and suitable for back-moulding using standard industrial processes such as Film Insert Molding (FIM). The only tricky part then is to design the capacitive-touch electrodes on the flat sheet before the 3D moulding, to take into consideration the deformations that they will undergo so as to obtain the right touch patterns in 3D.

The NanoBud films could find applications in automobile

centre consoles and dashboards, in home appliance control panels, remote controls, smartwatches and flexible displays. The company is engaging with several OEM manufacturers and expects the first devices using its technology to hit the consumer market next year, 3D formed touch-interfaces towards the end of 2015. Canatu says some of its partners are working on flexible touch-displays which could hit the market early 2016.



Focus on the future

Under the stewardship of Jalal Bagherli, in the past decade Dialog Semiconductors has risen from the ashes to become one of the fastest growing companies in the semiconductor space. Here he discusses the transition pathway from virtual extinction to success, future growth and diversification...

Hanns Windele: Dealing with Dialog today compared with 10 years ago is as different as day and night. How did you insert this new DNA into the company?

Jalal Bagherli: Early in my career I worked with large corporations and before joining Dialog I was running a start-up company. From the start up, I learned about survival and the importance of an entrepreneurial culture, whereas in the larger companies the focus is on organisations, markets, profit and loss. In a small company cash is the real motivation. If you don't have enough cash to pay your engineers at the end of the month, they are going to leave and the company can go bankrupt. You kind of evolve a sense of urgency, a sense of survival. I tried to bring the best of both worlds to Dialog, urgency and the entrepreneurial spirit of the start-up coupled with some of the good processes and discipline of the larger corporation, but leaving behind the bureaucracy.

HW: Tell me about some of the first changes that you implemented...

JB: You have to lead by example, and one of the most basic of these is cutting unnecessary costs. Upon joining I initiated a number of cost saving measures to bring that sense of survival I mentioned across the company. For example, I instituted a policy of economy travel for everybody across the company, including myself. It's hard for people to believe that there is a crisis if management is flying business class. The company was also suffering

QUICKFIRE QUESTIONS

What is the last non-business book you read?

Dinner with Churchill: Policy-Making at the Dinner Table by Cita Stelzer.

How many digital devices do you have on you at the moment?

Two mobile phones, one a BlackBerry soon to be abandoned in favour of the iPhone 6 Plus.

If you could be CEO of a non-technology company, what would it be?

Not a company as such, but running a Post Grad business school for engineers or maybe Head evangelist for entrepreneurial business approach at the EU!

Who would you wish to spend time in a prison cell with?

Perhaps Morris Chang the founder of TSMC who has had one of the largest influences on the semiconductor industry.

What piece of engineering would you donate to a museum?

The computer keyboard. We need to move to voice and touch as soon as we can.



"You have to push decision-making downstream and hold people accountable for their decisions..."

from an inability to make business decisions properly and quickly. What you have to do here is push decision-making downstream and hold people accountable for their decisions. We made a lot of changes: we bought in the idea that making profit for our shareholders is important. We also issued share options to all employees, which was not common for similar companies in Europe at that time.

HW: How much of the original Dialog culture survived the transition?

JB: I tried to preserve what was good about the company, and that was the technology. We had excellent engineering skills and we gave first class service to the customers. These are the types of things that we kept. None of it was magic, actually: we just looked at each item with common business sense. Maybe here and there it was a little turbo-powered with some of the survival instinct and risk taking philosophy that I brought in.

HW: How much did you learn from your stints at companies such as TI and Sony?

JB: You learn from every job and every experience. At TI, I learned the American-style operational culture, which is based on tight control and attention to accountability. At Sony I learnt that not everything has to be run in a military fashion, and that you have to build consensus through people you can't necessarily control and through indirect influence.

HW: Would you take a start-up proposition over a large corporation every time?

JB: Absolutely. A start up to a small or mid-size. For me, Dialog is the right size to express all the things that I have learnt. We have the money and capability to change things and influence our future. The management currently at Dialog really enjoys being able to execute on the strategy and implement the changes that they propose, and very often to then quickly see the direct impact of those changes. That's because we are the right size to allow change to quickly take place.

HW: You have high dependency on a single customer. Does this make you nervous?

JB: Not if the company that you are dependent on is one of the most successful electronics companies in the history of the world. If you're not working with the leaders, then you are probably doing something wrong. The mobile market is quite bifurcated at the moment. The top two or three players dominate the market and the rest don't make much revenue or profit: in fact they lose

money. The other thing to remember is that if your mission is to be in a high volume, high-growth market – which is our mission – you have to work with the leaders and trendsetters.

HW: You have stated that Dialog is evolving through “innovative partnerships”. What does that term mean?

JB: A lot of semiconductor companies are reluctant to cooperate with other semiconductor companies, or have a mentality of ‘not invented here’ and try to do everything internally.

We're not like that. We proceed cautiously, but we are open to do business with anybody as long as it is right for our company. We will enter a market early, will do joint ventures, joint product development and strategic investments into start-ups. We are even happy for partners to put their logos on the end product, if that's what it takes. We do not have a big ego. That's what I mean by innovation in the partnership model.

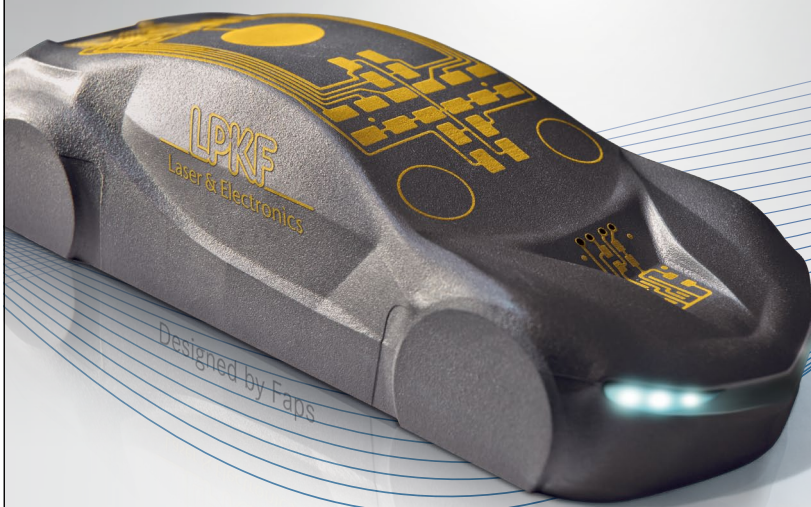
HW: How is Dialog starting to work with China?

JB: To work in China effectively you must understand the need to have deep roots in the market. We don't have that, and it's not likely that we will achieve that in less than a decade, either. By definition, developing commercial relationships with China takes time and that is something I like to shortcut.

Since we don't have the limitless resources to go pounding the streets, our innovation comes from partnering with somebody who is already big there, such as MediaTek who have over 50% market share in smartphone chipsets in China.

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HW: Does your move into Bluetooth Smart signal diversification for Dialog?

JB: It does indeed. We believe that we have fantastic traction in the Bluetooth Smart market. There is tough competition, but in any high-volume market, if you have innovation to bring to it, you can still create segmentation and win. And that's what we do. In this case, we were very early to the market and we are less than half the power and chip size of the alternative solutions. Beyond offering low power, we are working on the next generation devices targeted at high growth verticals, meaning to come you will see Dialog Bluetooth derivatives with bells on for smart home, health and fitness applications and other high growth market niches we have identified.

HW: You always appear to be looking for compelling markets: is that why you are breaking into solid-state lighting too?

JB: Absolutely. This is an area where we are very big in China. We support most of the major global lighting manufacturers in that territory. My intention is to be in high volume, high-growth markets and it is not my intention to run away from them like many of our peers. These companies say: "you can't go in there, you will be killed". Yes, you will be killed, but only if you are blind. You can't win across the entire market, but you can win in narrow verticals. We currently focus on residential retrofit LED bulbs because you can only do one thing well at a time in this market. Once we have firmly established our leadership, we will look at other areas to apply our Solid State Lighting technology.

HW: Will you be going into wearables?

JB: Wearables will be a big thing, but the first generation products fall far short of users expectations today. You wear a fitness band and it counts the number of steps you take or it monitors your sleep and in some higher-end models also heartbeat. So what? After a week of this you put it aside and quickly forget. But when wearables emerge in a second or third wave with something essential – such as hydration levels, diabetes or blood pressure monitoring over time– things will be different. Add to that something like an in-built payment systems and Wearables will have what's called a "turnaround factor" which basically means, you would turn around to go back and pick it up if you had left it behind? That's the test. You would turn around for your smartphone or credit card if you have left home without it, but would you really go home to pick up a device that counted how many steps you walked?

HW: The type of engineers required by a company like Dialog don't breed very quickly. Where do you get your talent?

JB: Focused recruitment. In the past years we have grown from 200 people to approximately 1300. To achieve this, we have successfully evolved a recruitment machine. Analog designers are a scarce resource, and more than 70% of our employees are engineers, to staff our 15 design centres around the world. This is, frankly, a challenge to manage, and it's a case of taking the mountain to Muhammad. But because we know that engineers don't like to move, we have to go to them.

HW: What happened with the proposed merger between AMS and Dialog?

JB: This was supposed to be the merger of two equals, and the reason for this was that both companies were valued on the



"Wearables will be a big thing, but the first generation products fall far short of users expectations today..."

stock market at an almost identical price. After due diligence by both companies we decided that it wasn't the right thing to do and would have been difficult to realise the expected synergies. When companies merge it is very easy to become distracted. As it happened, we both had strong momentum and growth, but in different directions. If you spend time artificially merging two organisations with different strategies you'll end up taking your eye off the ball and one-plus-one would have certainly been less than two.

HW: Does this mean that you are not open to any mergers at the moment?

JB: We are not on the lookout to undertake mergers just for the sake of it. You can end up with a lot of pain and after the early deal excitement, you find yourself with many overlapping functions, which is not always a good thing. The focus then quickly to shift to restructuring and impairment of assets, versus developing new business. Thus I believe is much better to try to find complementary products, companies and technologies that you can put into the machine and go forward, rather than trying to figure out what the machine is.

HW: What do you think is next for Dialog?

JB: Today, we are known as a supplier of customised power management technology. I think we have been somewhat a peripheral component supplier to the industry because project power management decisions traditionally come after everything else. Where I want to take the company is to a place where the project engineers first consider power management strategically in their architectural decisions and not as an afterthought to solve a problem late in their designs.

If you want to know where we are going next, you have to look at what is predicted to be the next high-volume, fast growth market, and not at what is behind us. Our ability to successfully execute in the next volume markets early – for example smartphones and tablets – has been our key success factor at Dialog.

HANNS WINDELE is Vice President, Europe and India at Mentor Graphics. www.mentor.com
FOR FURTHER DETAILS about Dialog Semiconductors visit www.dialog-semiconductor.com

ADI swallows Hittite, gains acquisition skill

By Peter Clarke

MIKE BRITCHFIELD, recently appointed as vice president of European, Middle-east and Africa sales at Analog Devices, has provided EE Times Europe with some of the thinking that goes along with his company's \$2 billion acquisition of Hittite Microwave Corp (Chelmsford, Mass.) The deal was announced in June 2015 and closed a month later.

Mike Britchfield, recently appointed as vice president of European, Middle-east and Africa sales at Analog Devices, has provided EE Times Europe with some of the thinking that goes along with his company's \$2 billion acquisition of Hittite Microwave Corp (Chelmsford, Mass.) The deal was announced in June 2014 and closed a month later. In short, Britchfield said, the deal was about high frequency electronics, which is going to become more common, even ubiquitous, across multiple markets that Analog Devices already serves. But it may also be about Analog Devices continuing to go after small and large acquisition targets and be an acquirer rather than an acquisition.

Analog Devices' history is in data conversion and signal conditioning but with an increasing capability in radio frequency electronics. So not only has Analog Devices business gradually moved from being about generic building blocks to more application-specific sub-systems at the IC and packaged component level, but many of those applications are moving from single-digit gigahertz frequencies up to microwave and millimeter wave frequencies.

"We could see a large jump in frequency was coming and the acquisition puts us in a position to do almost everything from antenna to bits," said Britchfield. Fabless Hittite has strength in the communications infrastructure and military-aerospace



Mike Britchfield, recently appointed as vice president of European, Middle-east and Africa sales at Analog Devices

sectors, which is also complementary to ADI's strength in automotive, industrial, healthcare and consumer electronics. The fact that Hittite is based close to ADI (Norwood, Mass.) and has a similar culture – both companies were founded by engineering graduates from Massachusetts Institute of Technology, should make integration go smoothly.

Hittite made a net income of \$70.9 million on annual sales of \$273.8 million in 2013. The sales were up by 3.6 percent from \$264.4 million for 2012 and net come was up 3.4 percent from \$68.6 million in 2012. For comparison Analog Devices made net income of \$673.5 million on revenues of \$2.63 billion in its 2013

fiscal year which ended on Nov. 2, 2013.

"Hittite has 25 years of RF and microwave design experience in gallium arsenide, silicon-germanium and gallium nitride, that is difficult to replicate organically," said Britchfield. "We bought revenue but most importantly we bought expertise and the potential for cross-fertilization with conversion," said Britchfield.

"At Analog Devices we are experts in our own processes and this acquisition helps develop the synergy to supply optimized chip sets and build from application knowledge."

Britchfield continued: "We have over \$1 billion of annual sales in conversion products. With this acquisition we are building another pillar of the business in RF and microwave. This was a big decision for Analog Devices."

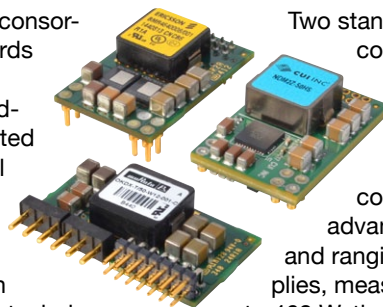
And it might not be the last Britchfield hinted: "Previously we grew through a combination of organic growth and acquisitions. We will continue with smaller acquisitions. But we need to be able to do an acquisition of the size of Hittite. It may take a year to fully integrate Hittite but this gives us the capability to do it again."

AMP consortium reveals first standards for distributed power

By Paul Buckley

THE ARCHITECTS OF MODERN POWER (AMP) consortium have revealed the organization's first standards aimed at establishing common mechanical and electrical specifications for the development of advanced power conversion technology for distributed power systems. The initial standards cover digital point-of-load (POL) and advanced bus dc-dc converters and are being demonstrated by AMP at electronica this week.

The goal of the alliance between CUI, Ericsson Power Modules and Murata is to realize the most technically advanced, end-to-end solutions and provide a complete ecosystem of hardware, software and support. Beyond purely mechanical specifications, it is the standardization of monitoring, control and communications functions, and the creation of common configuration files for plug-and-play interoperability that will ensure compatibility between each firms' products.



Two standards have been defined for digital point-of-load converters. The 'microAMP' specification covers supplies rated at 20 to 25 A in vertical and horizontal configurations, while the 'megaAMP' defines requirements for 40 to 50 A vertical and horizontal units. For advanced bus dc-dc converters the 'ABC-ebAMP' standard relates to advanced bus bricks measuring 58.42 x 22.66 mm and ranging from 264 to 300 W. For quarter-brick supplies, measuring 58.42 x 36.83 mm and ranging from 420 to 468 W, the Group has defined the 'ABC-qbAMP' standard. These standards detail mechanical footprints, features, and configuration files.

AMP Group spokesperson and CUI VP of Advanced Power, Mark Adams, commented: "Following the launch of Architects of Modern Power last month, the release of these standards marks an important first step on our shared technology

Smart wall re-focuses scattered RF signal

By Julien happich

EVER EXPERIENCED BAD radio communication, struggling to find the right spot at home, making the most of a faint signal to place a phone call? Through the use of a passive array of tunable microwave mirrors, researchers from Langevin Institute found a way to focus a scattered and seemingly chaotic RF signal towards the receiver (for example your cell phone).

In a paper titled “Shaping complex microwave fields in reverberating media with binary tunable metasurfaces”, professors Mathias Fink and Geoffroy Lerosey from the Ecole Supérieure de Physique et de Chimie Industrielles (ESPCI) at ParisTech disclose an experiment that boosts signal reception ten folds.

The researchers rely on what they describe as electronically tunable metasurfaces, in effect, spatial microwave modulators implemented as rectangular copper reflectors etched from a PCB substrate, each combined with a parasitic strip controlled through a pin diode – see figure 1.

The parasitic strips are near-field coupled to the reflectors, forming a hybridized resonator that can perform binary phase modulation (reflecting the waves either positively or negatively) depending on whether the pin-diode allows or not full strip resonance (when biased with a voltage, 0V or 5V).

For their experiment, they used an array of 102 such controllable electromagnetic reflectors, each measuring 31x45mm and spaced by 6cm, half a wavelength at the working frequency f_0 of 2.47GHz for commercial WiFi. Each element of the reconfigurable metasurface element was individually controlled through one of two single-board microcontrollers (Arduino Mega 2560) each with 54 digital output ports.

In total, the whole array used in the experiment covered an area of 0.4m² and was sufficient to boost signal in a scattering furnished office room of roughly 3x3x4m³.

