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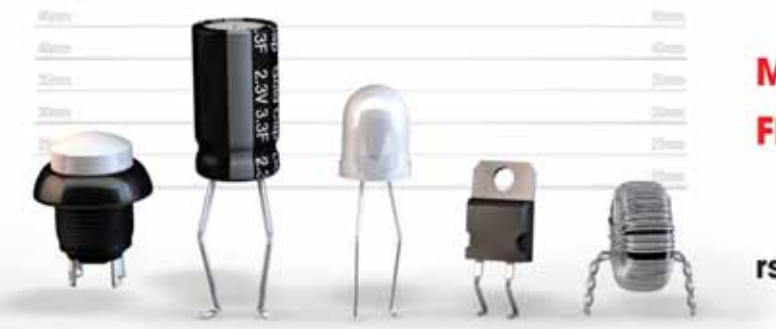

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2012 TRENDS IN DATA CONVERSION

A major trend we see in 2012 is the continued move to put more "smarts" into data converters. By managing additional system functions, these smart converters will not only allow designers to use smaller, simpler, more cost-effective data processors, they will make programming easier and improve overall system performance.

Two themes that over the next 18 to 24 months will illustrate this trend are the rapid expansion of advanced sensors in parallel with converter core technology development and the move towards embedding constant adjustable power features in the data converter. Increasingly customers are designing in the converter core and sensor IC simultaneously and as an integrated unit. In fact, system design engineers seek to optimize sensor performance by viewing the sensor-converter as a single unit. They consider the sensor-converter both in terms of analog signal acquisition as well as digital post-processing requirements. This not only optimizes the sensor performance by having a converter that "gets the most" out of the sensor element but also minimizes cost.

Due to this increasing level of integration, these enhanced "digital sensors" have all kinds of design advantages or "smarts". The converter can use internal calibration and linearization routines to process sensor outputs. Sensor gain and offset can be corrected by the converter and on chip sensor excitation signals can be created. Digitally-managed programmable gain amplifiers can be used to "optimize" the converter to a particular sensor reading and then reconfigure to read a different signal from the same sensor. Thermal errors can be accounted for and removed by including temperature monitoring capability in the converter and adjusting the converter output based on the temperature. MEMs (micro-electro-mechanical) sensors – typically accelerometers and gyroscopes – are also being combined with data converters to sense inertial and rotational motion. What this means is that designers do not need to pay as much attention to dealing with detailed sensor performance problems as was typically done in the past to improve time-to-market and performance.

As the range of applications continues to broaden and signal processing advances are being made, the number and complexity of sensors is growing rapidly. Many of these multi-domain sensors, for instance, require sophisticated, precise signal acquisition that can differ considerably from sensor to sensor. Likewise, the diversity of applications is leading to new converter technologies that are able to intelligently convert sensor inputs of different magnitudes and signal types with minimal pre-conditioning.

> *Increasingly customers are designing in the converter core and sensor IC simultaneously and as an integrated unit*

Moreover, given that the sensor signal is typically low enough to be corrupted by noise, the ability to co-locate the converter and sensor means that the signal now travels micron lengths, which makes sensor calibration easier and more reliable. Indeed, as system design becomes more heavily dependent on integrated sensors, the converter needs to be even more sophisticated and functional as its importance in the overall system continues to grow. This in turn leads to greater emphasis on system redundancy and functional safety, and requires deep converter understanding to ensure these concerns are appropriately managed.

The second major trend sweeping the data converter segment is being driven by the need for longer battery life, a general awareness of "green" design benefits, cost considerations, and legislation. Constant adjustable power represents the next step in the evolution of low power design as converters become intelligent enough to constantly regulate and adjust system power. This involves not only the converter managing system power but also dynamically managing its own power consumption to optimize the balance of signal acquisition and power consumption depending on the needs of the system at a particular time.

The advent of an embedded constant adjustable power function is the logical evolution of the power-down pins of a decade ago and the more recent power versus performance tradeoffs we've see in many data converter designs. These new features will require both design and more manufacturing innovation such as finer line lithography processes that are able to combine digitally-assisted analysis where digital techniques are used to augment core analog capabilities.

James Caffrey is marketing and applications director for the precision converter group and Tom Gratzek is marketing and applications director for the high-speed converter group, both at Analog Devices

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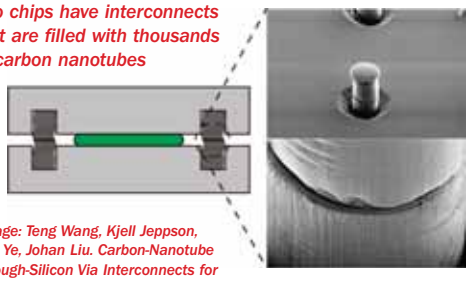
Two chips have interconnects that are filled with thousands of carbon nanotubes



[Image: Teng Wang, Kjell Jeppson, Lilei Ye, Johan Liu. Carbon-Nanotube Through-Silicon Via Interconnects for Three-Dimensional Integration. Small, 2011, Volume 7, pages 2,313–2,317. Copyright Wiley-VCH Verlag GmbH & Co. KGaA. Reproduced with permission]

CARBON NANOTUBES BEST FOR 3D ELECTRONICS

Researchers at Chalmers University of Technology in Gothenburg, Sweden, have demonstrated that two stacked chips can be vertically interconnected with carbon nanotube vias through the chips. This new method will lead to 3D integration of circuits, one of the most promising approaches for miniaturization and performance improvement of electronics.

Three-dimensional integration is a hot field within electronics since it offers a new way to package components densely but in tiny, well-functioning units. When stacking chips vertically, the most effective way to interconnect them is with electrical interconnects that go through the chip, instead of being wired together at the edges. So far the industry has mostly used copper for this purpose; but copper has some disadvantages that can limit the reliability of 3D electronics. Another major issue involves cooling when the chips get hot.

Carbon nanotubes are made of graphene with walls only one atom thick. "Potentially, carbon nanotubes have much better properties than copper, both in terms of thermal and electrical conductivity," said Kjell Jeppsson, a member of the research team. "Carbon nanotubes are also better suited for use with silicon from a purely mechanical point of view. They expand about the same amount as the surrounding silicon while copper expands more, which results in mechanical tension that can cause the components to break."

The researchers have demonstrated that two chips can be vertically interconnected with carbon nanotubes by through-silicon via interconnects, and that the chips can be bonded. They have also demonstrated that the same method can be used for electrical interconnection between the chip and the package.

However, part of this method needs to be improved before it can be transferred to industrial production. If successful, entirely new possibilities will arise for future shrinking of electronics – not least in terms of improved performance.

"If our method works on a large scale, I believe it will be in production within five years," said Jeppsson.

Fujitsu Develops Optical Amplifier Technology for Next Generation Optical Access Systems

Fujitsu is developing optical amplifier technology for use in optical access systems that link subscribers to central offices. The new technology has the ability to quadruple the splitting number and double transmission distances.

The use of optical aggregation networks, in which optical signals between a central office and many subscribers are optically passed along, rather than converted into electrical signals, has been proposed as a way to reduce the constantly growing amount of electrical power consumed by networking equipment. Although passive optical networks (PONs) are now starting to be deployed commercially, there are constraints in using them for optical aggregation networks. This is because the number of optical network terminals (ONTs) for the most commonly used PON is typically limited to 32 connections and its transmission distance to around 20km.

To address these constraints, Fujitsu and Fujitsu Laboratories have developed a burst-mode optical amplifier technology with a semiconductor optical amplifier (SOA), an integrated SOA-array module fabrication technology, and a SOA chip fabrication technology enabling uncooled operation.

In the SOA chip fabrication, an aluminum composite material is deployed in the active layer of the semiconductor optical amplifier to obtain high gain, even at high temperatures, eliminating the temperature control of SOA. This dramatically contributes to the reduction of the module's volume to one-fifth, and one-sixth of the power of a conventional, cooled, SOA module. It operates at temperatures of up to 85 degrees C, so it can be installed outdoors, allowing for remote nodes that need to operate under harsh conditions.

In an industry first, integrated four semiconductor optical amplifiers are fabricated into a single module. The newly developed optical coupling scheme simultaneously couples four SOAs with four single mode fibers with high efficiency, which reduces cost and footprint per piece.

With this approach, a next-generation access system applied to optical aggregation networks can have 128 terminal-equipment connections, four times today's splitting number, with distances of over 40km. This is expected to play a major role in the new era of cloud computing, in which a large volume of terminal equipment and devices are connected to the network.

NEWS IN BRIEF

Treehouse Labs unveiled the BiKN Technology Platform in the effort to revolutionize the way control, tracking and monitoring mobile networks and applications are delivered. The platform uses low-power wireless chip technology from NXP Semiconductors to enable the "Internet of Things", opening entirely new markets and applications for affordable wireless sensors and control networks.

Renesas Electronics has developed the industry's first 40nm memory intellectual property (IP) for automotive real-time applications. Renesas will also be the first to launch 40nm embedded flash microcontrollers (MCUs) for automotive applications using this 40nm flash technology with samples available by the beginning of autumn 2012.