“The experiment was a proof-of-concept and now we are looking at spinning out a startup to bring commercial products to market”, told us Lerosey in a phone interview.

“The beauty of this metasurface is that it is completely passive in that sense that it doesn’t generate any additional microwaves. It just reflects and re-shapes the existing reverberated waves in a room to maximize the transmission between a remote emitter and a receiver antenna”.

“Smart materials are a hot topic nowadays, with improvements on thermal or acoustic performance, or even designed for energy-harvesting such as photovoltaic windows. These tunable metasurfaces could create a new category of electro-

magnetically smart materials” continued Lerosey.

In practical applications, the metasurface could be applied to office furniture, construction panels or even carpets or ceiling tiles, either to increase communication performance on a same power budget, reducing the number of radio cells, or to decrease the overall radiated RF power and the users’ exposure to electromagnetic fields. It could also find use in planes or trains, with smart walls able to tune themselves to refocus the RF signal to multiple users.

“People are increasingly concerned about electromagnetic

pollution and our solution goes in the right direction”, added Lerosey who declined to comment on a tentative name for the start-up. “The resonators can be sized to match any target frequency, and in fact, with WiFi moving to 5GHz soon, we’ll be able to use smaller reflectors and pack more of them on the same surface for increased focus and gain”.

The CNRS (Centre national de la recherche scientifique) has secured various international patents and both researchers are confident that their findings

will attract serious investors.

“We are currently talking to a number of players, including construction material providers and RF infrastructure builders, but our solution could easily be deployed by the consumers themselves, so we are open to all partnerships” explained Lerosey who will play a consultant role together with Fink while remaining in academia.

Although the lab experiment used a sturdy hand-crafted prototype based on a commercial PCB substrate, printed electronics would be the best candidate to make large conformable metasurfaces, acknowledged Lerosey.

So far tuning optimization was carried out manually, by switching “on” and “off” the individual reflectors serially, checking the intensity feedback at the receiving antenna to maximize RF reception. But the researchers are working on light algorithms that could automate the procedure in real-time for a moving receiver.

By increasing the number of reflectors, larger “RF focus zones” could be created too. The reverse manipulation, tuning the reflectors to minimize or cancel out as much electromagnetic field in a given volume, could be used to create RF-free zones. This could find applications either in lab experiments, or in consumers’ homes (near your pillow) to reduce electromagnetic pollution locally.

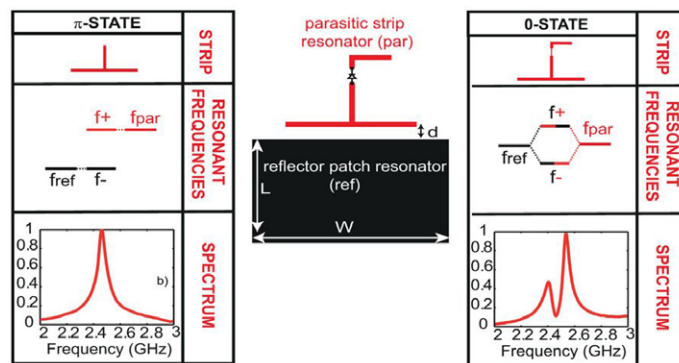
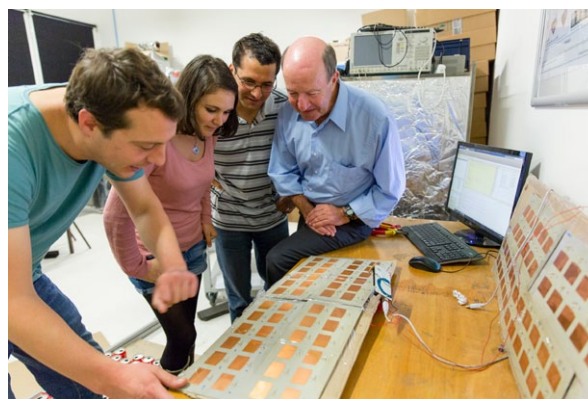


Fig. 1: the resonant unit cell (middle) and its two operating states (left-right). Source Scientific Reports .



From right to left, Mathias Fink, Geoffroy Lerosey and collaborators inspecting the metasurface panels crafted from etched PCB. (copyright Benjamin Boccas).

Wireless implants used to kill bacterial infection

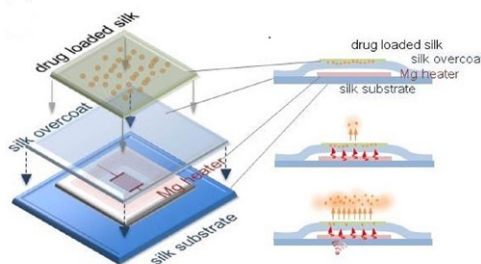
By Jean-Pierre Joosting

WIRELESS INNOVATIONS IN medicine have the potential to affect significant change in the way diagnosticians and treatments work. Bacterial infections cause many problems after surgery and in hospitals as is regularly reported in the press — particularly the so-called ‘super-bug’.

Currently antibiotics are typically taken orally or by injection, and rely on being transported to the site of infection via the blood. Not only do the concentrations of antibiotics vary in different parts of the body, making some areas more difficult to treat but many bacterial infections are developing resistance to many antibiotics currently available. A novel approach using wireless implants to heat up the infected portion of the body appears to kill *Staphylococcus aureus*, which is known as MRSA (Methicillin-resistant *Staphylococcus aureus*) when it becomes antibiotic-resistant. The MRSA strain is one of the so-called emerging ‘super-bugs’.

Wireless implants could also help deliver drugs to an infected part of the body that is difficult for antibiotics to reach or to deliver high doses without causing side-effects to other organs or parts of the body. Tolerance to many antibiotics is also of great concern, and often leads to patients not completing the full course of treatment, which in turn helps develop antibiotic-resistant strains of bacteria.

Recently, researchers at Tufts University, in collaboration with a team at the University of Illinois at Champaign-Urbana, have demonstrated a resorbable electronic implant that eliminated bacterial infection in mice by delivering heat to infected tissue when triggered by a remote wireless signal. The silk and magnesium



Dissolving electronic implant, made of silk and magnesium, wirelessly heats up infected tissues. Credit: Tufts University.

devices then harmlessly dissolved in the test animals. The technique had previously been demonstrated only in vitro.

“This is an important demonstration step forward for the development of on-demand medical devices that can be turned on remotely to perform a therapeutic function in a patient and then safely disappear after their use, requiring no retrieval,” said senior author

Fiorenzoomenetto, professor of biomedical engineering and Frank C. Doble professor at Tufts School of Engineering. “These wireless strategies could help manage post-surgical infection, for example, or pave the way for eventual ‘wi-fi’ drug delivery.”

Implantable medical devices typically use non-degradable materials that have limited operational lifetimes and must eventually be removed or replaced. The new wireless therapy devices are robust enough to survive mechanical handling during surgery but designed to harmlessly dissolve within minutes or weeks depending on how the silk protein was processed, noted the paper’s first author, Hu Tao, Ph.D., a former Tufts post-doctoral associate who is now on the faculty of the Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences. Each fully dissolvable wireless heating device consisted of a serpentine resistor and a power-receiving coil made of magnesium deposited onto a silk protein layer. The magnesium heater was encapsulated in a silk “pocket” that protected the electronics and controlled its dissolution time.

From warm to cool white: colour-temperature tunable LEDs

By Julien happich

AT ELECTRONICA, LED manufacturer Everlight introduced what the company claims to be the world’s first colour-temperature tunable LEDs in a simple COB (chip on board) package. After brightness dimming, tunable colour temperature is a feature that allows end users to tune the warmth of the light they receive. Typically, this feature was implemented through the use of multiple LEDs binned from cool white to warm white, behind a diffuser. With its CHI3030 27V/29W series, Everlight claims to have a very compact solution, with LEDs packaged behind concentric layers of phosphors offering different colour temperatures of white. Depending on how much of warm white or cool white you choose to light up, you can get a precise mix.

A multichip solution, the CHI3030 is the largest such colour-temperature tunable COB LED, measuring 30x30mm and drawing 29W at 27V. It is available with many different tunable ranges, from 2580 to 5700K for the KH Warm White series, to a tunable range of 4745 to 7050K for the KT Cool-White series, with a typical luminous flux of 2760lm for a 2700K warm white



to 2990lm for a 5700K cool white. Smaller series are also available with fewer concentric phosphor rings and operating down to 9W.

According to Christopher Keusch, Director of Lighting Business for EMEA at Everlight, such colour-temperature tunable LEDs will become main stream within the next few years, adding extra tuning flexibility while

making it easy for luminaire manufacturers to precisely calibrate their products at a fairly low cost.

Everlight is also keen to play in the increasingly popular filament LED market, where strips of LEDs lined up in series are coated in phosphor, to be implemented into traditional-looking filament light-bulbs. The company was exhibiting several such filament LEDs ready for integration by LED bulb manufacturers.



Adapting test strategies to IoT

By Mike Bartley and Declan O’Riordan

THE INTERNET OF THINGS (IOT) brings with it the ability to build more flexible and responsive control systems in which devices from many different vendors are brought together to deliver more functionality than is possible with traditional, standalone embedded systems. But this shift raises a number of issues for effective validation and verification.

A key difference between devices designed for the IoT and classic embedded systems lies in the explosion of their possible use-cases. Traditionally, embedded systems were often designed to run in a standalone context or if they were networked would run in a small set of predefined contexts. Such designs could be supported by a relatively straightforward strategy of testing at the unit level, followed by testing the integration of those units and finally testing at the subsystem and system levels.

The IoT redefines the concept of ‘system’. It brings with it the possibility of building much larger-scale, emergent systems in which interactions between independently designed devices on the network deliver the system functions. Incorrect functionality within one device can result in unpredictable behaviour at the system level, or may have little to no impact because other devices in the system can respond appropriately. A number of IoT applications rely on the concept of sensor fusion in which readings from many different sources are combined to build what should be a more accurate picture of what is happening around them. Errant devices may inject noise or incorrect data into the network that causes other devices to respond inappropriately, resulting in the wrong outputs being generated.

Because IoT devices will be designed independently it is almost impossible for the device design team to test for specific problems caused by other systems. Even if some of those systems are available for test before product delivery, a fundamental tenet of the IoT is that new applications will be developed over time that may stress the device in unforeseen ways.

The problems of testing for the IoT raise issues of responsibility. Who is at fault if a single device starts emitting erroneous data that causes a gateway device to report non-existent events that destabilise the control loops used by other components of the system, causing a failure that leads to an accident? Is it the vendor of the faulty device, is it the developer of the gateway for

failing to filter the bad data or the controllers for being unable to cope with extraneous events? A large number of IoT systems will also need to be able to cope with user-written software. Those used in home automation, for example, may be controlled by a combination of downloadable apps and user-written or customised scripts. Errors in these may, if not guarded

against, could cause IoT nodes to behave unpredictably.

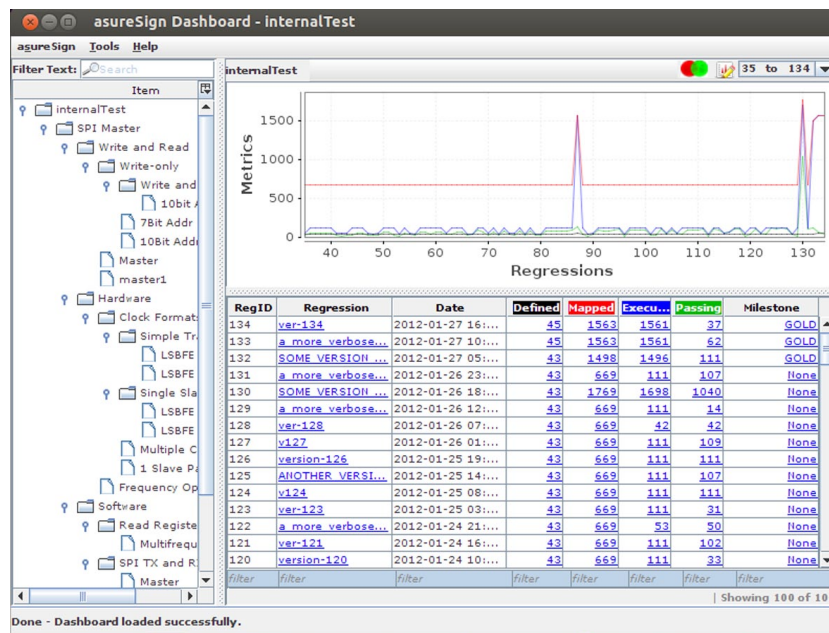
Developers of IoT devices not only need to consider the stability of their design when used in a networked context but their vulnerability. When things become financially important, they will become enticing targets to hackers. Even those without a direct financial benefit for successful attackers, some devices may provide an avenue for hackers to gain personal data that can be used for phishing attempts or simply be attractive targets for digital vandalism. In the wake of security disclosures about an internet-

enabled thermostat, showing how it was possible to load a web page showing the password it required, some users reported their devices misbehaving. In one case, a home user woke up in the early morning to find theirs had been set to 35°C.

In the world of personal computers and servers, the idea of regularly patching the software to counter types of attacks as they become known has become entrenched. But devices that do not have any form of high-bandwidth connection to the internet or which cannot suffer the downtime associated with a firmware update and reboot cannot realistically be treated the same way. An IoT device may have no high-bandwidth connection to load new software other than a custom connector inside the package that was used during factory configuration, and after commissioning in the field may be installed out of easy reach.

Because many of the devices will often be practically inaccessible, the “patch and pray” strategy used for many desktop software packages is unlikely to be an effective strategy for many forms of IoT device. They will need to be shown to be secure against a wide range of attacks. Patching can only be used for extreme situations where certain types of hack were unforeseeable at the time of design.

Because of the factors outlined above, there is a strong requirement for the firmware inside IoT devices to demonstrate trustworthiness. This has led, in the UK, to the release of a standard designed to improve the ability of software to avoid failures and resist attacks. The Trustworthy Software Initiative has backed the British Standards Institute’s PAS 754:2014 standard,



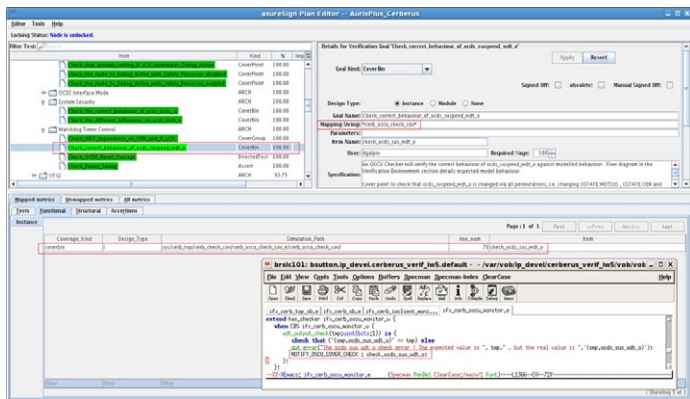
TVS' asureSIGN dashboard.

Mike Bartley is Founder and CEO of Test and Verification Solutions Ltd (TVS) - www.testandverification.com
Declan O’Riordan is Head of Security Testing at TVS.

which identifies five aspects of software trustworthiness: safety, reliability, availability, resilience and security.

The BSI document describes a widely applicable approach to achieving software trustworthiness rather than mandating any specific practices or procedures. The standard calls for an appropriate set of governance and management measures to be set up before producing or using any software which has a trustworthiness requirement. Under the regime, design teams need to perform risk assessments that consider the set of assets to be protected, the nature of the adversities that may be faced and the way in which the software may be susceptible to such adversities. To manage that risk, appropriate personnel, physical, procedural and technical controls need to be deployed. Finally, PAS 754 demands a regime be set up to ensure that creators and users of software ensure that governance, risk and control decisions have been implemented.

Where devices are likely to be incorporated into systems that have a safety aspect, certification to one of the relevant standards will be needed. This may be a generic standard such as IEC61508 or a domain-specific standard derived from it such as ISO 26262 that has been embraced by many of the automotive OEMs. A key element of the safety standards is the appropriate selection of a safety integrity level (SIL) to act as a guide for the degree to which functionality needs to be tested during design, during production and in the field, as built-in self-test mechanisms may be needed to ensure the device is fit for purpose. For example, a sensor node may include software to check its inputs are within bounds and not indicating a failure caused by too much dirt or a lost connection.



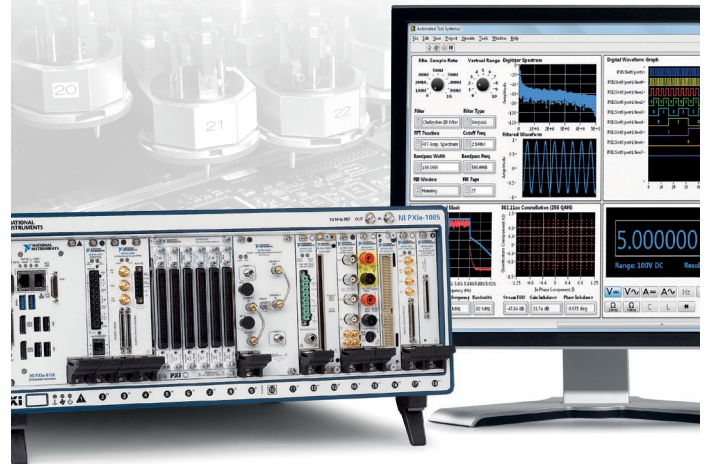
Proof of implementation as checked within assureSIGN's plan editor.

SILs differ slightly according to the relevant standard but follow a similar structure. In ISO 26262, for example, the automotive SIL (ASIL) ratings cover the four letters A to D, as well as QM for no safety impact. ASIL A is for systems that have little safety impact up to D for the most critical functions, such as brakes and steering. In IEC 61508, the SILs are numbered but cover similar grading of criticality.

The SIL determines the level to which each system needs to be tested. But to ensure that external problems cannot upset the more safety-critical systems, the engineering team has to go through a process of determining what could possibly affect the system they are designing, including events from external equipment. This calls for functions that check inputs as well as outputs for problems so that errant data does not cause the system to react unpredictably. An overarching test strategy needs to support those higher-level tests as well as the unit tests that will usually be performed during function creation and integration.

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Although the additional level of testing required for IoT may seem to be a burden that is difficult to support, research into software costs has shown that this attention to detail can pay off commercially. In a seminal paper published in IEEE Computer in 2001, Barry Boehm and Victor Basili of the University of Southern California and the University of Maryland, respectively, found that it costs 50 per cent more per source instruction to develop high-dependability software products than to develop low-dependability software products.

But, using the Cocomo II maintenance model, they found low-dependability software costs about 50 per cent per instruc-

tion more to maintain than to develop. High-dependability software on the other hand costs 15 per cent less to maintain than to develop. Making IoT systems more resistant to problematic external code and events – and thus avoiding inconvenient reflashing of the device – is likely lead to much lower maintenance costs than for systems where those precautions have not been taken.

The IoT will do much to increase the level of automated intelligence around us. It will also, because of this, change the way embedded systems developers handle validation and verification.

Wideband systems for RF signal capture and analysis

By Rainer Perthold

RADIO SIGNALS ARE ALL around us. With so many transmitters, both satellite and ground-based, there's a growing need for monitoring.

There are many applications that require the capture and analysis of radio signals. Government bodies may need to review signals to check compliance with the appropriate regulations, or to assess any problems with interference. For example, in the UK, Ofcom acts as the independent regulator for the communications industry, and in Germany the Bundesnetzagentur ensures compliance with the country's telecommunications act.

Another requirement is for COMINT (communications intelligence) and ELINT (electronic intelligence). This kind of work deals with intercepting and analysing communications, typically for surveillance or information-gathering.

The signals captured can include a wide range of RF frequencies, whether they are from satellites or other sources. Depending on the application, a user may want to record the signals, analyse them in real time, or store them for offline processing. There is also a need to archive the captured signals for later reference.

Typical radio monitoring applications require a flexible access scheme where all intercepted signals are buffered, while operators or automatic classification and analysis tools browse through the available content.

Wider bandwidths needed

While this kind of monitoring and analysis is a long-established application, there is a recent trend towards continuous surveil-

lance of all signals across wider bandwidths. Instead of selectively monitoring individual transmissions, organisations want to run automatic signal collection and analysis, all the time.

The objective of this continuous monitoring is to ensure that no relevant transmissions are missed. This puts additional demands on the equipment used, both in terms of the wider bandwidths targeted, and in the sheer quantity of data generated.

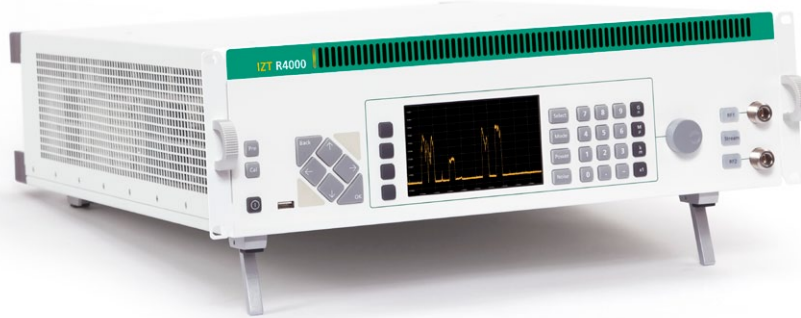
Another driver towards wider bandwidths is cost reduction by minimising the number of RF receivers required. Traditionally, organisations might use many narrowband receivers to monitor a frequency band – possibly as many as several hundred, if needed. If a single device could capture signals across

a much wider bandwidth, this would allow fewer receivers to be used, thus saving money.

Finally, wider bandwidths are increasingly required simply due to the wide bandwidth of signals to be monitored. For example, global navigation satellite systems (GNSS), such as GPS and the European Galileo system, typically have signals across a wide bandwidth. GNSS satellites transmit navigation signals in the L band, which covers the 1 to 2 GHz portion of the radio spectrum – for instance, the GPS L1 band uses a centre frequency of 1575.42 MHz. The bandwidth of the signal itself can be measured in tens of MHz, which can cause problems for narrowband receivers – the best way to handle the full bandwidth is to use a wider band receiver.

Hardware and software solutions

To meet these needs for continuous monitoring and wide bandwidths, manufacturers are developing hardware and software solutions that provide the performance required. Let's look at



Rainer Perthold is the CEO of IZT Labs - www.izt-labs.de

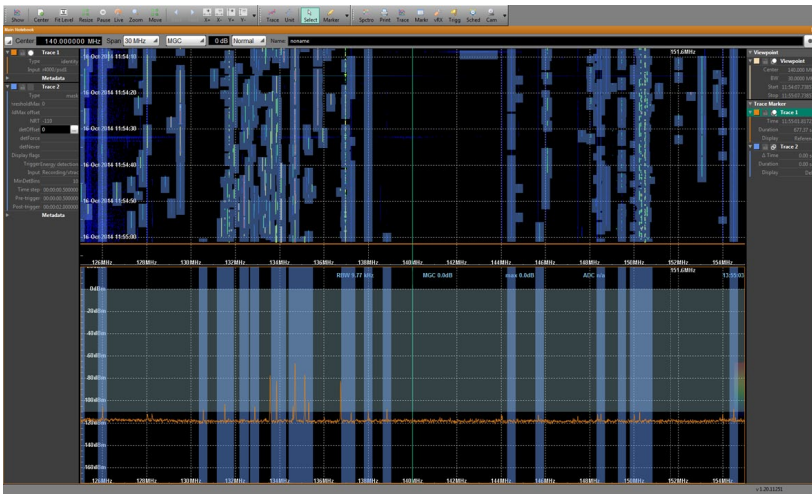


Fig. 1: Energy detection.

one example: the R4000 from IZT, with its associated Signal Suite software. The R4000 is a digital receiver and signal collection system, and is designed to meet customer demands for dynamic range even in high-bandwidth applications. It supports multiple simultaneous users on multiple channels.

As discussed earlier, bandwidth is a key factor in many applications. The R4000 provides an instantaneous bandwidth of 120 MHz, meaning it can handle GNSS data or other sources of wideband signals. This means that it can be used to replace multiple narrowband receivers, without compromising quality.

It is worth pointing out that wideband receivers such as the R4000 use software-defined radio (SDR) capabilities to implement parts of the system. As a technology, SDR is capable of achieving the highest levels of RF quality, as long as it is combined with traditional high performance tuners before the analogue to digital conversion.

Selective recording

Of course, with such a wide bandwidth, there will be huge amounts of data generated. Any practical solution needs to be able to store and analyse this data, but one way to minimise the problem is to be selective in which segments of the signal are examined.

With the R4000, all intercepted signals are stored in the first instance. Then, multiple operators or automatic classification and analysis tools can be used to browse through individual streams or multiple streams in parallel, no matter whether they were recorded in the past or are real time.

This means that users can specify criteria to determine the signals of interest. For example, they could only look at signals where the incoming power exceeding a certain threshold. The determining factors can be independent of threshold, such as only taking eight fixed sub-bands within the 120 MHz bandwidth, and continuously monitoring these smaller frequency regions. In fact, the R4000 can extract up to 32 sub-bands, which may overlap.

Automatic selection needs to happen quickly, with minimum latency. To achieve this, after digitisation, the R4000's DSP section calculates fast, high-resolution power spectra (PSD) with configurable parameters and three different detectors (minimum, RMS and maximum) in parallel. This PSD data gives an overview of the activities in the frequency band, and can serve as a

trigger source for selective capture – see figure 1.

In the past, dynamically shifting the centre frequency of the region being captured would tend to cause data corruption, or for the signal to be dropped. The R4000 overcomes these problems, and allows arbitrary sections of the spectrum to be extracted, and the region of interest to be varied in real time without affecting signal integrity.

The R4000 digitizes signals up to 140 MHz directly without additional frequency conversion, helping to improve dynamic range. For higher-frequency applications, the input frequency range can be extended to 3 GHz or 18 GHz, using the VUHF or SHF front ends. The R4000 includes highly-selective configurable signal pre-selectors to avoid signal overload problems, high-quality RF front-ends, and broadband digitizers – see figure 2.

Software integration and storage

Capturing the signal is just the start of the process – how can it be analysed and stored? In today's systems, there is close integration between software and hardware to provide the most useful tools. For some applications, the complex post-processing algorithms required are sometimes too slow to work in real time, so it is essential to store signals and process them offline.

The R4000 storage system separates signal capture from post processing and analysis, providing minutes to days of buffering capacity, if required. The storage hardware used depends on the use case, with varying sizes possible of hard drives or solid-state storage.

While new data from the sensors is being recorded, multiple users or post-processing modules can simultaneously access historic data in the storage system as well as live streams. The transition from live to recorded is completely seamless from the users' point of view.

To handle the vast amount of data generated, an effective graphical user interface is needed. For example, the R4000's software provides a customisable layout that can be switched from a basic overview to a fully detailed view. Customisable templates restrict the interface, helping users to focus on specific tasks.

A Software Development Kit (SDK) and open data formats ensure easy interaction with third party software and system integration. This feature is commonly used to analyse signals with MATLAB®.

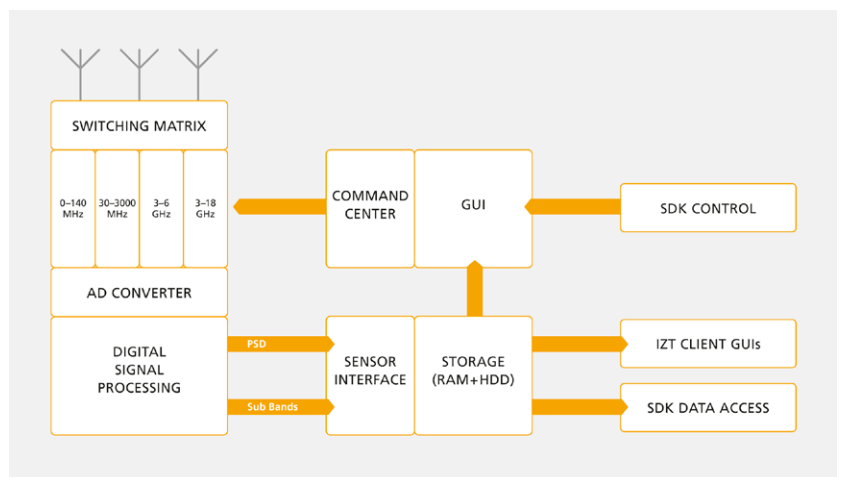


Fig. 2: IZT R4000 overview.

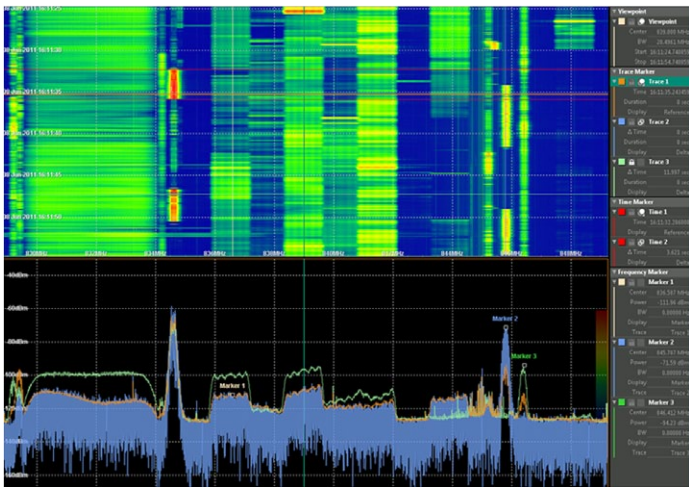


Fig. 3: Viewing captured data in the Signal Suite software.

Distributed systems

The R4000 backend system also allows distributed operation over different locations, supporting multiple sensors and multiple users. This means that it is possible to install the sensor at remote locations while data processing and visualisation

happens at a central command post – even with unreliable or slow network connections. All signals are recorded and cached at the remote location. Users or software modules request a preview of areas of interest. A variety of compression algorithms reduce the amount of data that needs to be transferred to the central command location, and users can configure the trade off between quality and speed.

Should the network go down, access to the sensor will be temporarily unavailable, but the remote storage system will continue recording and store all signals for later analysis. If the full content of a signal is needed, it can be compressed with configurable quality and transferred to the central location, possibly during times of low network use.

Conclusion

Many organisations have a need to monitor, analyse and store radio signals. With bandwidths growing, and the number of devices to be monitored also increasing, this creates a requirement for equipment that can capture wideband signals, and can deal with the large amount of data created. With suitable integration of hardware and software, it's now possible to meet this challenge, and to provide a user-friendly, cost-effective solution that meets the needs of government regulators and other bodies.

Passive oscilloscope probes tolerate temperature testing

Model 702902 and 702906 from Yokogawa are 10:1 passive oscilloscope probes that operate over a wide temperature range from -40°C to +85°C, and are suited to use in accelerated testing and validation methods where temperature cycling is part of the test procedure. The 702902 is designed for use with the isolated BNC input modules of Yokogawa's



DL850E ScopeCorder family, whereas the 702906 is intended to be used with the non-isolated BNC inputs of the Yokogawa DLM4000 and DLM2000 Series of oscilloscopes. The probes are fitted with long (2.5 m) cables, keeping the measuring instrument away from the high temperature measurement point. Longer probes are also required to connect the measuring instrument to a temperature-controlled chamber.

To ensure reliability under severe environmental conditions, these probes have been proved to withstand a cable mount pulling force of 60 N, and have been tested over 500 temperature cycles. In addition to supporting isolated and non-isolated inputs, these probes can also be used with a range of probe tip conversion adaptors to connect the probe to the application in the most convenient way. The choice of adaptors includes safety mini clips, fork terminal adapters, small or large alligator clips, and 4 mm conversion adaptors with pincher tip or safety banana connectors. Typical applications include accelerated testing and validation of automotive parts and designs inside a temperature chamber and the environmental testing of power converters designed for outside installations such as the inverters and transformers used for solar photovoltaic and wind-turbine power generation.

Yokogawa

<http://tmi.yokocms.com>

800W high-voltage programmable DC power supply

TDK's 800W model in the TDK-Lambda Z+ series of high voltage programmable DC power supplies is offered with output voltages of up to 160, 320 or 650 Vdc (as well as an additional model offering up to 375 Vdc), addressing the requirements for applications such as deposition processes, ROVs, ATE systems as well as general laboratory and industrial use. This unit achieves efficiencies up to 89% and carries a 5-year warranty. All units in the Z+ range can operate in either constant current or constant voltage modes and accept a universal (85-265 Vac) input. For higher power systems, such as those used in test or simulation applications, up to six units can be connected in parallel in a master-slave configuration. To increase the output voltage or to provide a bipolar output, two identical units may be connected in series with external diodes. All models can be programmed via the front panel or remotely by using the built-in USB, RS232 / RS485 or analogue control interfaces. Optional LAN, GPIB (IEEE488) and isolated analogue programming interfaces are also available. CE marked for EMC and in accordance with the LV (low voltage) and RoHS Directives, the Z+ high voltage series conforms to EN55022/EN55024, as well as IEC/EN61326-1 for conducted (FCC part-15-B and VCCI-B) and radiated (FCC part-15-A and VCCI-A) EMI. Safety approvals include UL/EN/IEC61010-1, and the Z+ high voltage series is designed to meet UL/EN60950-1.



TDK-Lambda

www.uk.tdk-lambda.com/zplus

1800W modular electronic loads for power tests

Interpro Systems' ML1800 Series of 1800W modular electronic loads features an 8-in. TFT LCD colour display with multiple language selection that is visible at a distance. The 6-slot chassis is rated at 1800W and can be specified with up to six 300W or three 600W modules. Modules are available with current ratings of 60 or 120A with voltages up to 80V; or 10 or 20A with voltages up to 500V. The load offers CC, CV, CR, CP, short circuit, battery and LED operating modes, 20 kHz transient test speeds with programmable rise, dwell and fall times, inductive load and capacitive load simulation, for testing of power supplies, batteries, LEDs, adaptors and converters. 16-bit programming and measurement resolution lets the ML1800 be operated as standalone instrument as well as having the capability to be integrated into a larger test system. It offers 10 user-programmable stored test sequences of up to 10 steps each. Programs can be run once, continuously looped or run once and then chained to other programs to provide very complex loading profiles. Test modes can be changed without turning off the load input. This allows the ML1800 series to more accurately simulate load testing applications. Turn-on capacitance and inductance simulation is easily performed using the CC Rise and CV Rise modes.