The IEC, which publishes global technical guidelines that allow millions of devices and systems to work together safely, and IEEE, the world's largest technical professional association, are launching "The Challenge" – to identify, analyze and debate why and how electrotechnology influences economic, social and environmental development and the impact of broadly accepted standards
The invitation is open to academic institutions worldwide. They will compete for $45,000 prize money, too.

European Partners Join Forces to Create "Smart Systems" Design with Integrated Methodology

A group of prominent semiconductor companies and universities have partnered in a new European research programme called 'SMArt systems Co-design' (SMAC). STMicroelectronics, Philips Medical Systems, ON Semiconductor and Agilent Technologies have been joined by a host of European universities and electronic design automation (EDA) industry partners in this three-year project with the goal to develop a leading-edge design and integration environment (the 'SMAC Platform') for the design of smart systems.

Smart systems are intelligent, miniaturized devices that incorporate multiple functions such as sensing, actuation, computation, wireless connectivity and energy harvesting in a single tiny package and will be key components of next-generation applications in areas as diverse as energy saving, healthcare, automotive, factory automation and consumer devices.

The bottleneck in developing smart systems is not due to the technologies but the design methodology. Advanced packaging technologies such as System-in-Package (SiP) and chip stacking (3D IC) with through-silicon vias already allow manufacturers to package all these capabilities more densely to meet increasingly demanding cost, size, performance and reliability targets. However, design methodologies have not kept pace with technology advances.

"The major obstacle to the rapid expansion of smart systems applications is not the technologies involved but the lack of a structured design methodology that explicitly accounts for final integration," said Salvatore Rinaudo, SMAC project co-ordinator and Industrial and Multisegment Sector CAD R&D Director at STMicroelectronics.

"Ideally, the total combination must be designed as a single system and the tools and methodology are currently lacking. By filling this gap with a holistic, integration-aware, design platform, the SMAC project will give European industry an advantage in exploiting the potential of smart systems, reducing design costs and time-to-market and minimizing the risk of encountering problems in the final integration."

Today, smart systems are designed using separate design tools for different parts of the system. For example, completely different tools are used to model, simulate and design components such as MEMS sensors, analogue and RF components, and digital ICs and none of these tools take into account the ultimate system integration.

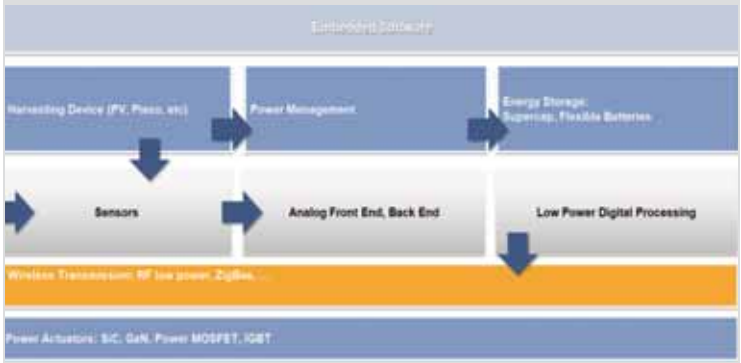
The SMAC Platform will ensure its usability in realistic, industry-strength design flows and environments. The result will allow the industrial partners and their customers to increase their competitiveness for smart system products and applications globally.

The scientific and technical results expected at the conclusion of the project include new modeling and simulation capabilities to support accurate multi-physics, multi-layer, multi-scale and multi-domain co-simulation; innovative integration-aware design techniques for components and subsystems from different technology domains and with different functions; combination and augmentation of existing modeling and simulation tools into a seamless design-flow, enabling integration-aware co-design of smart systems; and demonstration of the effectiveness of some of the new design solutions through implementation of test cases featuring leading edge technology among others.

SMAC Platform Statistics

The SMAC project will involve a total effort of over 1,300 person/months and an investment of approximately 13m Euros, of which the industrial partners will contribute around 5m Euros.

Smart Systems, as illustrated in the figure below, implement very complex functions and are often extremely heterogeneous, with parts from digital and analog electronics, RF, MEMS and other types of sensors, power sources and wireless transmission devices. Currently, no design methodology and tools exist that can master, simultaneously and seamlessly, all of the challenges that designers of smart microsystems are confronted with when they need to develop new products. These challenges include potential intended or parasitic couplings (e.g. thermal or electromagnetic) of closely packed elements.



The complexity of a modern smart system

Current System Design Approaches

In general, for the modeling, simulation, design and integration of Smart Systems, the scenario today is:

- **The non-electrical parts (micromechanical structures, electromagnetic fields, thermal phenomena, wave propagation etc.) are designed using Partial Differential Equation (PDE) solvers such as the Finite Element Method (FEM) or schematic-based behavioural libraries.**
- **The analog and RF parts are designed based on reuse of existing macros by highly specialized engineers, following a template-based approach.**
- **The digital parts are designed using automated synthesis tools (from high-level synthesis to physical synthesis) following a top-down paradigm.**
- **System design is supported by block diagram simulation (e.g., MATLAB-SIMULINK, SystemVue), which allow a comprehensive view of the entire system but use simple models of the subsystems and of the components.**
- **The amount of software implemented in microcontrollers and DSPs is significantly increasing.**

SMAC Project Partners

- **STMicroelectronics (Italy), Project Coordinator;**
- **Philips Medical Systems Nederland (The Netherlands);**
- **ON Semiconductor Belgium;**
- **Agilent Technologies Belgium;**
- **Coventor (France);**
- **MunEDA (Germany);**
- **EDALab (Italy);**
- **Fondazione Istituto Italiano di Tecnologia (Italy);**
- **Tyndall National Institute, University College Cork (Ireland);**
- **Instytut Technologii Elektronowej (Poland);**
- **Politecnico di Torino (Italy);**
- **Università degli Studi di Catania (Italy);**
- **University of Nottingham (United Kingdom);**
- **Katholieke Universiteit Leuven (Belgium);**
- **Technische Universiteit Eindhoven (The Netherlands);**
- **Slovak University of Technology Bratislava (Slovakia);**
- **ST-POLITO (Italy).**

AGILENT'S U1610A/U1620A

Agilent's U1610A/U1620A is the world's first handheld oscilloscope engineered with a VGA display.

With bandwidth of 100/200 MHz, the scope offers a floating measurement capability with two CAT III 600 V isolated channels. It also captures more waveforms from signals such as pulse width modulated circuit, in-rush, transient and motor start up sequences. Coupled with a benchtop-like display and dual window zoom function, it allows you to easily identify problem areas and zoom in for more detailed analysis.

CHANNEL-TO-CHANNEL ISOLATION WITH CAT III 600 V SAFETY RATINGS

The U1610A/U1620A extends the maximum input rating to cater for high voltage measurement and transient voltages which are recordable via a handheld oscilloscope. Equipped with the most robust isolation topology, technicians can now measure signals in the field and perform floating measurements. This type of isolation enables each channel to be individually isolated from one another and from other non-isolated system components, protecting users and preventing damages to devices when performing floating measurements.

VIEW EVEN THE MOST SUBTLE DETAILS WITH FAST SAMPLING RATE AND DEEP MEMORY

A good oscilloscope is often accompanied with deep memory depth and fast sampling rate, because these two go hand-in-hand. With a maximum memory depth of 2 Mpts, users can capture non-repeating signals such as motor start up sequence, in-rush and transient waveforms without sacrificing signal details. This also allows users to capture pulse width modulated waveforms commonly found in Variable Frequency Drive and power inverter systems over a wider time base.

OPTIMIZED VIEWING UNDER ALL LIGHTING CONDITIONS WITH THREE VIEWING MODES

Clarity is important when viewing waveforms, especially for a visual tool, in this case, an oscilloscope. This is why our U1610A/U1620A oscilloscope comes with a 5.7-inch VGA TFT LCD display for clear viewing of waveforms on-site and on the field. With

an option of up to three viewing modes, users can now view signals under all lighting conditions. Both models have screen resolution of 640 x 480 pixels, offering four times the resolution of comparable handheld oscilloscopes.

1) INDOOR MODE

The indoor mode has high contrast and brightness levels to clearly distinguish waveforms under an indoor lighting environment. Engineered with a VGA TFT LCD technology, users can now view the display across wide viewing angles for more efficient troubleshooting task.

2) OUTDOOR MODE

When performing field work in an outdoor environment, users can easily switch to this viewing mode via a set of soft keys. This mode works akin to an anti-glare mechanism; it filters out excessive sunlight hence reducing the risk of misreading or misinterpreting measurements.

3) NIGHT VISION MODE

This mode is tailored to be viewable under subdued lighting conditions by enabling high contrast levels of screen background against waveforms. With a single press of button, this mode is activated and the screen automatically adjusts with proper colour correction- creating clear distinct contrasts of the waveforms against the dark environment. This mode is particularly useful when measuring high speed signals, particularly in non repetitive signals.

UP TO 10 SELECTABLE LANGUAGES PROGRAMMED IN THE SCOPE

The U1610A/U1620A is programmed with up to 10 selectable languages (English, French, German, Italian, Spanish, Portuguese, Traditional and Simplified Chinese, Japanese and Korean) on the User Interface (UI) system and help menu. The diverse range of languages offered here gives users the choice to operate the unit in the language that they are most comfortable in.