Interpro
www.inteproate.com

LeCroy releases 100 GHz real-time oscilloscope for R&D

Previewed in a number of demonstrations since July 2013, LeCroy has now formally released its 100 GHz, 240 Gsample/sec LabMaster 10-100Zi oscilloscope, aiming it at engineers working on next-generation communication systems. This introduction, says Teledyne LeCroy, "continues to demonstrate a long running commitment to leadership in the high end oscilloscope market by aggressively pushing real-time bandwidth and sample rate boundaries". The LabMaster 10-100Zi is the newest acquisition module in the LabMaster 10 Zi Series of high-performance modular oscilloscopes. LabMaster 10 Zi is a modular and flexible platform that allows users to build oscilloscopes with high channel counts, even when only one or two channels are in the base model. LabMaster 10 Zi oscilloscopes are built from a single LabMaster Master Control Module (MCM-Zi) that contains the display, control, and ChannelSync clock distribution architecture; all managed by a server-class CPU. Users connect up to 20 acquisition modules, including the LabMaster 10-100Zi, in order to build oscilloscopes with up to eighty channels at 36 GHz, twenty channels at 100 GHz, or anything in between. The LabMaster 10-100Zi was, the company says, recently used by Alcatel-Lucent to demonstrate the highest-bandwidth coherent optical receiver capable of detecting a 160 GBaud QPSK signal.



Teledyne LeCroy
www.teledynelecroy.com

Oscilloscope probes for high-voltage signal measurements

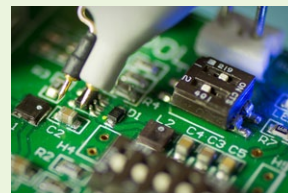
Keysight Technologies has introduced 200-, 300- and 500-MHz, high-voltage probes with a wider input range, higher common-mode rejection ratio and optimised accessories, for testing switching power supplies or power devices and for measuring motor drives and vehicle buses. The N2804A differential probe has up to 300-MHz bandwidth and ± 300 -Vdc + peak AC of the maximum differential input range, allowing engineers to use it for a broad range of power applications. The N2805A 200-MHz differential probe comes with a 5-m input cable, which allows engineers to easily reach DUTs over long distances. The probes have a differential input resistance of 4 M Ω and low input capacitance of 4 pF to minimise circuit loading. The N2804A and N2805A probes are compatible with Keysight oscilloscopes with a 50- Ω AutoProbe interface, which automatically configures the scope for the probe. The Keysight 10076C 100:1 passive probe with 66.7-M Ω input resistance provides the voltage and bandwidth engineers need for making high-voltage measurements referenced to the ground with low input loading. The probe provides 500-MHz bandwidth when used in conjunction with a spring ground tip to reduce inductive ground loading.



Keysight
www.keysight.com

Probes plus software enhance impedance measurements

To minimise circuit loading, Picotest has developed two transmission-line probes that the company calls PDN probes. The company also introduced software for the Keysight E5061B



VNA designed specifically for impedance measurements. Characterising PCBs and components for signal integrity and power integrity often requires high-speed measurements in both the time and frequency domains.

Because of high-frequencies, test equipment can load circuits and influence measurement results. The 1-port and 2-port PDN passive probes have, as you'd expect, 50 Ω impedance. According to the Picotest, measurement of power distribution network (PDN) impedance for FPGAs generally requires the measurement of impedance levels in the milliohm range at frequencies over 1 GHz. The probes add less than 1 pF of capacitance to measurements and have a rated bandwidth of 1.3 GHz. The unity-gain 1-port probe lets you measure ripple and noise produced by switching power supplies in power-distribution connectors on your board while maximising SNR (signal to noise ratio). You can use either the 1-port or 2-port probes to inject noise into your power supply, which lets you test sensitive circuits such as clocks and LNAs for how they perform under controlled noise conditions. The bidirectional 2-port probe can transmit a load-current step through one port while measuring the response from the other port. The VNA software automates the process for making NISM (non-invasive stability measurements).

Picotest
www.picotest.com

Enhancing network security with physical layer management

By Rudy Musschebroeck

INFRASTRUCTURE AND NETWORK security systems are fine as far as they go, but they don't provide visibility into the state of the physical network. For complete security, network administrators need to know who is connecting to the network at any given time, where they are connecting, and how they are connecting. Physical layer management (PLM) systems enhance network security and allow administrators to know how, where, and when there have been changes or modifications to the physical network.

Physical network security challenges

The physical layer of the network (cables and patch panels) is often ignored when it comes to documenting and managing the network. But without knowledge of where cables are and what they connect, network administrators are at a loss to prevent physical network attacks or even know if and where they occur. Someone can simply unplug a patch cord, insert a rogue monitoring and collection device, and then plug in a new patch cord connecting that device to the patch panel. The network management system shows that the network is down for a few seconds, but it comes back up, operating normally, so the event is ignored.

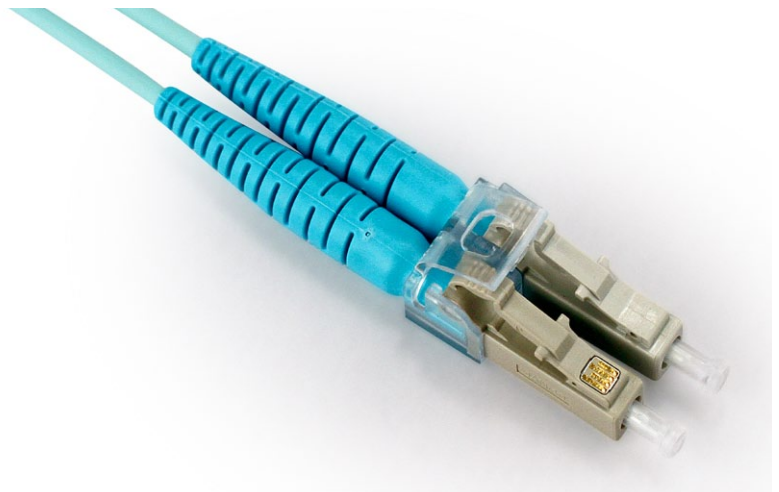
These internal network attacks are more worrisome than some might think. While external, Internet-based attacks by third parties get all the press, it is estimated that 63 percent of network attacks are done by the victim's own employees, and that 30 percent of those attacks are physical access attacks.

PLM systems and network security

PLM systems are Cyber Physical Systems (CPS) and address physical security problems by electronically documenting the physical layer of the network and maintaining real-time knowledge of the state of the network. CPS standards are developed by the National Institute of Standards and Technology to bring traditionally passive equipment and standalone PLM systems to a common standard for intercommunications and features. In a PLM network, the ports of the patch panels and the endpoints of patch cords are being continually monitored. PLM systems and their approaches have evolved, keeping pace with advances in technology, network architecture and operational needs. Each approach and technology advancement has improved the security posture of the physical layer network. Some of the more established approaches to PLM are:

Inference (presence detection) – in this approach, the ports on a patch panel will detect the insertion (or removal) of a device and report that something has been inserted (or removed). This system relies on an inferred process: you connect port A

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Quaero CPID chip embedded in a patch cord.

first, port B second, port C first and port D second, and it assumes you're going to do it in order, one patch cord at a time. If that process is not followed, the data becomes inaccurate. In the event of a man-in-the-middle attack, there is no way for the system to tell if the patch has been restored by the same cable, or even to the same position as the system does not know the origin or destination for any of the cables. Also, because the system does not physically monitor the patches, the system would not detect any changes that happened during a power down period.

Ninth wire – a ninth wire is a wire that runs along the length of a patch cord like a security loop. It tells the network administrator that point A is connected to point B, but offers no detail about what is making that connection from A to B. If anyone breaks the connection, an alarm goes off. In the event of a man-in-the-middle attack, where someone inserts themselves within the circuit to monitor traffic such as financial transactions, capturing passwords or credentials to access critical information, there is no way to identify that the patchcord has been replaced by the same cable. In case the patch has been moved to another port in an attempt to steal data, the system can tell you exactly which port the patch has been moved to.

Connection point identification (CPID) – this approach uses a chip in the end of each connector with a serial number that identifies the connector and the patch cord it is associated with. The two chips on the ends of a patch cord have the same base serial number, but they also have a designator that tells one end of the patch cord from the other. When the cord is plugged in, the patch panel knows where the cord is and where the two connection points are.

With CPID, the system always knows exactly which connector is where and if anything changes in that circuit path, including a different connector being inserted. The user will know immediately when circuit changes take place.

The CPID chip also contains information about the performance of the cable assembly. It tells us whether it's single- or multi-mode fiber, Cat6 or Cat6A cable. If a technician grabs the wrong cord and plugs it in, the administrator can see there's a cable mismatch and can stop cable mismatch problems before they occur. In the event of a man-in-the-middle attack the system will alarm you in all possible cases where the connector is removed, replaced by another connector or moved to a different position, even telling you when the system was powered down when the change happened.

PLM systems have event monitoring and alarming capabilities. When a particular patch cord is inserted or disconnected the system identifies the problem. This helps administrators quickly identify and respond to physical network breaches and accidental circuit disconnections. All systems offer different degrees of data and it is key to integrate the solution to your business processes to ensure your network is up and operational.

PLM and physical security

With the PLM system in place, the administrator can see if someone changes a patch cord to reroute a signal or runs a man-in-the-middle attack, because the administrator knows that the original connector has been disconnected, and that a different connector has been plugged in.

Another means of attacking the physical layer is by making unauthorised changes and enabling other circuits. Even if you have documentation saying that Switch Port 1 goes to Outlet Office 1, if a person has access to the wiring closet, he or she can make changes in the patching and route those signals to another location.

A network tech would have to physically respond and trace the cable to figure out where it's been rerouted. That takes about 50 minutes, during which time someone has the chance to attack the network. With PLM, the administrator can see when someone plugs in a patch cord and introduces a new connection to the physical layer, and can quickly direct the network tech to the precise location.

From an intruder security or uptime security standpoint, you want network changes conducted when and where they are scheduled and you want to know when anyone is making any changes to the network. The PLM system monitors port connectivity at all times. Whenever a change is made that resolves the end-to-end points of that circuit, you're getting that feedback in real time.

PLM alarming

A full-featured PLM system offers a number of different ways to send out messages. It can send e-mail to specified users so they can shut down a circuit or physically audit the breach. The system can also send notifications through e-mail to the company's security department, so, for example, if a surveillance camera goes down or a rogue device is connected they can send someone to address it.



CPID chips embedded in a patch panel.

There are many types of PLM solutions that provide a range of visibility and control to the physical layer network. By delivering information about the state of the physical network, and bringing the physical layer under the same visibility as management systems do for Layers 2-7, PLM systems complete the network security picture. Having a system in place to identify accidental and intentional connections and disconnections will allow you to identify when and where circuit changes occur and mitigate any service downtime and security risk.



High Reliability Performance to 10 Amps

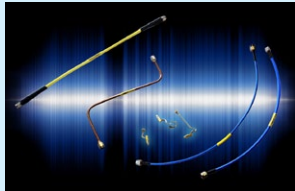
- Extremes of temperature
-65 to +175°C
- Four finger contact ensures connectivity in high vibration environments
- Up to 1,000 operations
- Jackscrew security system
- Small PCB footprint

 **M300**

For technical specifications go to:
www.harwin.com/M300

Phase matched cable assemblies from DC to 50GHz

The Cable Assembly division of Intelliconnect (Europe) Ltd, the UK based specialist manufacturer of RF connectors, now offers phase matched cable assemblies. This allows cus-



tomers to specify the electrical length in time or degrees at the frequency of operation for a specific cable assembly. Phase matching of a cable assembly is essential when connecting to multi-channel receivers as it

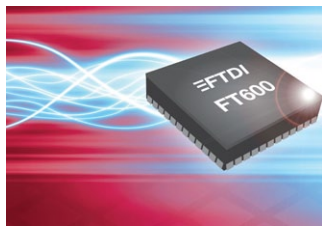
is important for discrete channels to match and track each other over frequency of operation. Cables can be matched in "sets" or pairs. One of two methods may be used - electrical length (matched to a golden standard), or phase matched to another cable. Applications for phase matched cable assemblies include high power amplifiers, RF combiners and filters, multi-beam antenna arrays, phased array radars. Coaxial, triaxial and multi-way connectors may be specified and fully immersible waterproof versions are available. All Intelliconnect cable assemblies are 100% electrically tested before despatch. In addition phase matching is available where required to ensure signal integrity in individual, or batches of, assemblies.

Intelliconnect

www.intelliconnect.co.uk

USB 3.0 interface in 56-pin QFN package

The FT600Q and FT601Q are FTDI Chip's first generation USB 3.0 products that function as SuperSpeed USB 3.0 to FIFO bridges, providing data bursting rates of up to 3.2Gbps. The FT600Q comes in 56-pin QFN package and has a 16-bit



wide FIFO bus interface, while FT601Q comes in 76-pin QFN package and has a 32-bit wide FIFO bus interface. Both these chips support up to 8 endpoints, other than the management endpoints. The endpoints are linked to a configurable endpoint

buffers of 16kByte length for IN and 16kByte for OUT. Both FT600Q and FT601Q support two interfacing modes; the 245 FIFO mode and the multi-channel FIFO mode, and thus provide more flexibility for system designers. The 245 FIFO mode has a simpler protocol, but for more sophisticated customers, the multi-channel FIFO mode supports up to 4 logical FIFO channels and data structures optimised for higher throughputs. The FIFO is provided with a 16kByte configurable buffer. The remote wake up function on these chips can be used to rapidly bring the USB host controller out of suspend mode. The USB battery charger detection function enables USB peripheral devices to detect the presence of a higher current power source in order to boost charging capabilities. It means that the FT600 can detect connection to a USB-compliant dedicated charging port (DCP) and transmit a signal allowing external logic to switch to charging mode. The IC can also benefit from the higher power delivery capabilities that the USB 3.0 standard supports while still being able to transfer data.

FTDI Chip

www.ftdichip.com

Rapid media converters support Ethernet applications in realtime

With their short latency, the FL MC 2000T Ethernet media converters from Phoenix Contact have been specially optimized for use in applications with time-critical protocols. The optical converters are optionally available with pass through operating mode.

This enables the latency to be halved in comparison to standard mechanisms such as store-and-forward. As a result, they are suitable for Ethernet protocols such as Profinet, Powerlink,



Ethercat or Sercos III. The devices are in robust metal housing and satisfy high environmental requirements for implementing a variety of applications. Distances of up to 40 kilometers can be bridged using single-mode fiberglass. In addition to numerous diagnostics LEDs, the media converters feature the Link Fault Pass Through function. This provides permanent connection monitoring. If the connection drops, direct redundancy measures can come into play. A relay output on the device also informs you of a voltage or connection drop. Data transmission via fiber optics optimizes Ethernet applications with regard to their performance and transmission reliability. In addition to the increased range, the advantages of electrical isolation are also apparent.

Phoenix Contact

www.phoenixcontact.com

Hermetic-sealed multi-fibre connection systems

Molex' Hermetic-Sealed Multi-Fibre Circular MT Optical Assemblies promise extreme sealing performance in the smallest footprint. These assemblies provide system reliability in extreme environments,

including severe weather conditions, high altitudes and high atmospheric pressures. These conditions can cause ordinary surveillance and sensor equipment to fail, which can create critical communications problems.



Hermetic sealing can address this problem, but only under certain circumstances. Hermetic-Sealed Multi-Fibre Circular MT Optical Assemblies contain 12 to 24 fibres in one small-footprint connector compared with similar products that utilise discrete-fibre (one fibre per contact) connector designs. The assemblies are appropriate for applications that require optimal environmental and pressure-sealing capabilities, such as aerospace and defence, mining, oil and gas exploration, industrial process control, and medical. They can operate in temperatures ranging from -40° to 70° C. A Multi-Fibre MT interface with 12 to 24 flat-ribbon fibre counts provides the densest fibre count in a compact hermetic interface for maximum data transfer. This suits the HSMFC MT Optical Assemblies for tight panel configurations where space is at a premium. Sealing rates are to 1x10⁻⁶ helium (He) cc/s at one atmosphere differential pressure. Stainless steel connector housings provide high durability and corrosion resistance.

Molex

www.molex.com/link/hermeticsealed.html

Shielded M12 cable connectors with PG cable gland

Provertha has expanded its M12 product portfolio with the introduction of fully shielded M12 cable connectors with PG cable gland. Due to the fully shielded MG cable gland the new M12 connectors are ideal for challenging applications with high EMC.

The RF-tight solutions with 360° shielding support a wide spectrum of cables with diameters from 5.5 mm to 9.0 mm. Cable with different diameters can be easily adapted for various applications.

Despite the new features and the reliable shielding the new M12 cable connectors retain the compact form factor and the dimensions of the standard M12 cable connectors. The crimped contacts with the PG cable gland enable a secure and reliable cable strain relief in demanding applications.

Provertha Connectors, Cables & Solutions GmbH
www.provertha.com



Miniature connector crams 4 power and 20 signal contacts

The Fischer MiniMax Series handles more mixed signal and power connections while saving money, space and weight, according to the manufacturer. The miniature solution comes as a pre-cabled solution for handheld or body-worn applications when space is limited. The Fischer MiniMax Series is available both in 19 and 24 pin configurations. While the 24 pin configuration is available with 4 power and 20 signal contacts, the 19 pin configuration features 4 power and 15 signal contacts as standard. Within the signal contacts, there are 2 advanced contacts for USB power connections as available option. The connector comes in push-pull, screw lock and quick release.

Fischer Connectors

www.fischerconnectors.com



Optical D-Sub connector withstands harsh use

Lane Electronics' Positronic Optik-D Series is an ARINC 801 conforming fibre-optic connector designed to be used with the company's Combo D-Subminiature family. Positronic's Combo-D is a hybrid connector system which allows designers to incorporate power, signal, coax and now optical contacts in a single mixed density, D-Subminiature format. According to Lane Electronics, Optik-D connectors are more cost effective than D38999 or ARINC 600-based systems and are compatible with ARINC 801 products from other manufacturers. The Optik-D connector features an ultra-low insertion loss figure of just 0.06 dB (typical) achieved thanks to a proprietary design based on a tight tolerance guide pin and bushing that act jointly to keep the fibre cores precisely aligned.

Lane Electronics

www.fclane.com



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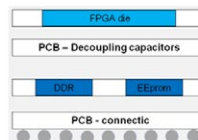
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Tiny tattoos sense health

By Jessica Lipsky

RESEARCH INTO NANOSENSORS is bearing fruit at the University of California San Diego. Researchers at the University's Center for Wearable Sensors have prototypes for several tiny, inexpensive sensors fit for the skin that target a variety of medical uses.

Joe Wang, distinguished professor in UCSD's Department of Nanoengineering and faculty director of its wearables center, showcased temporary tattoos outfitted with electrochemical sensors to monitor electrolytes and metabolites in real-time.

The tattoos are screen printed and can be worn for up to a week. "The skin is an important sensory function," Wang said at TSensors Summit. "The skin is not only our own body, but it could be the body of any host like a building, a tree, or a moving car."

Such sensing devices "couple favorable substrate-skin elasticity along with an attractive electrochemical performance" for highly efficient sensing. Attached sensors did non-invasive diabetes monitoring using tears and were also able to assess endurance and performance through sweat. The tattoos were able to withstand at least 50 manipulations and still retain shape and performance.

The sensors allow for measurement of trace heavy metal elements such as lead down to a parts-per-billion level. Wang added that the tattoo sensors could also be used to harvest energy in the form of a printable biofuel or zinc battery, which could potentially power an LED with sweat.

Research began with printable textile-based sensors sewn into the elastic waist of underwear to measure performance. Multi-electrode layers on garments were eventually able to sense explosives while a "forensic finger" on a glove could do an on-spot analysis of a crime scene.

"The goal was to develop a forensic lab on a sleeve with detection of explosives and gunshot residue all integrated with supporting electronics on a sleeve, on a textile," Wang said.

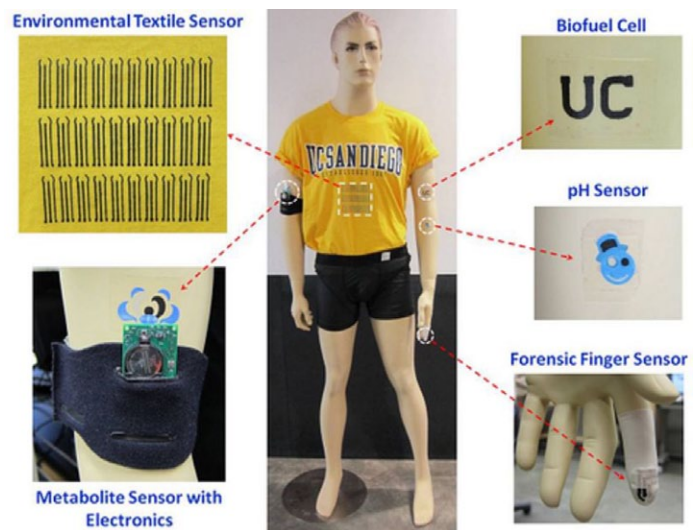
Wang and team also worked with the Navy to put printable sensors on a wetsuit to monitor underwater security and environmental conditions. Other prototypes monitored saliva in a mouth guard.

Minimally invasive micro needle sensors are also under development at the center. Researchers hope to create an array of



Screen printed tattoos would need to be worn with an additional device that would send data via Bluetooth LE. (Image: UCSD)

Jessica Lipsky is Associate Editor at EE Times



Several Center for Wearable Sensors research projects. (Image: UCSD)

up to 15 carbon based needles with electrodes that can monitor electrolytes under the skin. The needles would sit barely beneath the skin and, in addition to monitoring electrolytes, could more effectively deliver drugs.

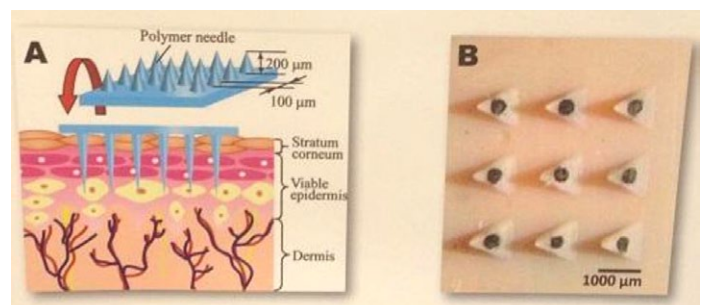
"We're working on continuous monitoring of multiple chemical markers under the skin. The ultimate goal is to [create a] sense, act, treat, and feedback system and integrate sensors with drug delivery actuators," Wang said.

To deliver medications more effectively, each micro needle will be equipped with different reservoirs. A doctor could trigger those reservoirs to send drugs at varying intervals or doses.

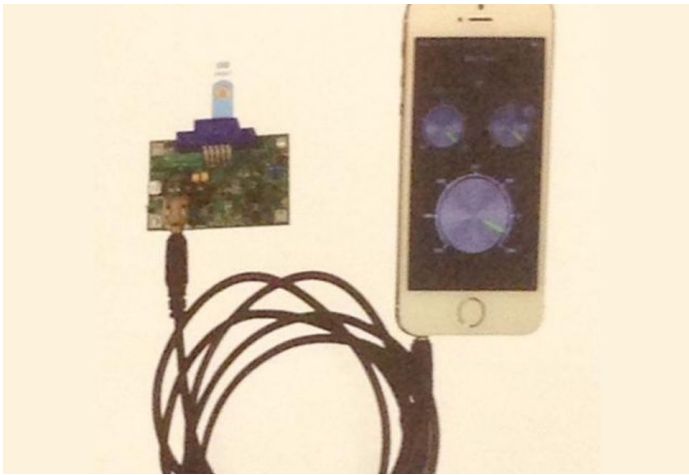
Students in UCSD's Bioengineering department showed proof-of-concepts, including a point-of-care system for glucose monitoring. The portable glucose molecule detection platform can be plugged into any smartphone and, eventually, more basic handsets. The goal is to bring the price of the glucose monitor below the current \$23 average and enable data to be instantly sent to doctors.

Long-term, uninterrupted monitoring of an ECG also necessitates a wearable sensor. The group's design leverages the "quasi periodicity" of ECGs -- which exhibit data spikes during cardiac incidents -- to create a "dynamically reconfigurable" device. Although still in circuit design, one student said the wearable sensor can go into low power mode when the sensor shows low signal activity.

A project in UCSD's Integrated Systems Neuro-engineering



(Left) Example of needle depth. (Right) A nine-micro needle array. (Image: UCSD)



A point-of-care system for glucose monitoring. (Image: UCSD)

department aims to “advance the current state of retinal prostheses for the treatment of neurodegenerative blindness” by more accurately measuring retina activity and further explore effective phosphenes -- the phenomenon of seeing light without light entering the eye.

Researchers can monitor a degenerating retina by sending controlled electrical stimulation pulses on the intact retinal ganglion cells. Such pulses can elicit visual perceptions on the degenerated retina. To more easily monitor phosphenes from

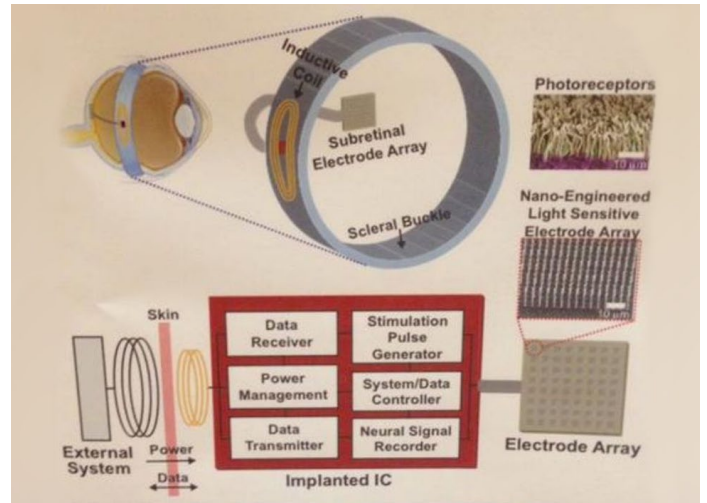


Diagram of nano-engineered retinal prosthesis. (Image: UCSD)

the failing retina, the department developed a retinal prosthesis with a light sensitive electrode array positioned in subretinal areas.

The prosthesis also has an implanted integrated circuit and wireless power for data telemetry, allowing researchers to note different types of retinal ganglion cells and adapt the electrical stimulation pattern. The IC was able to transmit 6.78 Mbits/s data and deliver up to 6 mW of power over 13.56 MHz.





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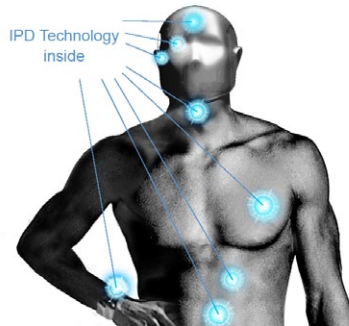
HY-LINE Computer Components Vertriebs GmbH
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THine Electronics, Inc.

Shrinking silicon integrated passives for implantable heart monitors

By Laëtitia Omnès

IN ADDITION TO THE PROGRESS already made over the last twenty years, insertable/implantable medical device manufacturers have to push the envelope further, to extend people's lives, improve quality of life and even allow the recovery of lost functions. Size, weight, reliability and lifetime are all important when developing electronic medical devices. And the job includes passive components. To illustrate the role of passive components on the final structure and on the performance of an electronic medical device, we will detail in this article a concrete example of a miniaturized 'implantable' heart monitor device.



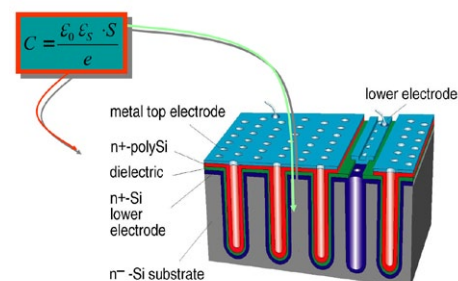
Implantable devices containing IPD technology.

Engineering and design challenges

For the last decade, the medical community has been aware of the need for heart monitor implants to detect heart beat abnormalities. The device is inserted under the skin of the patient's chest. It records every beat of the heart and the information is transmitted wirelessly to the medical center. The heart activity can therefore be monitored remotely so as to assess unforeseeable and abnormal cardiac events which would indicate the need to implant a pacemaker. The medical industry is strongly encouraging the development of smaller and longer-lasting devices to simplify surgical operations, and this has become a key challenge for the main medical device manufacturers. In the 'implantable' device we consider as an example, the objectives were clearly defined by the final device manufacturer: to reduce the size of the electronics by a factor of 10 and optimize the power consumption to achieve a battery lifetime of 3 years.

Silicon-based 3D integrated passives

To achieve these objectives, large discrete components had to be replaced. The solution offered was based on silicon integrated passive device (IPD) technology.



One of the most critical passive components in an electronic medical device - and one of the most difficult to integrate - is the capacitor, especially if its value is above 1µF. The development of 3D high-density capacitor technology has addressed these issues. The newest generation uses innovative 3D structures and reaches densities of 250nF/mm², enabling the

Laëtitia Omnès is Marcom Manager at www.ipdia.com - She can be reached at laetitia.omnes@ipdia.com

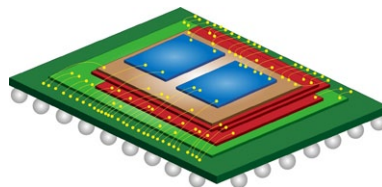
manufacture of miniature silicon capacitors with a capacitance measuring several µF.

The materials used in this technology are similar to those used to manufacture ICs. The primary benefits are high reliability and minimal leakage within the capacitors, mainly obtained thanks to the high purity dielectric layer generated during the high temperature curing.

Different steps with IPDs

Returning to our specific example, some multi project wafers were first proposed with single silicon capacitors with several values and silicon capacitor arrays, in order to qualify the technology and check the yield. This first step passed, two bundles of capacitors were designed. The first one was an array of large silicon capacitors totaling more than 3µF in a single die. As specified above, the silicon-based IPD technology enables high capacitance in a small case size, with a thickness which can be as low as 100µm. A first step towards miniaturization was therefore achieved.

The second bundle was composed of another array of isolated silicon capacitors of 100nF each. The main drawback of this design was the interference caused by the side-by-side position



Schematic of the final module.

of these silicon capacitors, which would have had a negative influence on the leakage current and therefore on the power consumption. The challenge was to adjust the technology to get a leakage current under 10nA from one node to another. The design

of this capacitor array has been revised using a 'High Isolation' technology mainly consisting in controlling the behavior of the diode coupled with the array. As a result, the integrated system had a total capacitance exceeding 7µF, relying on a high isolation design to reach a final device size ten times smaller than the previous generation of 'cardiac monitors'.

Leakage current was below 0.2nA/µF at 3.2V/25°C/120s. To achieve a faster and more reliable transition from prototyping to industrialization, prototypes were then developed under the same conditions and environment as for the industrialization step.

New horizons in medical technology

Integrated passive components with silicon in 'insertable' cardiac monitor devices offer new opportunities to improve the final product reliability, lifetime and performance. In this context, this leads directly to fewer device replacements for the patient. We can therefore imagine that this solution can be adapted to other implantable devices that have the same goals in terms of reliability, lifetime and performance. We are only at the dawn of an era of new possibilities. The R&D programs and technology roadmaps allow us to imagine many new functions and improvements to existing functions brought by integration.

Disposable liquid flow sensors expand medical device options

Sensirion has designed disposable liquid flow sensor solutions for medical devices. The use of intelligent, compact and cost-effective disposable liquid flow sensors will change the field of drug delivery and enable solutions to be provided which are safer, more reliable and more mobile for care in the hospital and at home. The disposable liquid flow sensor LD20-2000T

provides liquid flow measurement capability from inside medical tubing, such as an infusion set or a catheter, in a low cost sensor, suitable for disposable applications. Drug delivery from an infusion set, an infusion pump or other medical devices can be measured precisely and in real time.

Treatments will become more effective, as they become easier to monitor and control. Patient's safety is improved by the automatic detection of failure modes such as clogging, free flow, air bubbles, or leaks in the tubing connection. Inside the disposable liquid flow sensor, an IC measures the flow inside a fluidic channel. Flow rates from 0 to 420 ml/h and beyond



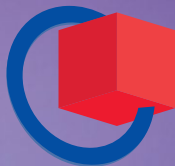
are measured with a typical accuracy of 5% of the measured value. Ultra-low flow ranges span 0-5 ml/min with resolution of down to 0.1 nl/min. Inert medical-grade wetted materials ensure sterile operation with no contamination of the fluid. The straight, open flow channel with no moving parts guarantees reliability of the measurement technology. The miniature size of the sensor chip results in very fast and highly repeatable measurements. Using Sensirion's CMOSens technology, the

fully calibrated signal is processed and linearised on the chip with a footprint of only 7.4 mm². The LD20-2000T disposable liquid flow sensor enables manufacturers of medical devices to innovate new solutions using a ground-breaking technology which only now has become available.

Sensirion has vast experience in the medical field and Sensirion's liquid flow sensors are already being used in numerous applications in challenging fields, from diagnostic instruments to process control in the semiconductor industry.

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NÜRNBERG MESSE

Single-channel gate driver provides on-chip galvanic isolation

STMicroelectronics has launched the STGAP1S advanced single-channel gate driver which integrates galvanic isolation with analog and logic circuitry in the same chip to help simplify driver design while ensuring high noise immunity for safe and reliable power control. STGAP1S is the first in ST's new generation of gapDRIVE gate drivers, which combine proprietary bipolar-

CMOS-DMOS (BCD) process technology with innovations that enable an isolation layer to be grown on-chip to allow even greater system integration. Up to 1500V can be present on the high-voltage rail without interfering with other circuitry, ensuring a level of robustness that makes this new device ideal for use in industrial drives, high-power 600 V or 1200 V inverters, solar inverters, and uninterruptible power supplies. With signal-propagation delay of 100 ns across the isolation layer, the STGAP1S is capable of transmitting high-accuracy PWM signals. The integrated driver stage can sink or source up to 5 A, and has a rail-to-rail output that allows negative drive voltages for use with large IGBTs or wide-bandgap power switches, such as silicon-carbide MOSFETs. High common-mode transient immunity, in excess of ± 50 V/ns, allows reliable communication across the isolation layer and safe operation. Separate sink and source outputs enhance design flexibility and help eliminate external components. The device also has a built-in SPI port for configuring the control logic and status monitoring.