For more information visit: www.agilent.com/find/handheldscope

AGILENT U8030 SERIES 375 WATT TRIPLE-OUTPUT POWER SUPPLY

The Agilent U8030 series are compact DC power supply that provide excellent load regulation and clean output noise for continued stability, and offer a total output of 375 W. These power supplies have three outputs—one fixed output and two variable outputs—that can be controlled individually or simultaneously. Here are a few tips on how to optimize the capability of these multiple-output power supplies:

TIP 1: AUTOMATE YOUR TEST WITH OUTPUT SEQUENCING FUNCTION

The Agilent U8030 Series DC power supply comes with output sequencing feature. You can store three settings and recall these settings in sequence either as single or loop operation from the front panel. This feature for example is very convenient if you would like to perform a power cycle test on embedded systems without using a computer.

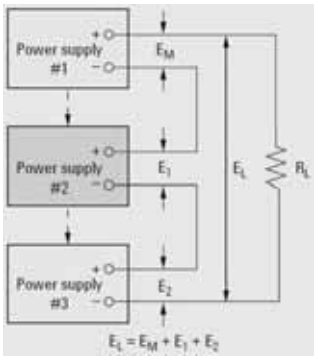


Figure 1

By storing three different settings into the U8030 Series power supply, you can configure the power sup¬ply to continuously cycle the power of the embedded system. Furthermore, with two programmable output channels on the U8030 Series, you can test two embedded systems simultaneously.

TIP 2: CONNECT THE OUTPUTS IN PARALLEL OR IN SERIES TO ACHIEVE HIGHER VOLTAGE OR CURRENT

Connecting two or more power supplies or output channels in series (Figure 1) provides higher voltages, but observes these precautions:

- Never exceed the floating voltage rating of any of the supplies.
- Never subject any of the power supplies to negative voltages.

Connecting two or more power supplies or output channels in parallel (Figure 2) provides higher currents, but again, observes these precautions:

- One unit must operate in constant voltage (CV) mode and the other(s) in constant current (CC) mode.
- The output load must draw enough current to keep the CC unit(s) in CC mode.

TIP 3: ELIMINATE NOISE FROM LOW LEVEL MEASUREMENTS

Noise in low-level measurements can come from a number of different sources, and it's easier to eliminate noise than to filter it.

CHECK THESE NOISE SOURCES:

I. Power supply

Starting with a low-noise supply is naturally a great way to keep noise out of your measurements. Linear power supplies have lower common-mode noise currents and generally operate at low frequency. However,

Memory location	Voltage (V)	Time interval (s)
M1	0	Δt1 = 15
M2	5	Δt2 = 30
M3	0	Δt3 = 15

Table 1: Example of power cycle test setup on embedded system

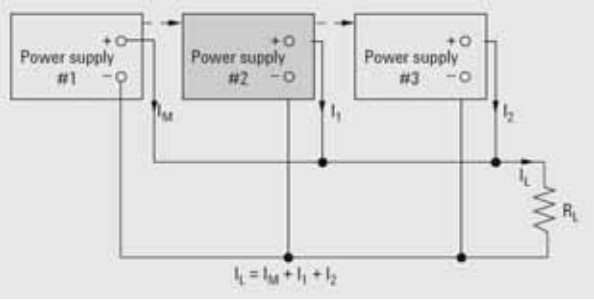


Figure 2:

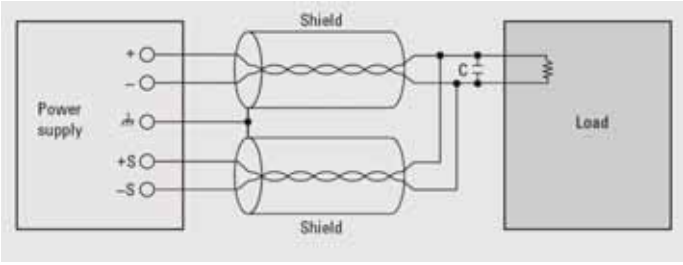


Figure 3

you can use switch-mode supplies successfully if their specifications include a low common-mode current. As a rule of thumb, common-mode current over 20-30 mA is likely to cause trouble.

II. DUT to power supply connections

Minimize conducted noise by eliminating ground loops. Minimize radiated pick-up (both electric and magnetic) by using twisted shielded conductors for the output and remote sense leads. To make sure the shield doesn't carry current, connect the shield to ground at one end only, preferably the single-point ground on the supply (Figure 3).

III. Current variations to the DUT

Rapid changes in the DUT's current demand cause voltage spikes. To prevent this, add a bypass capacitor close to the load. The capacitor should have low impedance at the highest testing frequencies. Avoid imbalances in load lead inductance; direct connections to the DUT, such as twisted shielded pair, are your best bet.

SUMMARY

The U8030 Series power supply comes with out¬put sequencing capability, allows you to automate your test from the front panel. In addition to providing excellent load regulation and clean output noise, the U8030 Series power supply has multiple channels so you can perform multiple tests concurrently. If you need high voltage or current for your application, you can easily connect the outputs in parallel or in series.

Counterfeit Consumer Electronics and Brand Authentication

COUNTERFEITING OF CONSUMER ELECTRONICS IS A SERIOUS, EXPENSIVE PROBLEM, BUT **GREG MILLER**, VICE PRESIDENT AND GENERAL MANAGER OF THE JDSU AUTHENTICATION SOLUTIONS GROUP, EXPLAINS WHICH TECHNIQUES AND TOOLS TO USE TO FIGHT IT

You want the best possible deal on a new TV, so you go online to a well-known auction site. You see the exact popular brand and model you want at a price you can't resist. You look at a thumbnail of the TV and it's exactly what you saw in the showroom of the expensive electronics store. You look at the seller's reputation: five stars, fast delivery and inexpensive shipping. You buy it immediately!

Six months later, the display dies. It's past the online seller's warranty, so you contact the manufacturer and give them the serial number, but you find out they did not make that TV. It's a counterfeit. Your TV had an expensive brand name on the outside and cheap, unauthorised parts on the inside. It's a theft of your money and the brand's reputation.

By some estimates, this type of fraud affects up to 20% of consumer electronics inventory.

Why is Counterfeiting So Attractive?

Intense direct-to-consumer advertising drives consumer purchasing behaviour, assigning significant value to star brands. Consumers identify products by their names, not their functions. You don't buy a gaming platform, you buy a Wii or a Playstation. You don't buy a phone, you buy a Droid or a BlackBerry. Legitimate manufacturers pay the marketing costs for these strong brands; consumer demand for the brands increases; and counterfeiters reap the rewards by stealing the brand names, affixing them to lesser-quality goods and selling them at higher prices.

It is easy to create compelling counterfeit labeling and packaging. A simple desktop computer and printer can be used to create interactive websites and high-resolution labels. The ubiquity of such comparatively inexpensive equipment empowers almost anyone to be a counterfeiter, making authentic brand identity much harder to protect.

The Internet offers counterfeiters the perfect advertising and distribution platform for global illegal activities. There is virtually no barrier-to-entry. Counterfeiters can offer goods on any number of unregulated sites and can generate considerable fraudulent sales volumes before anyone is the wiser. Consumers have become accustomed to seeing lower and lower prices, and indeed some sites now offer online bargaining. This furthers an attitude of "if it's too good to be true, it might just be a good deal".

Lastly, the penalties for counterfeiters, besides being very difficult to enforce in the multinational Internet environment, are just not that substantial compared to the potential profits. Penalties are very hard to enforce. One big problem is that consumers are often complicit in this fraud. If they think they're almost getting the real thing for a substantially lower cost, they'll look the other way.

With complex electronics, they may not understand why working with a reliable brand through their authorized channels is important. They're willing to take chances with something cheaper as long as a big-name brand icon is affixed to the front of the item and printed on the box.

So, with all these factors working against them, how can manufacturers protect their brands without alienating consumers? There are, in fact, quite powerful solutions.

Engaging Consumers in Brand Authentication

Consumers often greet authentication with a groan. Authenticating identity can mean long lines at airports.

Various electronic devices suffer from counterfeiting

Authenticating a credit card can mean pulling out a driver's license as backup. Proving that "you're you" online means remembering any number of usernames and passwords. We're willing to do it, but there's rarely any joy in it.

The key for manufacturers trying to engage consumers in effective authentication is to create a positive experience – entertain the user in some fashion and show they're getting value.

The simplest way to entertain is to offer visually pleasing graphics. For example, holograms can be constructed that show elaborate motion. Labels can integrate these holograms with pigments that shift colours as viewing angles change. These are called overt authentication techniques because they are clearly visible to any viewer.

Holographic solutions are often delivered as high-security foils or films that can be stamped or laminated onto paper or plastic substrates. These substrates can include hot stamp foil, labels, hang tags, shrink sleeves, induction cap-seals, textiles and moulded plastic. Importantly, the solutions can combine overt effects such as 3D colours, animation and flip images with covert effects such as microtext, nanotext and machine-readable features.

Unique, multilayer pigment flakes let paints, coatings, plastics and textiles change colours when viewed from different angles. Each flake exhibits a wide range of hues depending on the angle at which it is viewed and the angle of incidence of light, affording dramatic colour shifts that even take place in low-light environments. Highly chromatic, durable and easy to incorporate, these types of pigments can add value and appeal to virtually any product, especially where colour is a key differentiating factor.