STMicroelectronics

www.st.com



Strain/force tag enables RFID weight monitoring

The Atlas four-channel RFID-enabled force sensor tag from Farsens S.L. comes in two flavours: the Atlas Q100L with a strain measurement range of 0kgf to 45kgf and a maximum accuracy of ± 0.5 kgf per channel; and the Q2000L with a measurement range of 0 kgf to 900 kgf per channel and a



maximum accuracy of ± 10 kgf per channel. Both tags transmit a unique identifier together with the associated weight measurement data from their four load cells, to any commercial EPC C1G2 reader without the need of a battery on the sensor tag. The tags come in a variety of antenna designs and sizes to adapt the performance to the required application in the 860-960 MHz band. The reading distance for the battery free strain/force tag is around 1.5 meters and it can be embedded in a wide variety of materials such as plastics or concrete. The tags are a perfect match for users that have RFID infrastructure in place and want to monitor weight without adding the cost of wiring or maintenance. They will find applications in warehouse inventory management, especially for granulates and liquids held into big containers or designed into smartpallets.

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Farsens S.L.

www.farsens.com

Parametric measurement module doubles speed in SoC testing

With the T2000 PMU32E, chip test system vendor Advantest extends the capabilities of its T2000 platform. The new high-density, 32-channel module offers twice the resolution and accuracy in testing digital, analog and power management systems-on-chips (SoC) devices.

A T1200 tester equipped with the PMU32E can now achieve a similar accuracy, set-up time and gang functionality as a T2000 Enhanced Performance Package (EPP) tester. According to the vendor, measurement using the T2000 PMU32E is more than two times faster than with its predecessor. In particular, DC linearity measurement time is faster due to an enhanced sampling rate and enhanced data transfer. These faster operating speeds lead to significantly higher throughputs and a lower overall cost of test while maintaining backwards compatibility, Advantest says. Operating efficiency is further improved by the new module's ability to run test programs already developed for the earlier PMU32 module. In addition, the new module has twice as much memory capacity, expanding the capabilities of the channel-independent arbitrary waveform generator (AWG) and digitizer. The PMU32E also supports load testing of on-die regulators (ODR) with its ISVM (current source and voltage measurement) ganging function. Advantest expects to begin shipping PMU32E modules to customers by the first quarter of 2015.

Advantest

www.advantest.de



SystemDesk generates virtual ECUs for functional tests

Version 4.3 of the Systemdesk Autosar tool from dSpace enables function developers and software integrators in the automotive domain to automatically generate virtual Electronic Control Units (V-ECUs) in a development process complying with Autosar R4.

Within the dSpace tool chain for virtual safeguarding, V-ECUs facilitate testing of new ECU functions without the need for hardware prototypes. After integrating the new functions into the ECU application software, developers can use them to generate a V-ECU with just a few clicks. SystemDesk automatically generates and configures the necessary components such as the Autosar runtime environment and basis software components. If necessary, users can adapt the basis software configuration according to their needs. Thus, developers can create specific V-ECUs to test their functions; no specific previous knowledge as to the basis software is necessary. The benefits: For function tests, virtual ECUs are available earlier than the ECU hardware prototype, because the developer can generate it at its workplace PC. The functional behaviour of V-ECUs is comparable with the behaviour of physical ECUs. In addition, modifications or alterations can be implemented quickly and without much effort.

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dSpace

www.dspace.de



Standard LED cooler supports high bay lighting demands

MechaTronix has released the company's first standard high bay cooling platform with the ModuLED Mega passive LED cooler. In a diameter of 134 mm, a height of 100 mm and a weight of



1.5kg, the passive LED cooler keeps luminaires up to 10,000 lumen on the required case and junction temperature. With a thermal resistance R_{th} of 0.6 K/W the ModuLED Mega 134100-HBG can cool down 80 watts dissipated power or the equivalent of 115 watts electrical power. The ModuLED

Mega is designed in such a way that afterwork like drilling holes or tapping screws threads can be avoided in the design. On one side there is a standard mounting pattern for direct assembly of the Mean Well HBG-60 and HBG-100 high bay LED driver. The other side of the cooler has a typical modular ModuLED design, with a variety of mounting patterns for each Zhaga LED module and the top 15 LED manufacturers of COB LED engines. An example of a high bay sub assembly with the Mean Well HBG-100 LED driver, ModuLED Mega 134100 LED cooler, Laird TPCM phase change thermal pad, Cree CXA3070 COB module and BJB Zhaga LED holder. The ModuLED Mega is an example of the ideal balance between conduction, convection and radiation cooling and guarantees by this an optimal performance to space ratio. Besides the 100mm high model for high bay designs, the LED cooler will also become available in a limited height of 20 mm with a cooling performance up to 4000 lumen.

MechaTronix

www.led-heatsink.com

OBD2 adapter, app bring the repair shop to the tablet

The EasyDiag Plus adapter from Launch Europe connects a tablet computer or smartphone to the on-board diagnostics (OBD-2) socket and provides an in-depth analysis of to



car brands that can be freely chosen. In addition it supports specific interactions with ECUs such as ABS/SRS, Airbag, or transmission controller. The EasyDiag Plus

adapter connects to the handheld device via Bluetooth; the related app (available for Apple and Android) can be downloaded free of charge from the adapter vendor. The software provides a vehicle-specific in-depth analysis for two vehicle brands without cost; additional brands can be downloaded against the payment of a fee. This analysis allows users to look deeply into software and control systems of the respective vehicle. Besides this analysis, the adapter supports standard OBD-2 and EOBD diagnosis for all brands and displays real-time data. In addition, the EasyDiag Plus contains software that allows users to look into the engine management functions, enabling him to check OBD error codes or read out data like engine coolant temperature.

Launch Europe

www.launch-europe.de

Precision Hall-effect angle sensor SoCs for automotive and industrial

Allegro MicroSystems' A1332 and A1334 are high-resolution 360° angle sensor ICs based on magnetic circular vertical Hall (CVH) technology. These contactless Hall-effect magnetic sensors, with their system-on-chip (SoC) architectures, provide high output refresh rates and low signal-path latency to support a variety of demanding automotive and industrial applications. Both devices are suitable for automotive applications such as electronic power steering (EPS) and transmission systems, and for sensing motor position, throttle/pedal position, and other parameters that require the accurate measurement of angles. The A1332, with an onboard 32-bit processor and EEPROM for factory and customer programmability, includes segmented and Fourier linearisation functions for supporting challenging off-axis/side-shaft magnetic sensing configurations that are commonly found in electronic power steering and transmission applications. The A1332 also supports on-axis/end-of-shaft magnetic sensing configurations, and can produce high-accuracy angle measurements with an output refresh period of 32s. The device incorporates a 2-wire IC digital interface with signal path and I/O diagnostics for achieving higher reliability to meet ASIL automotive safety requirements. The A1334, with its onboard digital signal processing functions and EEPROM for factory and customer programmability, is designed specifically for on-axis/end-of-shaft applications that require ultra-fast output refresh rates and low signal path latency. Its 4-wire 10 MHz SPI interface offers a 25s output refresh period and a nominal signal-path latency of 60s.



Allegro MicroSystems

www.allegromicro.com

Solid state relay switches through optical command

Avago Technologies' ACPL-K30T is claimed to be the industry's first solid state photovoltaic driver to be automotive qualified per AEC-Q100 Grade 1. The device features high ESD rating and fast turn-off time (40 μ s typical) and is compatible with a wide selection of AEC-Q101 certified MOSFET components to form a solid state relay solution of desired voltage or current rating. Because the part is optocoupler-based, switching off the LEDs on one side of the part totally cuts off the drive voltage on the other side of the device, making it optimized for use in battery management systems of modern electric vehicles (EV), hybrid electric vehicles (HEV) and plug-in hybrid electric vehicles (PHEV) as well as high-temperature power systems of conventional internal combustion engine vehicles. The part's open circuit voltage is 7V (typical at a LED drive current of 10mA), and short circuit current is 5 μ A. It comes in a stretched SO-8 package compatible with standard surface mount processes, Lead(Pb) free and fully RoHS 6 compliant.



Avago Technologies

www.avagotech.com

GaN driver amplifier serves X-band

RFMW has announced design and sales support for the TGA2627-SM. This 32 dBm Psat GaN driver comes packaged as a 5- x 5-mm, air-cavity ceramic QFN providing an SMT advantage over DIE based competitors. The push-pull internal configuration provides low harmonic content of <40 dBc over the 6 to 12 GHz frequency span. Small signal gain is rated at >27 dB. Target markets for the TriQuint TGA2627-SM include radar, EW and communication systems. Using a 25V bias and drawing only 200mA, the TGA2627-SM is compatible with TriQuint's high power amplifiers, easing the burden of multiple bias supplies.

RFMW

www.rfmw.com

Renesas processors for industrial automation have built-in networking

Renesas' RZ/T1 Real-Time Processor comprises a real-time CPU with up to 600 MHz operation and the R-IN engine, offering both real-time control and deterministic network connectivity for industrial equipment. The RZ/T1 Group is a factory automation solution with built-in industrial network functionality for use in many industrial applications such as AC servo drives, motion controllers, inverter control and general industrial equipment that require high speed, respon-



siveness, and excellent real-time performance. Demand for improvements in performance and network connectivity are addressed by combining high-performance, real-time control and multi-protocol industrial Ethernet communication functions on a single chip. The RZ/T1 group of devices is built around the ARM Cortex-R4F core operating at up to 600 MHz and is configured with two regions of tightly coupled memory, which is linked directly to the CPU core, removing the need for cache memory. TCMs support critical routines, such as interrupt handling routines or real-time tasks, ensuring the highest level of responsiveness with no cache latency. The RZ/T1 also integrates the R-IN Engine industrial Ethernet communication accelerator. It provides the same multi-protocol features as the Renesas R-IN Series, with support for multiple industrial Ethernet communication standards, including EtherCAT. Renesas says that traditional solutions such as high-frequency microprocessors (MPUs) with cache memory are unsuited for real-time control because of the unpredictability characteristics of cache memory. And, while microcontrollers (MCUs) with on-chip flash memory are likewise marketed for real-time control, the increasing performance requirements are driving them to hit their performance ceiling. Deterministic, open standard networks such as EtherCAT, Ethernet/IP, and PROFINET are becoming mainstream in all types of industrial equipment. Supporting such standards typically requires the use of a separate ASIC with dedicated communication functionality, which leads to increased system cost and circuit board footprint.

Renesas

www.renesas.eu

Debug for Cortex-M gains power: probe gives full instruction trace in real time

I-jet Trace from IAR Systems is a probe providing extensive debugging and trace functionality, delivering large trace memory capacities and high-speed communication via USB 3. The probe supports all ARM Cortex-M cores, including the ARM Cortex-M7 core, that have Embedded Trace Macrocell (ETM) capabilities. Tracing every single executed instruction, ETM provides developers with unmatched insight into the microcontroller's activities and enables them to find critical bugs that are difficult or even impossible to find any other way. I-jet Trace has a memory capacity of 32 Msamples and is designed to take full advantage of the speed and current delivery of the SuperSpeed USB 3 communication port, enabling high-speed debugging. The probe allows real-time trace clocking at up to 150 MHz and Serial Wire Output (SWO) using Manchester and UART, clocking at up to 200 Mbps. The trace data is collected by the C-SPY Debugger in IAR Embedded Workbench and can be visualised and analysed in various windows. I-jet Trace is a new addition to IAR Systems' lineup of in-circuit debugging probes. The product portfolio covers different needs from initial to more advanced development and is targeted for simplified, seamless and more flexible development workflows. All products are integrated with IAR Embedded Workbench. The complete debugging solution provided by I-jet Trace and C-SPY also includes Power Debugging. This technology provides developers with information about how the software implementation of an embedded system affects the system's power consumption.

IAR Systems

www.iar.com



BeagleBone Black, Raspberry Pi run Pico scope... in beta

Pico Technology has released beta drivers for its oscilloscope and data logging devices to run on the popular ARM-based BeagleBone Black and Raspberry Pi development boards.

The drivers give programmers access to a great variety of compact, economical USB oscilloscopes and data loggers, ranging from very basic configurations to high-speed oscilloscopes with bandwidths up to 500 MHz, high-resolution 12-bit and 16-bit oscilloscopes, and deep-memory oscilloscopes with buffer sizes up to 512 MS. Most PicoScope oscilloscopes also offer advanced digital triggering, fast block-mode and streaming-mode data capture, and a built-in signal generator or arbitrary waveform generator. The data logger range includes multichannel voltage loggers, 8-channel thermocouple loggers and the educational DrDAQ multifunction logger. Separate driver packages and snippets of C code are available for Raspbian and Debian systems. Similar code could be developed in C-compatible programming languages such as C++, Java and JavaScript. As beta products, these drivers are explained and supported on our forum at:



Pico Technology

www.picotech.com

Embedded power platform addresses mechatronic designs

Addressing car manufacturers' and tier one's strategy towards electrification of auxiliary components in vehicles, Infineon has launched an intelligent motor driver chip platform with embedded 32-bit ARM Cortex M3 processors inside. The first two family members are the TLE987x series for 3-phase (brushless DC) motors and



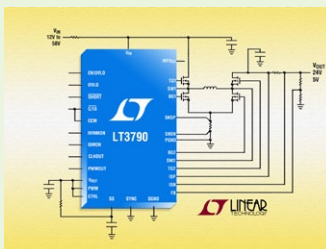
the TLE986x series for 2phase (DC) motors. In this product family, Infineon combined its proprietary automotive qualified 130nm Smart Power manufacturing technology with its experience in motor control drivers. "Our strategy is bringing the intelligence next to the motors in mechatronic designs", said Theodore Varelas, Marketing Manager, Automotive Body Power Applications at Infineon. Where previous multi-chip designs needed a standalone micro-

controller, a bridge driver and a LIN bus transceiver, users of the new chip family benefit from motor control designs with minimum external components count. The products reduce the component count from today's approximately more than 150 down to less than 30, thus allowing integration of all functions and associated external components for the motor control in a PCB area of merely 3cm. The peripheral set of both the the TLE987x and the TLE986x includes a current sensor, a successive approximation 10-bit ADC synchronized with the capture and compare unit for PWM control and 16-bit timers. Both series include an on-chip linear voltage regulator to supply external loads. Their flash memory is scalable from 36kB to 128kB. They operate from 5.4V up to 28V. An integrated charge pump enables low voltage operation using only two external capacitors, resulting in a significant BoM reduction when compared with the commonly used voltage bootstrap techniques. The bridge drivers feature programmable charging and discharging current. The patented current slope control technique optimizes the system EMC behaviour for a wide range of MOSFETs. The products withstand load dump conditions up to 40V while maintaining an extended supply voltage operating down to 3.0V where the microcontroller and the flash memory are fully functional.

Infineon
www.infineon.com

Synchronous buck-boost controller regulates up to 250W

LT3790 is a synchronous buck-boost DC/DC controller that delivers up to 250W of power with a single IC. Its 4.7V to 60V input voltage range suits it for automotive and industrial applications. Its output voltage can be set from 0V to 60V, for use as a voltage regulator or battery/supercapacitor charger. The LT3790's internal



4-switch buck-boost controller operates from input voltages above, below or equal to the output voltage, for applications such as automotive, where the input voltage can vary dramatically during stop/start, cold crank and load dump scenarios. Transitions between buck, pass-through and boost operating modes are seamless, offering a well regulated output in spite of wide variations of supply voltage. The LT3790's design has three control

loops to monitor input current, output current and output voltage. The LT3790 uses four external switching MOSFETs and can deliver up to 250W of continuous output power with efficiencies up to 98.5%. Output current accuracy of $\pm 6\%$ ensures precise current regulation while $\pm 2\%$ output voltage accuracy offers a precise output voltage, making it suitable for charging applications. Multiple LT3790s can be paralleled for higher power requirements. Its switching frequency can be programmed between 200 kHz and 700 kHz or synchronized to an external clock. Additional features include output disconnect, input and output current monitors, a C/10 charge termination and integrated fault protection. The LT3790EFE is available in a 38-lead thermally enhanced TSSOP package.

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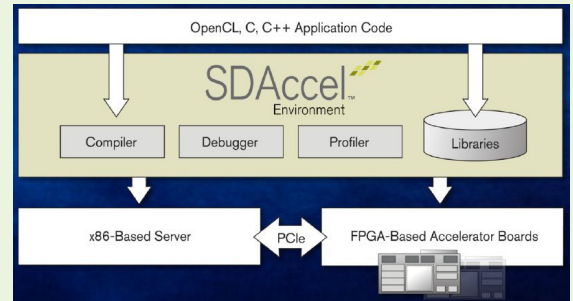
Turning FPGAs into programmers' best friends

Xilinx chose Super Computing 2014 to unveil its SDAccel development environment for OpenCL, C, and C++. The new environment will make it easy for software developers to use FPGAs in the comfort of a CPU/GPU-like environment while enabling them to achieve up to 25X better performance/watt for data center application acceleration compared to CPUs or GPUs, claims the company. SDAccel combines what Xilinx presents as the industry's first architecturally optimizing compiler supporting any combination of OpenCL, C, and C++ kernels, along with libraries and development boards. The architecturally optimizing compiler is also said to deliver 3X the performance and resource efficiency of other FPGA solutions, letting developers use a familiar workflow to optimize their applications and take advantage of FPGA platforms with no prior FPGA experience. The integrated design environment (IDE) provides coding templates and software libraries, and enables compiling, debugging, and profiling against the full range of development targets including emulation on x86, performance validation using fast simulation, and native execution on FPGA processors. It executes the application on data center-ready FPGA

platforms complete with automatic instrumentation insertion for all supported development targets. SDAccel has also been architected to enable CPU/GPU developers to easily migrate their applications to FPGAs while maintaining and reusing their OpenCL, C, and C++ code in a familiar workflow. The SDAccel environment includes the programmer-ready IDE, C-based FPGA optimized libraries, as well as commercial off-the-shelf (COTS) platforms from partners such as Alpha Data, Convey or Pico Computing, ready for data center use. SDAccel libraries include OpenCL built-ins, DSP, Video, and linear algebra libraries for high performance, low power implementations. For domain specific acceleration, optimized OpenCV and BLAS OpenCL compatible libraries are available from Xilinx Alliance member Auviz Systems. Unique to FPGA solutions, and like CPU/GPUs, SDAccel keeps the system functional during program transitions. It creates FPGA-based compute units that can load new accelerator kernels while an application is running. Throughout application execution, critical system interfaces and functions such as memory, Ethernet, PCIe and performance monitors are kept live. On-the-fly reconfigurable compute units allow FPGA accelerators to be shared across multiple applications. For example, operational systems can be programmed to switch between image search, video transcoding and image processing.

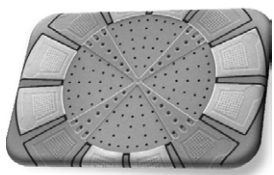
Xilinx

www.xilinx.com



Qualtre launches single-axis BAW MEMS gyro

Qualtre Inc. (Marlborough, Mass), a developer of solid-state silicon MEMS motion sensors based on bulk-acoustic wave (BAW) materials, has announced the availability of the QGYR110Hx BAW MEMS gyroscopes, single-axis angular rate (rotational)



sensors designed for harsh environments. The single axis family complement the QGYR330H three-axis gyroscope products announced in June. The single-axis device has a linear acceleration sensitivity of 0.015 degrees/s/g, a selectable full

range of +/-200 degrees per second to +/-3,000 degrees/s. The parts with either analog or digital (I2C or SPI) outputs come in a LGA32 package measuring 7mm by 7mm by 2.9mm. Specifications of single-axis QGYR110Hx BAW MEMS gyroscopes. Source: Qualtre. The gyros are manufactured using a high-aspect ratio polysilicon and single-crystal silicon fabrication process, which Qualtre claims offers advantages over conventional MEMS tuning-fork gyroscopes. "Our unique technology lets us offer the best-in-class 1-axis MEMS gyroscope at highly competitive price points compared to other 1-axis parts," said Sreeni Rao, vice president of vertical markets at Qualtre in a statement. He added: "This advanced MEMS technology offers high shock and vibration immunity due to its rigid construction and high frequency operation. Together, these features allow us to address challenging requirements for higher performance combined with greater reliability, for industrial applications such as robotics, commercial and industrial drones, platform stabilization, and heavy machinery, to name just a few."

Qualtre Inc.

www.qualtre.com

Atmel adds integrated MCU/Wi-Fi module for edge node IoT applications

In the Atmel | SMART portfolio of SmartConnect low-power, secure Wi-Fi solutions, this FCC-certified module offers a complete standalone edge node solution delivering that promises design flexibility and security for IoT developers. Positioned as the first fully integrated FCC-certified Wi-Fi module with a standalone MCU and hardware security from a single source, the SmartConnect SAM W25 module includes



Atmel's recently announced 2.4 GHz IEEE 802.11b/g/n Wi-Fi WINC1500, along with an Atmel | SMART SAM D21 ARM Cortex M0+-based MCU and Atmel's ATECC108A optimised CryptoAuthentication engine with ultra-secure hardware-based key storage for secure connectivity. There is a need, Atmel says flexible, for cost-optimised modules that provide a complete end-point solution from a single vendor. The fully integrated SAM W25 delivers a secure 'plug and play' solution integrating wireless technologies with the design flexibility required for Internet of Things (IoT) designers. Atmel's FCC-, Telec-, IC- and CE-certified SAM W25 is a standalone solution that gives designers a fully integrated platform with a low-power MCU, hardware security and FCC-certified wireless connectivity from a single source. The small packaged module is cost optimised to lower the overall bill of materials for battery-operated applications ranging from remotes to home automation devices and beyond.

Atmel

www.atmel.com

Advanced wheel hub drive passes extensive driving tests

By Christoph Hammerschmidt

BESIDES HIGH DESIGN freedom and low-wear characteristics, wheel-integrated electric drives offer a high potential to improve safety and driving dynamics of electric vehicles. However, they pose high challenges to drive design and manufacturing - in particular with respect to the safety assessment and to the specific measures for series deployment. A research consortium led by Fraunhofer IFAM now succeeded in proving the safety of such drives even in the case of malfunctions.

The consortium tested two wheel hub drives, mounted at the rear axle of a Fraunhofer-developed demo vehicle under various difficult road surface conditions. The wheel hub drive generated a torque of up to 900 Nm per wheel. Tests included dynamic turning manoeuvres on wet surface, directional stability on slick, icy roads as well as during heavy braking - and all of them in combination with various system malfunctions which have been controlled selectively by the scientists. Subject to the test were innovative concepts of drive monitoring and error handling of fault-tolerant drive technologies under the aspect of operational safety.



In a first phase, the project partners collected and analysed data on possible effects of errors. By means of measurements on test rigs and numerical simulations, they determined the brake torque during short circuits in the coils as well as during failures of sensors and other components. Based on this knowledge they could develop specific hardware and software concepts for failure management. In this context, they developed a novel error recognition method that enables localising any errors reliably.

Failures of the current sensor and the angle sensors can be detected safely through a comparison of values obtained through measurements and through model-based calculation. In the case of an error, the model data are used. Handling of complications like short circuits in the windings or converters is based on a fault-tolerant design of the entire drive system. Towards this end, the electric motor consists of multiple redundant subsystems, enabling designers to isolate any errors and to compensate brake torque resulting from a failure, guaranteeing safely stopping the vehicle and even continue operation in emergency mode.

The test proved that in particularly during rides at the physical limits under difficult road and weather conditions the implementation of the project results led to significant safety improvements. At any operational situation the formation of improper brake torques could be avoided. Even during fast turns and wet or even slippery road conditions, the vehicle remained controllable. First assessments as to the economics of the concepts showed that the safety measures can be integrated into electric drives without added cost, which makes it possible to transfer the results into series vehicle production.

The project consortium included Fraunhofer IFAM and the institute for drive systems and power electronics of the Hannover university. It was funded in part by the German federal ministry for economy and energy.



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Classic op-amp adds programmability

Diodes Inc. has introduced its own variant of the TLC271 programmable op-amp, with a bias-select mode, enabling closer matching of power dissipation and AC performance with the specific requirements of battery-powered consumer and industrial products. To help extend battery cell life, its low-bias mode helps reduce power dissipation, while medium and high bias modes progressively increase op-amp AC performance. Bias modes can also be dynamically changed, allowing the device to idle in power-saving mode then switch to a defined high-performance mode in response to application demand. Diodes Incorporated is accompanying the release of its own SO-8 packaged TLC271 with a companion part, the TLC271L. This fixed-metal mask option has the bias-select pin removed and operates continuously in power-saving, low-bias mode. By reducing supply currents down to 10 μA and operating at a 3V supply voltage, the TLC271 is suitable for a wide range of Li+ battery and energy-efficient MCU supplies. This op-amp provides an optimised output range for low voltage applications by featuring a full rail-to-rail output swing of up to 16V. With typical high input impedance and low bias currents, combined with common-mode and supply-voltage rejection, this is a drop-in replacement part in both commercial temperature (0 to +70°C) and industrial temperature (-40°C to +125°C) grades.

Diodes

www.diodes.com

32-bit PICs have wide peripheral menu and scalable memory

Microchip's low cost PIC32MX1/2/5 32-bit MCUs are applicable to applications, including digital audio, Bluetooth, industrial connectivity, USB and general-purpose embedded control at lower prices. By blending features of Microchip's existing PIC32MX1/2 and PIC32MX5 MCU families, this latest PIC32MX1/2/5 MCU series offers a rich peripheral set for a wide range of cost-sensitive applications that require complex code and higher feature integration at a lower cost. With up to 83 DMIPS performance and large, scalable memory options from 64/8 kB to 512/64 kB (flash/RAM), these PICs are suited to Bluetooth audio software required for low-cost Bluetooth audio applications, such as speakers, consumer music-player docks, noise-cancelling headsets and clock radios. Flexible CAN2.0B controllers are also integrated, with DeviceNet addressing support and programmable bit rates up to 1 Mbps, along with system RAM for storing up to 1024 messages in 32 buffers. This feature allows designers to easily employ CAN communication schemes for industrial and automotive applications. The series has features including four SPI/I2S interfaces for audio processing and playback, a Parallel Master Port (PMP) and capacitive touch sensing hardware for graphics and touch-sensing interfaces; a 10-bit, 1 Msample/sec, 48-channel ADC; as well as a full-speed USB 2.0 Device/Host/OTG peripheral.



Microchip

www.microchip.com

Get started with FPGA design

This month, Arrow Electronics is giving away ten BeMicro Max 10 FPGA evaluation boards together with an integrated USB-Blaster, each package worth 90 Euros, for EETimes Europe's readers to win. Designed to get you started with using an FPGA, the BeMicro Max 10 adopts Altera's non-volatile MAX 10 FPGA built on 55-nm flash process. The MAX 10 FPGAs are claimed to revolutionize non-volatile integration by delivering advanced processing capabilities in a low-cost, instant-on, small form factor programmable logic device.



The devices also include full-featured FPGA capabilities such as digital signal processing, analog functionality, Nios II embedded processor support and memory controllers. The BeMicro Max 10 includes a variety of peripherals connected to the FPGA device, such as 8MB SDRAM, accelerometer, digital-to-analog converter (DAC), temperature sensor, thermal resistor, photo resistor, LEDs, pushbuttons and several different options for expansion connectivity. Two 40-pin prototyping headers allow for further design expansion.

Check the reader offer online at

www.electronics-eetimes.com

Wide-voltage range, low-power temperature sensors

Atmel has a family of high-precision digital temperature sensors with the widest Vcc range from 1.7V to 5.5V. The new family delivers higher temperature accuracy and faster I²C bus communication speeds, and are available with integrated nonvolatile registers and serial EEPROM memory for consumer, industrial, computer, and medical applications. Inventory of one device covers all Vcc requirements in a variety of applications. Currently, Atmel says, digital temperature sensors on the market are available with a very limited Vcc range requiring users to purchase multiple temperature sensors. The new family also delivers a higher accuracy rate at $\pm 0.5^\circ\text{C}$ accuracy (typical) across the 0°C to +85°C temperature range, across the entire wide voltage range (1.7V to 5.5V). The low voltage operation of the devices also reduce the overall power consumption. The new family also delivers a faster I²C bus communication with speeds of up to 1 MHz, increasing the data throughput for both temperature sensor operations and for devices with integrated Serial EEPROM. The sensor family includes six high-precision, digital temperature sensors based on the industry-standard LM75 functionality offered by a number of vendors. All the devices accurately measure and monitor temperature to address the thermal monitoring requirements for a wide variety of applications and are highly configurable. They include devices with serial EEPROM memory from 2k-, 4k- or 8k-bits to store system parameters and user preference data.

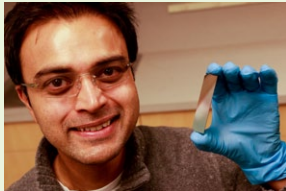
Atmel

www.atmel.com



Polarizing filter reduces energy drain from smartphone displays

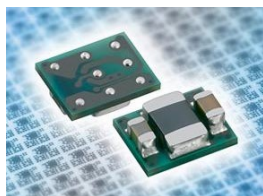
A polarizing filter has been developed by University of Utah engineers which allows in more light, leading the way for mobile device displays that last much longer on a single battery charge and cameras that can shoot in dim light. Polarizers are indispensable in digital photography and LCD displays, but they block enormous amounts of light, wasting energy and making it more difficult to photograph in low light. The Utah electrical and computer engineering researchers created the filter by etching a silicon wafer with nanoscale pillars and holes using a focused gallium-ion beam. The new concept in light filtering can perform the same function as a standard polarizer but allows up to nearly 30 percent more light to pass through, explained University of Utah electrical and computer engineering associate professor Rajesh Menon. The study is being published in November's issue of *Optica*, a new journal from The Optical Society. Sunlight as well as most ambient light emits half of its energy as light polarized along a horizontal axis and the other half along a vertical axis. A polarizer typically allows only half of the light to pass because it is permitting either the horizontal or vertical energy to go through, but not both. Meanwhile, the other half is reflected back or absorbed, but the resulting image is much darker. Most polarizers will eliminate anywhere from 60 to 70 percent of the light. With the new polarizer, much of the light that normally is reflected back is instead converted to the desired polarized state. The University of Utah researchers have been able to pass through about 74 percent of the light, though their goal is to eventually allow all of the light to pass through.



Micro DC/DC converters fit wearable devices

With a 6-MHz power switch embedded in its miniature PCB, the TDK EPCOS B30000P80 ultra-compact DC/DC converter module claims space savings of up to 35% compared to conventional discrete solutions for use in wearable devices and cameras, as well as WLAN, GPS, and Bluetooth applications. Micro converters in the series have a footprint of only 2.9 x 2.3 mm and an insertion height of 1 mm. The modules accommodate an input voltage range of 2.2V to 5.5V. Comprising eight models, the B30000P80 series offers output voltages ranging from 1.10V to 2.80V and maximum output current of 600 mA. All converter modules employ overload protection and will shut down automatically at excess temperatures. Their efficiency of 92% makes them well-suited for battery-powered devices. Under light loads, the modules operate in power-save mode using pulse frequency modulation, with a typical quiescent current of 24 μ A. The converters can be shut down using an enable input. In this case, the supply current drops to below 1 μ A. They also feature fast load transient response and low ripple voltages and currents. Devices operate over a temperature range of -40° to +85°C.

TDK EPCOS
www.epcos.com



Smaller, uprated ESD protection diode for high-speed interfaces

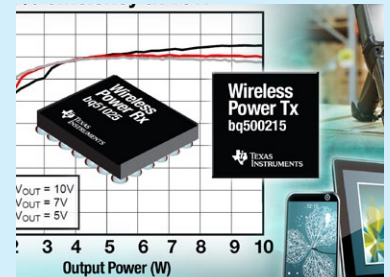
Toshiba Electronics Europe ESD (electrostatic discharge) protection diode type DF5G7M2N is rated to protect equipment attached to communication lines, using high-speed interfaces such as USB3.1, HDMI, DisplayPort and Thunderbolt from static electricity. It can also be used to protect small portable devices such as smartphones and tablets from ESD events. In a 1.3 x 0.8 mm DFN5 package that reduces its footprint to less than 50% of that of similar products, the DF5G7M2N simplifies wiring design, making it suitable for high density mounting. This ESD diode presents low capacitance and low dynamic resistance (CT=0.2 pF, RDYN=1 Ω). It also suppresses signal quality deterioration (insertion loss) by lowering capacitance ($|S_{21}|^2 = -1.3$ dB @f=10 GHz) and provides high ESD resistance, ± 8 kV.

Toshiba Electronics Europe
www.toshiba-components.com



10-W wireless power delivery promises faster, cooler charging without plugging in

TI's receiver and transmitter system efficiently charges one- and two-cell battery-powered applications, and supports any Qi-compatible 5-W wireless charging system. Claimed as the first fully integrated 10-W wireless charging receiver and corresponding transmitter, the bq51025 and bq500215 enable waterproof and dustproof portable designs and provide a faster, cooler charge to one- and two-cell (1S and 2S) Li-Ion



batteries. The charging solution is also compatible with any 5-W Qi-compliant product in the market – allowing consumers the flexibility to charge in more places. The bq51025 receiver supports a programmable output voltage of 4.5 to 10 V and achieves up to 84% charging efficiency at 10-W when paired with TI's bq500215 wireless power transmitter, significantly improving thermal performance. The fully-contained wireless power receiver solution measures 3.60 by 2.89 mm, and can be designed into many portable industrial designs. The bq500215 is a dedicated, fixed-frequency 10-W wireless power digital controller transmitter compatible with 5-W Qi receivers. The transmitter features an enhanced foreign object detection (FOD) method that detects objects before any power is transferred, and actively reduces power if excessive loss is detected. Qi-compliant communications and control ensures compatibility with any Wireless Power Consortium Qi-certified transmitter or receiver up to 5W. The wireless charging solution's I²C communications interface allows better alignment of the receiver on the transmitter surface, as well as ability to send proprietary packets of data between the receiver and transmitter. Both devices will be compatible with TI's future medium power Qi-compliant transmitters and receivers.