Optical security solutions such as laminates and seals are also commonly used for product authentication. These packaging elements immediately indicate if a product has been opened, refilled, or otherwise modified. For example, "fugitive" inks immediately dissolve and clearly alter their appearance if tampering occurs; "frangible" films on the surface of packaging fracture into small pieces when damaged; and holographic authentication labels can include tamper-apparent break patterns.

Covert and forensic authentication solutions use hidden features that can only be detected with microscopes or specialised readers. These techniques include the use of microtext, nanotext and embedded images within holograms. For example, holographic films and inks can include microstructured taggants that incorporate customised logos in specific shapes. Holographic images can also include hidden, machine-readable codes used in conjunction with digital solutions.

These visually pleasing, overt techniques work because the expertise and materials needed to create and manufacture sophisticated, pigmented holograms and labels are hard to obtain. Counterfeiters can't create holograms with flip images and microtext in a garage, nor can they buy sophisticated pigments on the open market. Consumers can immediately tell the difference between a highly designed, expensive-looking label and a cheap knockoff. The consumer can see the quality and relish the value.

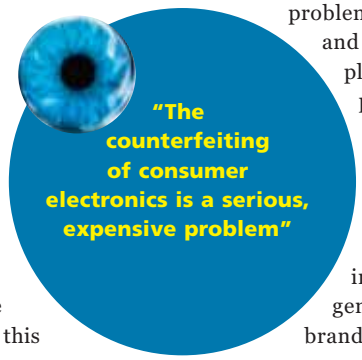
Employing Digital Tools

Digital tools can complement overt visual effects to both enhance the robustness of an authentication program and engage the consumer in a different way. One example is where a product's ID is tracked throughout the distribution cycle and the customer purchase. With this technique, the customer's involvement in the process generates a stronger brand and greater customer loyalty. Here's how it can work:

- The manufacturer generates an encrypted ID code for a particular product.
- A specialised security printer integrates the code (QR code, 2D bar code, or digits) onto an overt-authentication label.
- The manufacturer affixes the label to the product and/or its packaging.
- Tracking data for the code is managed by a data center: when and where it was shipped, customs information, when it was sold and by whom, etc.
- The end-consumer scans the bar code or enters the code online.
- The consumer is taken to a customised landing page where he is informed on the authenticity of the product and other services can be offered. Such services can be customised by the brand owner and may include things like warranty information, special offers, or other incentives.

The customer experience reinforces the exclusivity of the brand and opens a line of communication between the customer and the manufacturer. This increases brand loyalty and offers greater sales opportunities for the manufacturer. It is a win-win solution that can reduce losses due to counterfeiting and heighten brand value.

The counterfeiting of consumer electronics is a serious, expensive problem. The technologies and techniques are in place to stop a large proportion of it. Fortunately for manufacturers, stopping this kind of fraud can improve the customer experience, increase margins and generate even stronger brands. ●



The last dB: Range and performance issues in low power

MYK DORMER IS SENIOR RF DESIGN ENGINEER AT RADIOMETRIX LTD
WWW.RADIOMETRIX.COM

There is a very wide range of applications for low power wireless modules: from simple, short-range data transfer devices, to networks covering many square kilometers. As desired range increases, the demands on the radio circuitry and associated antennas become ever more demanding.

Finally, as coverage approaches the practical limit for unlicensed systems (458MHz half-watt narrowband radios can reliably reach out a mile or more), the more experienced user will become aware of what seems to be a contradiction: The range prediction model equations (Egli and similar) predict that between 10 and 12dB of link margin improvement (in tx power, aerial gain or rx sensitivity) is needed for each doubling of the radio operating range, and yet practical tests conducted (on foot or by vehicle) in any less than ideally flat and unobscured environment will reveal great areas of marginal performance, where the link seems on the edge of failing (or of signalling successfully). It is possible to travel hundreds of meters away from the transmitter, with the link communications remaining marginal. In other words, the predicted sharp cutoff between "in range" and "out of range" areas is absent, and the areas of sporadic performance can seem annoyingly large.

In these marginal areas it is instinctively evident that just another dB or two of link margin could make the difference between reliable coverage and nothing usable at all.

The actual reasons for this behavior are many and varied: The environment is often nowhere near as predictable as the mathematics would indicate. Instead of regular, even, path-loss effects, the changes in signal strength are more often dominated by shadowing by large buildings or the ground itself – in the form of hills and valleys; by fading effects, where multiple phase-shifted reflections of the wanted carrier subtractively interfere; and by absorption, especially at higher frequencies wet foliage can form an excellent RF absorber.

Take a critical look at your system design. If all else fails, fundamental change to the way the radio link operates can reap dividends

The actual receiver performance is often overwhelmed by the contribution of interference, noise and spuri (both external "other user" interferers and local "digital noise" from the system's own processors and switch mode power supplies) and by imperfections in the aerial system (poor matching, inappropriate or misunderstood directionality, or even de-tuning by proximate metal structures).

While improving the accuracy of radio propagation path models would form a solid basis to a PhD, we are engineers and as such are more concerned with fixing the problem rather than knowing the minute details of the cause.

So how is it possible to get that "few extra dB" and reclaim those tantalisingly half-usable areas? If we assume that the maximum legal power is already being used, and that the receiver and transmitter circuitry are both fully functional 'state of the art' examples, then there are a few areas to look at.

Review the aerial design. Far too many low power radio systems are

fitted with low performance, poor quality or inappropriate antennas. For good long-range performance there really are no shortcuts: tiny, internal-to-case aerials may be good enough for a few hundred meters, but to get the acres of coverage a higher performance system promises it comes back to "as much metal as possible, as high up as you can". Fixed-site antennas can use mast-mounted dipoles (centre or end fed) or monopoles (quarter wave or 5/8 lambda) with suitable ground plane radials. Mobile installations should still mount as good an antenna, as high as possible (vehicles often provide a convenient metal roof, to which one of the many commercial "PMR type" magnetic mounted whip antennas can be fitted). Hand-held boxes should at least mount the aerial (and a helical type is theoretically ground plane independent), away from adjacent conductive masses (such as the user's hand!) which can de-tune or mask the aerial.

Look for height. An awful lot of trouble can be caused by less than obvious undulations in the local ground surface: even a dip of a few meters can put thousands of tons of soil into the path of what is (at least at UHF) a more or less line of sight communications medium. The higher that the antenna can be mounted the better; although even this cannot prevent the effects of large buildings or overwhelming geological features. Obviously, fixed-site equipment is better placed to achieve this (where, in an ideal world, it might even be possible to erect a dedicated mast) but even a mobile antenna will offer better performance on a vehicle's roof, compared to bracketing it off the chassis.

Look for external problems. Sometimes, the performance limitations are not due to your radio at all. Noise and spurious signals will swamp out a weak – wanted! – one. An audio output from the receiver discriminator can be very useful in diagnosing such problems. An NBFM receiver output in the absence of a carrier is band-limited white noise. If the receiver output is "quietened" in the absence of a signal, or other signals – tones, warbles, crackles, even voice – can be heard, then the likelihood is that this is the restriction on your range. Lacking an AF output, useful information can be gained from an RSSI (signal strength) output, or even the use of a simple "scanner" receiver on channel. At this point start looking to reduce locally-generated noise (separate radio/antenna and any digital equipment; put filters on power and data lines, suspect any switch-mode supplies, ensure the aerial feed coax is good quality and, if necessary, remote-mount the radio hardware in a screened box) and look at changing to another channel to ameliorate external interference.

> *The most powerful tool in your armory is to go to the user's site with representative equipment and conduct a test – in advance – yourself*

Take a critical look at your system design. If all else fails, fundamental change to the way the radio link operates can reap dividends:

- Reducing the actual over-the-air radio link data rate will (usually) increase absolute sensitivity.
- Multiple redundant transmission of each data packet can avoid short-term "burst" interference effects, or fades on a moving radio.
- Arranging to shut down digital components (especially processors and LCD screens) during the radio communication burst can work well (and, if the bursts are short, will be invisible to the user).
- Separate the transmit and receive aerials to allow a "gain" antenna to be used on receive (either a compressed radiation profile omni-directional such as a co-linear, or a true directional antenna if applicable) without exceeding legal transmit power limits.
- Diversity techniques (sending multiple transmit bursts from physically separated antennas, or using multiple receivers – and separated receive antennas – to receive the burst in parallel) are very powerful, and can eliminate the effects of deep fading altogether, but can be expensive in radio hardware terms and very intrusive to the overall system design.
- Repeaters: Perhaps the most powerful technique to increase coverage, a carefully set up network of repeaters can cover any problem areas or dead spots. Unfortunately, of all the techniques suggested here, this has the greatest impact on the overall system design, to the point that it is unlikely that repeaters can be added to a system that is not already designed to use them.
- Finally, the most powerful tool in your armory – I have left until last – go to the user's site with representative equipment and conduct a test, in advance, yourself. Then you will anticipate (and be able to design for) most of the problems discussed here. Even if the final radio hardware isn't available, a very good estimate can be made with a known transmit power, a receiver with an RSSI calibrated (approximately) against the final system's calling signal level, and something like the aerials that will eventually be used. Then a "coverage map" can be roughed out in a couple of hours and the problem areas identified before it's too late to do something about them.