Texas Instruments
www.ti.com

New class of layered materials drive PV innovations

By Paul Buckley

PHYSICISTS AT THE UNIVERSITY of Kansas have fabricated a substance from two different atomic sheets of a layer of graphene and a layer of tungsten disulfide which could be used in solar cells, LEDs and flexible electronics.

According to the researchers, the approach is to design synergistic materials by combining two single-atom thick sheets, for example, acting as a photovoltaic cell as well as a light-emitting diode, converting energy between electricity and radiation. However, combining layers of atomically thin material is a thorny task that has flummoxed researchers for years.

The new material interlocks in a similar fashion to Lego bricks and the scientists' findings are published by Nature Communications.

Hsin-Ying Chiu, assistant professor of physics and astronomy, and graduate student Matt Bellus fabricated the new material using 'layer-by-layer assembly' as a versatile bottom-up nanofabrication technique. Then, Jiaqi He, a visiting student from China, and Nardeep Kumar, a graduate student who now has moved to Intel Corp., investigated how electrons move between the two layers through ultrafast laser spectroscopy in the University of Kansas Ultrafast Laser Lab, supervised by Hui Zhao, associate professor of physics and astronomy.

To build artificial materials with synergistic functionality has been a long journey of discovery, Chiu said. A new class of materials, made of the layered materials, has attracted extensive attention ever since the rapid development of graphene technology. One of the most promising aspects of this research is the potential to devise next-generation materials via atomic layer-level control over its electronic structure.

A big challenge of this approach is that, most materials don't connect together because of their different atomic arrangements at the interface the arrangement of the atoms cannot follow the two different sets of rules at the same time, explained Chiu.

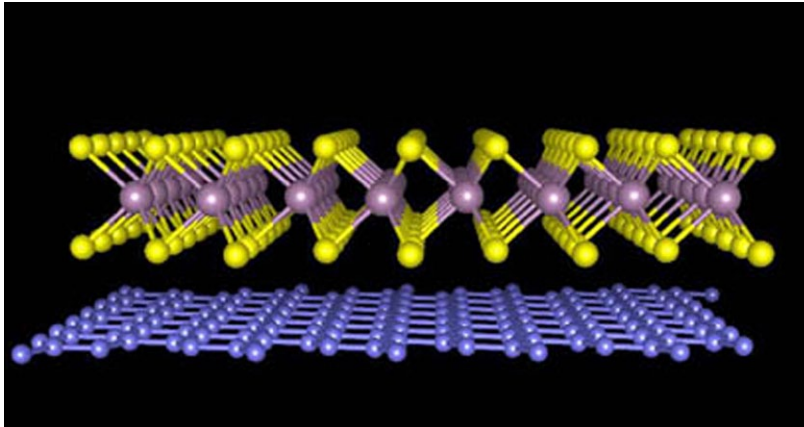
This is like playing with Legos of different sizes made by different manufacturers. As a consequence, new materials can only be made from materials with very similar atomic arrangements, which often have similar properties, too. Even then, arrangement of atoms at the interface is irregular, which often results in poor qualities.

Layered materials such as those developed by the University of Kansas researchers provide a solution for this problem.

Unlike conventional materials formed by atoms that are strongly bound in all directions, the new material features two layers where each atomic sheet is composed of atoms bound strongly with their neighbors but the two atomic sheets are themselves only weakly linked to each other by the so-called van der Waals force, the same attractive phenomenon between molecules that allows geckos to stick to walls and ceilings.

There exist about 100 different types of layered crystals graphite is a well-known example, Bellus said. Because of the weak interlayer connection, one can choose any two types of atomic sheets and put one on top of the other without any problem. It's like playing Legos with a flat bottom. There is no restriction. This approach can potentially produce a large number of new materials with combined novel properties and transform the material science.

Chiu and Bellus created the new carbon and tungsten disulfide material with the aim of developing novel materials for efficient solar cells.



The single sheet of carbon atoms, known as graphene, excels at moving electrons around, while a single-layer of tungsten disulfide atoms is good at absorbing sunlight and converting it to electricity. By combining the two, this innovative material can potentially perform both tasks well.

The team used scotch tape to lift a single layer of tungsten disulfide atoms from a crystal and apply it to a silicon substrate. Next, they used the same procedure to remove a single layer of carbon atoms from a graphite crystal. With a microscope, they precisely laid the graphene on top of the tungsten disulfide layer. To remove any glue between the two atomic layers that are unintentionally introduced during the process, the material was heated at about 500 degrees Fahrenheit for a half-hour. This allowed the force between the two layers to squeeze out the glue, resulting in a sample of two atomically thin layers with a clean interface.

We found that nearly 100 percent of the electrons that absorbed the energy from the laser pulse move from tungsten disulfide to graphene within one picosecond, or one-millionth of one-millionth second, Zhao said. This proves that the new material indeed combines the good properties of each component layer.

The research groups led by Chiu and Zhao are trying to apply this Lego approach to other materials. For example, by combining two materials that absorb light of different colors, they can make materials that react to diverse parts of the solar spectrum.

Farnell element14 backs kickstarter project Robox

Farnell element14 is now stocking Robox' 3D printer. Retailing for £849.90, the unit features a proprietary dual-head print nozzle design for improved print speeds (up to three times as



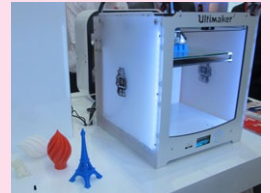
fast as competing printers, according to the distributor). One nozzle is designed to print in detail, while the other is able to 'fill in' larger areas at much higher speeds. The Robox's needle-valve system stops

'ooze' and 'stringing' from the nozzles, ensuring speed and quality. The Robox can print super-fine 0.02mm layers. Robox users can also pause a print part-way through and swap out the filament being used – allowing for multi-colour 3D printing.

Farnell
www.premierfarnell.com

RS Components augments rapid-prototyping product portfolio

RS Components has added the Ultimaker 2 3D printer to its growing range of rapid-prototyping machines. Reselling for £1575.00, the desktop 3D printer employs fused filament fabrication (FFF) technology and targets electronics and mechanical engineers involved in design, prototyping and research and development, as well as enthusiasts and students. Manufactured from premium parts and materials the latest version of the Ultimaker 3D printer, compared to its previous incarnation, now adds a heated bed, which smoothens the print output, allows for ABS material printing and also prevents warping. The printer offers a print speed of up to 300mm/s and a layer resolution of only 20 microns or 0.02mm.



RS Components
www.rs-components.com

Astute launches Electromech division with key franchises

Astute Electronics, a supplier of electronic components and value added services, has launched a franchised electro-mechanical division to complement its brokerage activities. Heading up the new electromechanical division is Gary Evans who has many years in international sales and marketing roles at leading connector companies including Deutsch, ITT and Harwin. The division launches with six significant franchises: Amphenol, Airborn, Delphi, Fischer, Positronic and Quell. The initial manufacturing partners, explains Evans, have been chosen for the innovative products and technologies they offer, plus their applicability to Astute's key customer base, which includes many of the world's leading defence and high-reliability companies.

Astute Electronics
www.astute.co.uk

Ginsbury Electronics brings Kyocera's TFT LCDs to Europe

Displays specialist Ginsbury is now stocking Kyocera's 7.0-inch TFT display featuring a fully integrated On-cell touch panel. The TCG070WVLR*PC*-GD*118 is offered with an On-cell projected capacitive touch panel. The touch panel cover glass, touch sensor and controller are fully integrated



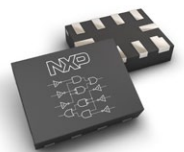
into the display module to yield a thin, lightweight LCD panel which provides superior light transmission and improved optical performance. An On-cell touch panel differs from a bonded projective capacitive touch panel in its mechanical construction, in that the cover glass and touch sensor are fully integrated into the LCD cell, thus enabling a reduction in overall module thickness and weight. Production process costs are also reduced as there is no additional optical bonding required following the final assembly of the display module.

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Ginsbury Electronics
www.ginsbury.co.uk

Mouser launch design contest around NXP's dual PCB configurable logic

At electronica, NXP Semiconductors N.V. introduced its line of multi-gate, multifunction, dual PCB configurable logic devices with Schmitt-trigger inputs. By offering more flexibility in the combinations of logic functions that can be achieved, the configurable logic allows design flexibility, reduced inventory cost and faster qualification in customer's applications. The dual configurable logic devices combine two or more different functions in a single package, separately configurable, hence offering readily-available glue logic. At the heart of the Big I.D.E.A. (International Design Engineering Award) challenge, sponsored by NXP and Mouser, is the Dual PCB Configurable Logic product line together with products from other NXP Business Units.



Mouser
www.thebigidea2015.com

Plessey extends European distribution network with Syscom Electronique

Plessey has entered into a distribution agreement with Syscom Electronique, an electronics distributor headquartered close to Paris, to expand Plessey's European network with coverage in the France and Tunisia markets for its GaN-on-Silicon LED products. Regis du Manoir, President of Syscom, said: "Plessey's advanced LED technology will help Syscom's customers to successfully develop and market distinctive and innovative solutions. We believe Plessey's solutions can give French customers an edge in the highly competitive LED lighting market place." David Owen, Plessey's Marketing Director, explained: "Syscom Electronique has a dedicated team working in the lighting segment and therefore a considerable knowledge of the growing French lighting industry and customer base which will accelerate the time to market for Plessey GaN-on-Silicon LEDs in this region."

Plessey
www.plesseysemiconductors.com

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LAST WORD

What is Design-to-Cost and why does it matter?

By Ben Jordan

DESIGN-TO-COST SHOULD be part of your design process. With a committed team and the right tools, you can reduce product costs and improve your competitive position. As a design engineer, you know that what you do affects the cost of your products. In fact, there have been studies that show that choices made during the design phase account for 70% of the life cycle costs of a new product.

To help you make these tough choices, we recommend you adopt the Design-to-Cost (DTC) process. Design-to-Cost uses real-time supply chain data to assess design choices with cost objectives in mind. It takes into account such things as manufacturing lead times, volume pricing, volume capacity, and logistics information, all while your product is still in the design phase. Using this information, you'll not only produce great products, but you'll help your company gain and maintain a competitive advantage.

DTC addresses product costs across the entire product life cycle, including the following:

Recurring production costs, including production labor, direct materials, process costs, overhead, and outside processing.

Non-recurring costs, including development costs and tooling.

Product costs, including recurring production costs and tooling.

Product price or acquisition costs, including product costs; selling, general, and administrative costs; warranty costs and profit.

Commitment cuts costs

DTC isn't a magic bullet -- it's hard work. To do it right, you need to make it an integral part of your product development process. Part of this is making a commitment to address costs at all design reviews. Fortunately, this is easier than it was in the past because companies now have access to real-time data on each of the components in a design. By working closely with your purchasing team and with suppliers, you can have direct access to component costs and availability.

Ben Jordan is senior manager of Content Marketing Strategy at Altium – www.altium.com

One way that DTC helps keep costs down is by addressing the problem of "creeping elegance." As "elegance" creeps into a design, engineers sometimes specify parts that are difficult to source, have a high logistics cost, or may not be available in sufficient supply. Discovering these issues early in the design cycle saves considerable engineering time and component cost.

Similarly, with accurate and current cost information, you can initiate preventive action that avoids costly supply chain surprises downstream. You can quickly identify other potential supply chain issues, such as parts availability or logistics problems, in real-time. In addition, the DTC process motivates you to explore creating cost-saving alternatives while still meeting design specifications.

DTC also helps prevent unwise budget cuts that may hurt profitability. Cutting design engineering budgets, for example, may cut design costs, but may also result in an inferior product design and drive up material and labor costs. Cutting costs on components may result in higher warranty costs and lower customer perceptions of the end-product.

Being successful with DTC

To be successful with DTC, you must establish cost as a constraint from the outset of the design process. Goals need to be sensible and achievable -- impossibly high goals will be ignored and goals that are obviously too low do not generate the commitment necessary to achieve them.

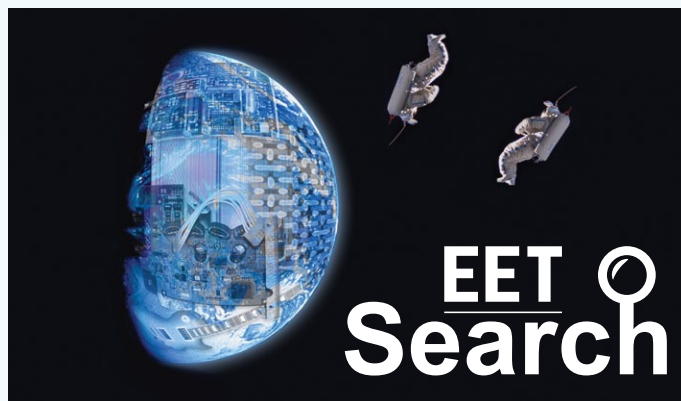
Equally as important, DTC must be a team effort that includes design engineering, management, and supply chain executives. All team members must commit to cost targets, development budgets, and design timelines. And, once established, DTC needs to be continued to the end of the product's life, since additional cost-saving opportunities will arise during the downstream production, operations, and support phases.

In addition to setting achievable goals and establishing a committed team, you need tools that dynamically maintain and update supply chain data for each component in a design.

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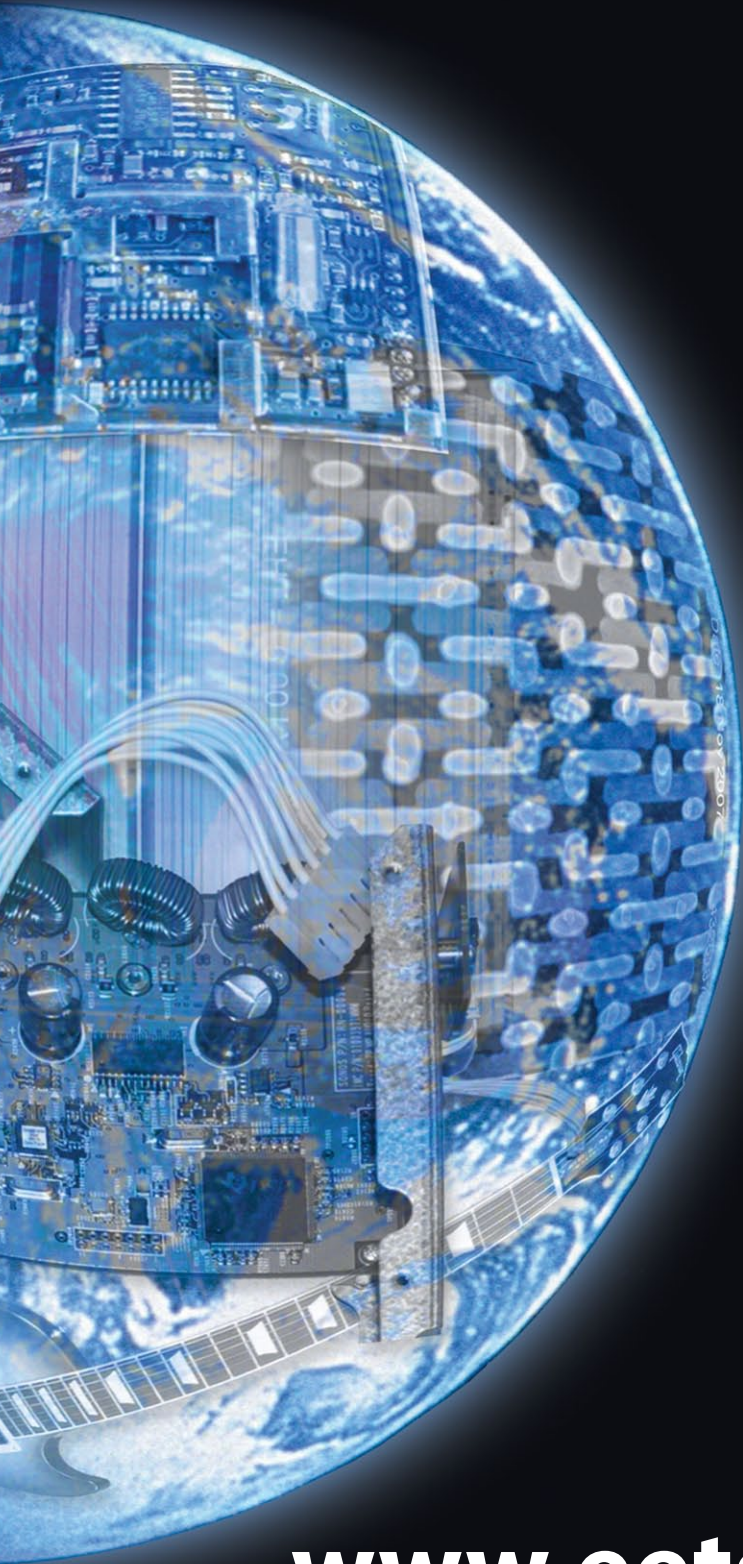


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