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TUNING FILTERS IN THE FIELD MADE EASIER WITH HANDHELD VNAs

THE NEED TO CONDUCT TRADITIONAL VNA MEASUREMENTS IN THE FIELD, INCLUDING DUAL PORT S-PARAMETERS, HAS BECOME MORE IMPORTANT, SAYS **DAVID T. WITKOWSKI** FROM THE ANRITSU COMPANY

The complexity and diversity of measurements required to install and maintain wireless networks have created testing challenges. Engineers, technicians and other wireless professionals have historically relied on bulky vector network analyzers (VNAs) that were limited to use in the lab, test bench, or on a production floor.

Today as the RF spectrum becomes more crowded with increasingly complex signals requiring more sophisticated filtering, the need to conduct traditional VNA measurements in the field (including dual port S-parameters) has become more important. The market has developed a growing need for these types of measurements while installing and maintaining both mobile voice and wireless data networks.

Despite the ability of these traditional instruments to make the necessary measurements, there are limitations. Benchtop instruments are large and heavy and this makes it difficult – if not impossible – for such a solution to be used in the field or in elevated/space restricted environment. Adding to the complexity of using benchtop instruments in the field is the need to utilize AC extension cords or even portable generators to power the equipment.

Another problem with the use of benchtop instruments in the field is that their displays are not designed to be used in sunlight. In many instruments, the viewing angle is not optimal for field use, especially when working on systems with limited physical access. Seeing the results can be problematic, due to these factors.

From an investment standpoint, purchasing benchtop instruments for use in the field can make anybody purchasing it a bit nervous. These expensive investments, which were never intended to be used in the field, are susceptible to damage and weathering due to the rugged outdoor environments in which they are used.

What field personnel require is a single instrument that is specifically designed for today's stringent performance and compliance testing requirements. It must combine portability, durability and extensive measurement capability and performance. Portable instruments which can offer two-port measurement, high-frequency coverage and optional time-domain capabilities, also must be ideal for applications through to 20GHz, including using the time domain to simplify filter tuning at base stations and cell sites.

Tuning Filters

It can be difficult in any environment to tune a multiple-resonator filter, such as bandpass and pass-notch filters, which can have multiple complex pole/zero criteria. The pole/zero count is usually increased due to the need for more stopband or notch rejection, with the trade-off of greater complexity in passband filter tuning. In a bandpass filter, for example, resonators are tuned such that the coupling between resonators satisfies filter requirements for input and output VSWR, passband insertion loss, passband amplitude ripple and out-of-band rejection.

In a broadcast tower or a cellular communications base-station, a filter may even be connected to another component, such as a power combiner, as part of a multifunction assembly. Filter testing is typically performed by exciting a DUT with a tracking generator and evaluating the filter's in-band and out-of-band responses. This can be done more easily and accurately with a VNA by measuring the S-parameters at each port and path through the DUT.

There are many ways to tune a filter with a VNA. A template response based on a "golden" filter (which is a type of "reference" component that provides performance closest to the ideal response) is one method. This measurement is then stored in the memory of the VNA for comparison to other filter measurements. The response for an ideal filter can also be created by modelling the desired filter with a computer-aided-engineering tool, such as Microwave Office from AWR. These simulated responses are then saved in the memory of the VNA for comparison with measured data on actual filters.

Another method is to adjust resonators and coupling while studying the effects of the tuning in the time domain. Unlike a frequency-domain display, which shows magnitude or phase across a frequency range, time-domain displays can show the individual responses of a filter's resonators

In a bandpass filter resonators are tuned such that the coupling between resonators satisfies filter requirements for input and output VSWR, passband insertion loss, passband amplitude ripple and out-of-band rejection

VNA MASTER SERIES FROM ANRITSU

RECOGNIZING THE NEEDS ASSOCIATED WITH FIELD INSTALLATION AND MAINTENANCE, ANRITSU HAS DEVELOPED THE VNA MASTER SERIES OF HANDHELD VECTOR NETWORK ANALYZERS.

The new instruments were engineered to provide several of the key features necessary for RF/microwave engineers to conduct system maintenance and interference hunting in a variety of field applications.

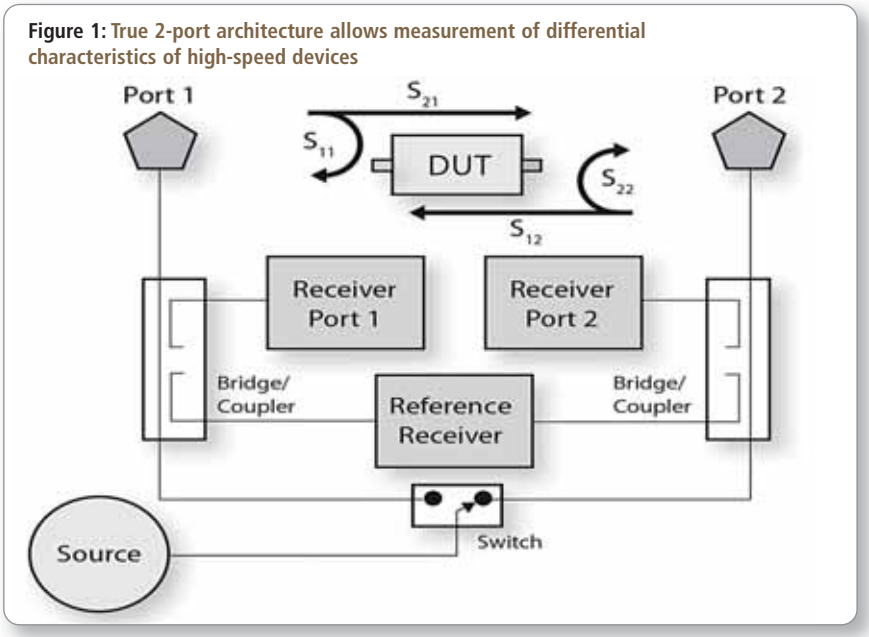
The frequencies covered are from 5kHz to 20GHz for the top-of-the-line model. In addition, the three-receiver architecture in the VNA makes it easy to conduct S-parameter measurements. One test receiver should be for signals incident on port 1 (for measuring S_{21} and S_{11}), the second dedicated to signals incident on port 2 (for measuring S_{12} and S_{22}), and the third acting as a reference receiver with an internal switch routing test signals between the ports.

The VNA Master is optimized for the precision S-parameter measurements necessary to accurately test cables, antennas and filters. The MS20xC/3xC handheld analyzers offer a true 2-port VNA for simultaneous determination of all S-parameters. A powerful 12-term error correction algorithm allows the MS202/3xC series to deliver S-parameter performance that is generally 10 times more accurate than scalar measurement results. The true 2-port architecture allows measurement of differential characteristics of high-speed serial devices. The MS202/3xC family also supports dispersive waveguide measurements.

The analyzers have a sweep speed as fast as 350µs/pt to provide real-time display updates for filter tuning operations. In addition, the models offer > 95dB dynamic range for filter measurements, enhanced time domain analysis to address material measurements, and TDR functionality. Time Domain gating for isolating/locating problems during distance-to-fault analysis makes the VNA Master well suited for isolating/locating problems along long inaccessible cable runs.

VNA Master C family from Anritsu

Figure 1: True 2-port architecture allows measurement of differential characteristics of high-speed devices



separated by time or distance through the DUT. VNA time-domain analysis was once associated solely with bench-top test systems, but that's no longer the case as T&M manufacturers bring this capability to the field.

Efficient filter tuning requires the ability to measure and display a minimum of two S-parameters at the same time. For example, in tuning a bandpass filter for a flat passband response (by measuring and viewing its S_{21} response), the effects of reflected signals should also be studied by observing the filter's S_{11} return-loss response. The effects caused by adjustments made while tuning should appear on an analyzer's display in real time. The Anritsu VNA Master family achieves real-time displays of performance changes from tuning by means of 0.5ms/point data refresh rates.

Conducting Time Domain Measurements

When applying time domain to filter tuning, users must consider the path through the filter as it interacts with the test signal from the built-in source of the VNA. By using a VNA, which offers automatic source switching between ports and multiple display capabilities, users are able to view the input and output ports of a filter under test simultaneously.

The following is one example. Two measurement channels can be used to test the return loss (S_{11}) of the resonators starting from the input port, and the reverse return loss (S_{22}) starting from the output port. For the S_{11} measurements, the first resonator in the time-domain plot will be the one closest to the filter's input port. Conversely, the first resonator represented in a time-domain plot will be the one closest to the filter's output port, for the S_{22} measurements. Since the time-domain data is based on an inverse FFT of the measured frequency domain data, users need to select the frequency span to include all of the passband (and some of the skirts) of the filter. The measured frequency span of the VNA should be two to five times the filter bandwidth in order to give the optimal resolution for tuning the filter's resonators. To support field tuning of filters, the VNA should allow users to employ an arbitrary number of data points to optimize the instrument's display resolution when evaluating both broadband and passband characteristics.

Another feature that has become increasingly important in today's wireless world is the ability to stamp measurement data with time/location for simple identification of different test sites when using handheld instruments.

VNAs should also feature flexible marker readouts and be able to provide output data in a variety of formats, including .txt, .csv, and .s2p files, to easily export results to external computers for further analysis and archiving. Waveguide support to test filters and other waveguide components in satellite-communications and point-to-point-radio systems should be provided as well. ●

SOLAR-POWERED PUBLIC SERVICE INFRASTRUCTURE CONSIDERATIONS

FOR ENERGY STORAGE, ILLUMINATION & COMMUNICATIONS

WILLIE CHAN, SENIOR PRODUCT MARKETING ENGINEER FOR µMODULE POWER PRODUCTS AT LINEAR TECHNOLOGY, EXPLAINS THE GROWING IMPLEMENTATION AND IMPORTANCE OF SOLAR-POWERED PUBLIC TRANSPORT ILLUMINATION AND COMMUNICATIONS INFRASTRUCTURE

Consistent with the movement towards more environmentally-friendly solutions, self-sustaining solar-powered infrastructure is starting to be deployed around the world. To improve customer service, convenience and safety, public service stations with night-time illumination and wireless communications capabilities are being deployed in increasing numbers. Illuminated bus stops with real-time arrival information are appearing in North America; solar-powered ticket kiosks are appearing in Europe. These units may also be deployed in areas where electrical and wired communications infrastructure may not be cost-effective to build. In both cases the units must be able to wirelessly communicate to perform their respective functions. The proof of concept is out there, but how can we optimize the power network within the system to make the most efficient use of available sunlight for maximum up-time with minimized costs?

Solar Cell Operating Characteristics

The amount of energy produced by a panel of solar cells is proportional to the total amount of light received. The influence of clouds, trees, dirt, surface area of the solar cell panel and the rotation of the sun can cause dramatic fluctuations in the amount of light available for power generation. Combined with solar cells' characteristically high source impedance, a load that attempts to pull a relatively large constant current may encounter some time where there is no power delivered to it, its charger and battery in most cases. Therefore, a circuit must be applied to carefully control the current and correspondingly maximize power delivered from the solar cells to the charging unit.

The typical output current and output voltage characteristics for solar cell panels are shown in Figure 1. An interesting trend emerges in that, regardless of the lighting conditions for a given panel, the maximum output power will be delivered when the output voltage is at a relatively constant voltage, VMPP. The voltage VMPP may be found by reviewing the technical documentation for the solar cell panel of interest. At the same time, a good practice may be to verify the VMPP figure independently, creating the I-V curves like the one shown in Figure 1 using successively increasing or decreasing loads under the same illumination conditions that may be easily created by facing the panel at various angles to the sun.

Viewing the performance curve from a real solar cell panel, the importance of extracting power from a solar cell at VMPP cannot be understated. The data in Figure 2 was gathered within a period of a minute with the panel aimed directly at the sun under clear skies at our Milpitas, California campus using an automated load box. As indicated by the graph, an uncontrolled load could cause the net output power to vary anywhere from under 2W to 47W in direct sunlight. If it were possible to maintain the output voltage of the panel

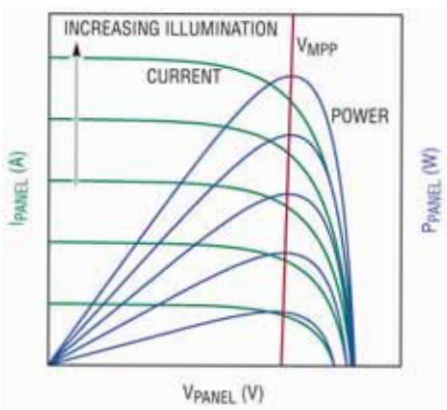


Figure 1: Typical solar panel output current and power vs output voltage curve

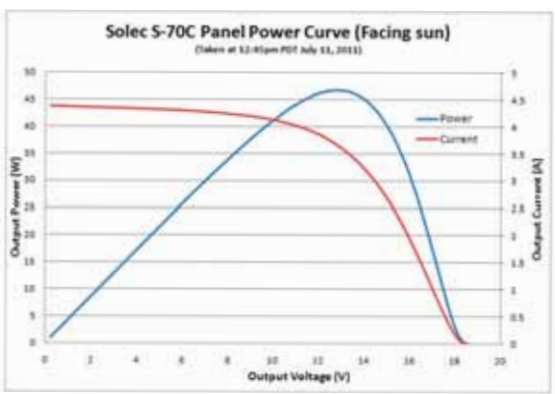


Figure 2: Solec S-70C panel: output current vs output voltage curve

constant at approximately 13V, we could be assured that the maximum amount of power is available to the load. But how could this task be accomplished?

Optimizing Solar Cell Power

Solar energy generation costs are still higher than that of traditional sources such as coal and natural gas, due in part to the cost of the solar cells. While the cost per watt is decreasing, a July 2011 report by SolarBuzz.com indicated solar cell pricing was in the range of €0.96 to €2.54 per watt of peak generating capacity, depending on volume and technology. As stated previously, non-ideal sunlight conditions often prevent the panel from operating at peak generating capacity. Moreover, any potential impedance mismatch between the solar cell and the load (operation at other than VMPP) must be considered for the application and factored into the amount of solar generating capacity to design into the system. As the mismatch is reduced so does the solar panel size and cost while achieving the same power output.

A convenient approach to reduce impedance mismatch is achieved by employing a Maximum Peak Power Tracking (MPPT) circuit between the output of the solar cell panel and the load. In particular, this circuit varies the current load to maintain the voltage at VMPP. The circuit may be built with discretes using a myriad of components or integrated within a device like the LTM8062 switching µModule battery charger. The MPPT circuit ensures maximum power is delivered to the load under widely varying illumination conditions. The effectiveness of the LTM8062 MPPT circuit was put to the test by comparing the output power of two identical setups using a Solec S-70C panel with MPPT enabled and MPPT disabled, the latter implemented by pulling the VINREG pin to VIN.

Energy Storage: Circuit Comparison Components and Setup

Three LTM8062 modules were connected in parallel for a maximum charge current of 6A ±7.5% in the constant current charging state. The LTM8062 is an integrated constant current, constant voltage (CC/CV) step-down switching battery charger solution accepting a 4.95V to 32V operating input voltage range. The charge termination voltage was set at 8.4V (Figure 3) to simulate a two-cell Li-Ion stack well below its 18.8V maximum rating to accommodate the solar cell's VMPP figure explained next.

The Solec International S-70C is a monocrystalline solar cell panel rated for 70W peak output power. Empirical measurements under varying light conditions determined the maximum peak power voltage (VMPP) to be 13V although the label indicated a figure of 17V. Still, it displays the typical performance characteristics of solar cell panels. The panel was positioned to lie parallel to the ground for all measurements to model installation on a flat roof.

Since the initial charge state of the battery in a real world application is highly variable, depending on system usage, size of the battery and sky conditions on prior days among other factors, an electronic load was used to simulate a maximum power draw from the solar panel approximately at the transition between constant current and constant voltage charge regions. By challenging both circuits at this operating point, we can be certain the circuit will support all other events in the charge cycle. With a 8.4V charge termination voltage corresponding to a two-cell Li-Ion stack, the electronic load was required to pull up to 6A from the three LTM8062 charger modules in parallel while maintaining a voltage of approximately 8V.

Maximum Peak Power Tracking Effectiveness

Measurements were taken with the MPPT circuit enabled and disabled throughout the day outside our Milpitas, California campus on a summer day. Those familiar with San Francisco summer weather patterns will be familiar with typically overcast mornings becoming perfectly clear by afternoon. This turned out to be the case for our experiment performed on a July day. Measurements were taken during normal business hours, although a real application would potentially have hours of additional light available before and after the data was gathered. Figure 4 shows the effective load current and power delivered to the electronic load simulating our 8.4V Li-Ion battery at near maximum power draw throughout the day as well as the atmospheric conditions that were perfectly clear except where noted.

The current and power delivered to the simulated battery cell is dramatically higher with the MPPT circuit active compared to the circuit inactive. The current to the load showed a 20% to 40% improvement with the exception of the noon period where the LTM8062's internal maximum charge current limit was reached when MPPT was enabled. Separating the battery charger and load from the circuit for a moment, an active MPPT circuit extracts 18% to 42% more power from the solar cell panel than with the circuit inactive. In general, the more dramatic improvement tends to be at lower light levels during the morning and evening hours. The additional energy delivered to the load over the nine hour period would have been approximately 240Whr without the MPPT circuit and 300Whr with MPPT enabled (Figure 5), an improvement of 25%. Accordingly, a 100W solar cell panel system with an MPPT enabled at the load would generate equivalent power to a 125W solar system without MPPT. Using a solar cell panel market price of €1 to €2.54 per Watt, the potential cost savings would be equivalent to €25 to €63.5.

Reliable Energy Efficient Illumination

With the maximum output power now efficiently stored in the battery, the most reliable and efficient way to provide night-time illumination today is with LEDs. The new San Francisco city bus stops being introduced consume 74.4W with LEDs compared to their fluorescent bulb illuminated predecessors which consume 336W. Cost of ownership is also reduced as LEDs last ten times longer than their

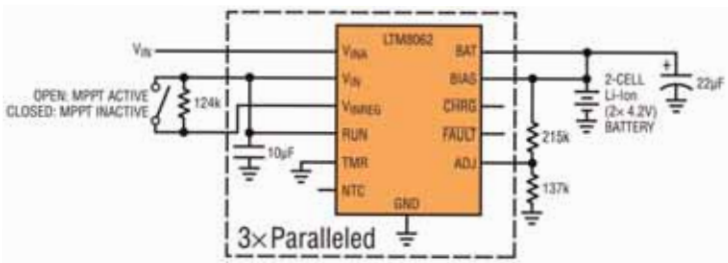


Figure 3: MPPT effectiveness test circuit schematic for 6A maximum charge current

While cost per watt of energy generation from solar is decreasing, a July 2011 report by SolarBuzz.com indicated solar cell pricing was in the range of €0.96 to €2.54 per watt

LEDs require DC power for operation; fluorescent bulbs require an AC voltage typically in the range of 200V to 1500V for operation, requiring a costly and complex driver when operating from a DC power supply

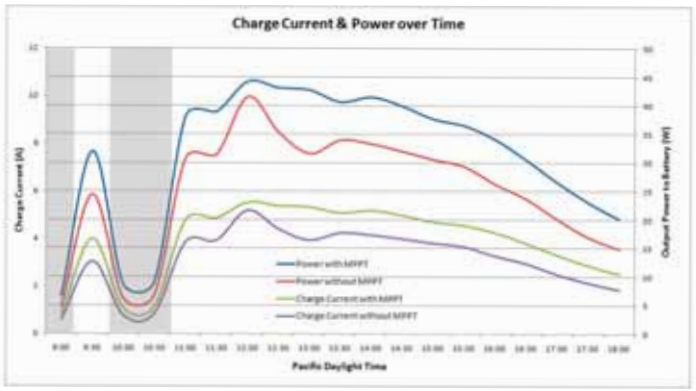


Figure 4: Charge current and power with and without MPPT

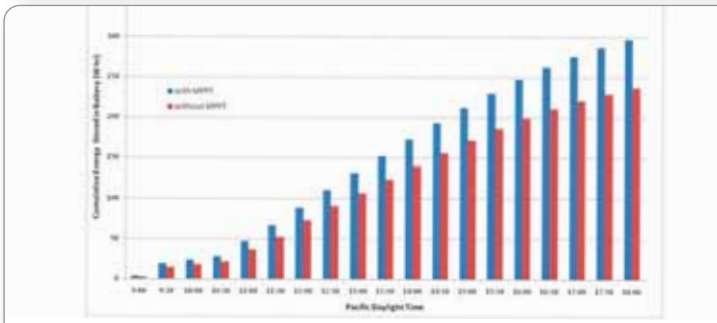


Figure 5: Cumulative energy delivered to battery

fluorescent counterparts. Furthermore, LEDs require DC power for operation, fitting perfectly with the DC power available from the solar cells and batteries. Fluorescent bulbs require an AC voltage typically in the range of 200V to 1500V for operation, requiring a costly and complex driver when operating from a DC power supply. The relatively high voltage AC power supply required by fluorescent bulbs can also become a source of interference with potential wireless communications described in the next section.

In this experiment, the simulated 8.4V Li-Ion battery pack would deliver most of its energy at approximately 7V. Taking the LTM8042 LED driver as an example, a luminous flux of 1300 lumens (16V string at 700mA) can be achieved using neutral white XLAMP XM-L LEDs by Cree. With the same battery pack, the LTM8042-1 LED driver can deliver a luminous flux of 1040 lumens (24V string at 350mA) in combination with neutral white Luxeon Rebel ES LEDs by Lumileds.

If two solar panels were stacked in series to raise the VMPP to 26V and the battery stack increased to 16.8V, a luminous flux up to 2880 lumens could be achieved with the XLamp XM-L LEDs or 1430 lumens with Luxeon Rebel ES. To save power during dusk and dawn hours, seek an LED driver which supports a high dimming ratio.

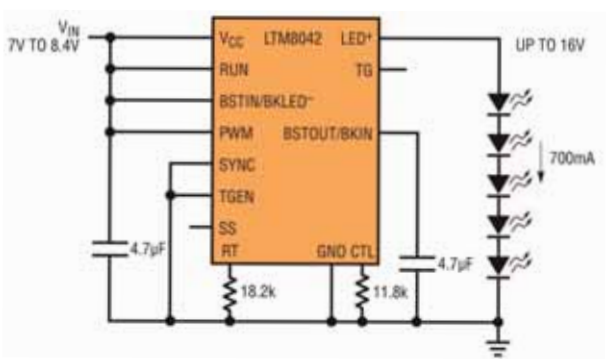
Clear Communication is Key

Wireless communication is an easy addition to public service infrastructure. Whether it's a Wi-Fi, HSPA, LTE or other wireless standard, communication systems are consuming less power and the supporting service area constantly increases in size. Public transportation stations can then communicate real-time service updates to their passengers and ticket kiosks can process electronic payments for passengers.

Solar-powered sensors are starting to be embedded in the streets of major cities to identify open parking spots to drivers and thereby relieve traffic congestion. The ability to clearly communicate information from and/or to the system is key, particularly wireless communication if the system is off the grid where traditional wired communication infrastructure may not exist.

Low radiated noise solutions are important in wireless communications for improved signal reception and transmission. Power module solutions which meet stringent EN55022 Class B radiated EMI limits are available from vendors such as Linear Technology which offers eight certified step-down µModule regulator products. When selecting an EN55022 Class B solution be sure to carefully review the third party certifications verifying compliance to the specification.

The benefits of self-powered intelligent urban infrastructure are far reaching. The technology exists today to make it possible; however optimization is required to make it practical. ●



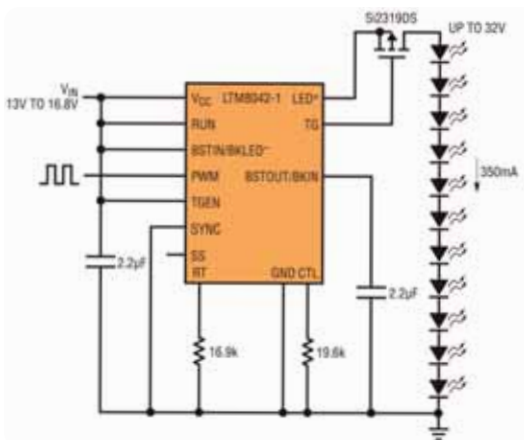


Figure 6a and 6b: LTM8042 and LTM8042-1 in boost configurations

Mouser Electronics:
Firmly Embedded in Europe

Embedded systems are the tiny computers that control the functionality of everyday devices. Whether it be a smartphone, tablet, router or an industrial robot, these systems have been touching and changing modern life like never before. Perhaps no one knows this better than Mouser Electronics, the global design-fulfillment distributor that delivers the most advanced products and newest technologies from more than 450 manufacturers to electronic design engineers across Europe. Mouser's supplier lineup includes industry leaders such as Texas Instruments, Fairchild Semiconductor, Maxim Integrated Products, Microchip Technology, Atmel Corporation, Vishay, NXP, and Infineon, to name a few.

With nine local Customer Support Centers located in Europe and Israel, Mouser will showcase its broad line card of products at this month's Embedded World in Nuremberg, featuring a multi-media exhibit in Hall 1, Stand 434. Their booth will highlight kiosks from supplier partners Laird Technologies, Olimex, ON Semiconductor and Freescale Semiconductor.

EMBEDDED MARKET TRENDS AND DESIGN PRESSURES.

Mouser is seeing growth in embedded development in Europe. One source is the number of luxury automakers in Europe. The drive to deliver the connected car ¬– one that's eco-friendly with a reduced carbon footprint, incorporates the latest driver-assist technologies, features mobile connectivity and infotainment advances – is helping to pave the way for embedded innovation.

Also, consumer demand for tablets, eBooks/readers, and smartphones with critical capabilities available at a touch of the finger are influencing embedded design. Pyramid Research forecasts that this mobile proliferation will lead to total mobile revenues of 46.7bn Euros in Europe for 2012.

Europe is the world's largest Consumer Electronics market. Market researcher, Gfk, reports the consumer electronics market will grow by 2% – with Europe's share of global retail sales revenue expected to surge in 2012.

An aging population in Europe in search of quality care is driving innovation in healthcare technology spanning patient administration, health monitoring and care, imaging and diagnostics, and record management.

Traditional design requirements, such as high-reliability, long life cycles and cost management remain. Engineers have to guide the creative process and develop new concepts, involving a broader range of disciplines. As budgets and time-to-market pressures increase, they must do more with less.

PLUGGING MOUSER INTO THE EMBEDDED DESIGN EQUATION

Mouser is a trusted partner on which more and more European design engineers are relying. The distributor provides the newest semiconductors and electronic components and stands as a top design resource for engineers. Its award-winning website, www.mouser.com, offers a library of more than 2,000 Product Knowledge Center (PKC) sites, data sheets, block diagrams and other training tools.

Mark Burr-Lonnon, Mouser Vice President of EMEA Business, explains: "Our chief goal is to help design engineers in Europe and elsewhere around the globe get their designs to market faster. We accomplish that by offering the most advanced technologies and newest products, plus local support and fast delivery, supported by an easy-to-navigate website packed with extra resources. Engineers know they can trust Mouser to deliver What's Next."

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EMBEDDED DESIGN TRENDS

In advance of Embedded World, Mouser shared some insight on embedded design trends. Visit Mouser in Hall 1-434.

M2M. Machine-to-machine communication, through both wired and wireless access methods, is on the rise. While the technology for remote connectivity isn't new in Europe, what is changing are the business scenarios and new applications for remote connectivity. This is being triggered by the widespread adoption and upsurge of mobile-based communications. Key M2M adopters include automotive and logistics companies using GPS, energy providers building out smart grids, and healthcare providers wishing to monitor patients and access data remotely.

Laird Technologies, supplier partner of Mouser, offers a wide range of high-performance wireless modules, including Bluetooth®, ZigBee®, 802.11 (WiFi) and proprietary standards that are incorporated in M2M applications and systems. Their range of Bluetooth Intelligent Serial Modules offers an extremely robust, high performance and fast route to embedding Bluetooth into product design. In addition, Laird's WiFi modules are ideal for embedded wireless LAN solutions, requiring no host processor and adding intelligent wireless capability to any application. Engineers can quickly discover the latest M2M breakthroughs from Laird Technologies at www.mouser.com/lairdwireless.

ARM® Multi-core Processors. New applications in the areas of imaging, rendering, compression, multimedia and recognition demand higher band width, enhanced processing capabilities, quicker responses and more efficient algorithms. This is creating a shift from 8-bit and 16-bit to 32-bit cores that reduce power consumption, costs and offer increased reliability.

In response, Mouser offers an ever-expanding portfolio of ARM Cortex™–M4 processor solutions for embedded design. The relative simplicity of ARM processors makes them suitable for low-power applications. They have become dominant in the mobile and embedded electronics market, thanks relatively low cost and small size. It firmly stands as the ideal core for high-growth applications such as motor controls, power management and industrial automation.

Mouser carries the newest, most advanced processors for embedded design – Freescale Kinetis product family, Texas Instruments Stellaris LM4F family, NXP Semiconductors' LXP4300 family, plus ATMEL's SAM4S MCU series to list a few. Engineers can ARM their designs to the core by visiting www.mouser.com/ARMCortexM4.

IMPLEMENTATION OF THE INMARSAT BROADBAND GLOBAL AREA NETWORK PART 1

IN THE FIRST OF TWO ARTICLES **STOJCE DIMOV ILCEV** OF THE DURBAN UNIVERSITY OF TECHNOLOGY (DUT) IN SOUTH AFRICA REVIEWS THE INMARSAT BROADBAND GLOBAL AREA NETWORK SYSTEM FOR CIVILIAN AND MILITARY MOBILE AND PORTABLE SOLUTIONS

At the end of 2005 Inmarsat launched its Broadband Global Area Network (BGAN) service as the first high-speed wireless data solution with voice, available globally. The service is accessed through a portable, broadband satellite transceiver with antenna that is as easy to carry as a laptop computer.

The BGAN network consists of a fourth generation constellation of Geostationary Earth Orbit (GEO) I-4 satellites and an optimized ground network, which interconnects with a variety of terrestrial infrastructures. This system employs bandwidth-efficient modulation and coding techniques, capable of supporting variable bit-rate services and QoS, depending on the needs of the application.

The BGAN system is positioned as the satellite component of 3G IMT-2000, especially the Universal Mobile Telecommunications Service (UMTS) standard. The system will provide a near-global coverage overlay for the terrestrial networks, giving users service availability beyond the reach of terrestrial IMT-2000 networks. A range of supported terminals, ranging from small personal devices, portable and mobile units linked with onboard entertainment, communications systems to remote base stations, including local area networks for civilian and military applications and SCADA or M2M.

Overview of the Inmarsat System

Inmarsat was the world's first international and non-governmental Mobile Satellite Communications (MSC) operator and is still the only one to offer a mature range of modern communications services to maritime, land, aeronautical and other mobile or semi-fixed users. Founded in 1979, the keystone of the strategy is the current Inmarsat I-4 satellite system, which from 2004 is supporting BGAN. The BGAN offers satellite communications at up to 492kb/s for Voice, Data and Video (VDV), including Internet access for mobile fixed and portable multimedia and other advanced applications.

Inmarsat, as a largest satellite communications provider for all-mobile services, has developed BGAN models for global business solutions known as the Inmarsat-M4 system. With the appropriate software and hardware the M4 service supports mobile data and Integrated Services Digital Network (ISDN) solutions up to 64kb/s and Internet Protocol (IP) up to 492kb/s. It also covers the secure encryption (STU III/STE) system important for corporate and military communications and extends to covering fixed and/or mobile office communications systems such as a LAN, the Internet and ISDN/PSTN in remote areas, using multimedia the semi-fixed GAN (Global Area Network) at first and then BGAN portable utilization later. The BGAN system provides a range of IP and VDV solutions covering almost all of the world's landmass for civilian and military satellite communications, telephone, newsgathering, videoconference, Internet, SCADA monitoring and broadcasting in all remote environments.

BGAN offers broadband-type data-rates and effectively enables staff to replicate their remote or mobile office environment out in the field. The BGAN service supports a number of applications, including Windows 2000, Windows XP, Windows NT4, Mac OS 10.1 onwards and Linux.

Inmarsat M4 Service

Inmarsat M4 incorporates industry-standard ISDN and IP interfaces and offers users a choice of two ways of sending and receiving data: Mobile ISDN and Mobile Packet Data Service (MPDS). Each method has its own advantages, the high quality and speed of ISDN, the considerable cost-effectiveness and flexibility of IP, and the choice depends on what the user is aiming to achieve.

The ISDN solution is the ITU-T (formerly CCITT) term for the digital public telecommunications network. The 64kb/s data service supports applications between ISDN terminals using ISDN protocols such as V.120 or X.75. It will support any 64kb/s data-stream and is the service used for implementing ISDN mobile

> The BGAN solution is a near-global satellite Internet and multimedia network with telephony, using portable or mobile terminals

Figure 1: Inmarsat-4 Global Beam Coverage
[Taken from the book "Global Mobile Satellite Communications" by S D Ilcev]

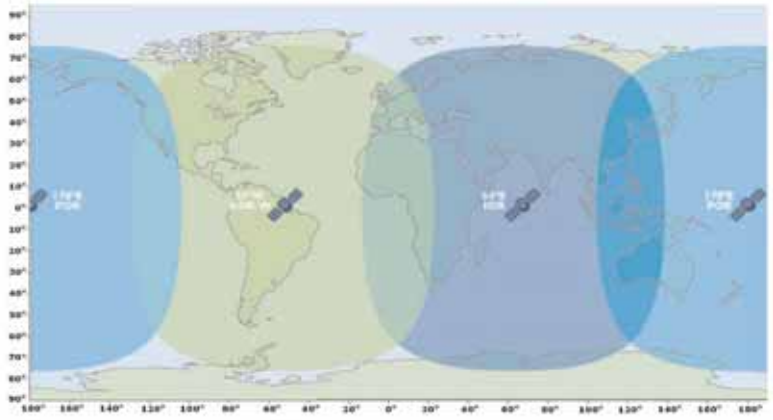
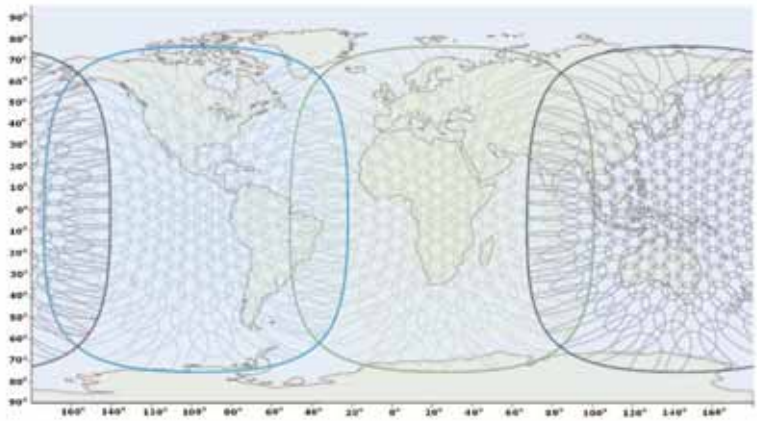


Figure 2: Inmarsat-4 spot beam coverage



applications, such as videoconferencing, LAN routing, file transfer, broadcast-quality audio transmissions and secure telephony. The Mobile ISDN service provides full-time use online of a high-capacity channel capable of carrying a constant data stream.

The service is accessed primarily through the RJ-45 connector and therefore up to eight multiple ISDN devices can be attached to the BGAN.

A Point-to-Point Protocol (PPP) modem data service, suitable for data file transfer, email or Internet access, may also be available via an RS-232, USB or infrared port. Users are charged by the length of time this dedicated channel is allocated, so to provide ISDN call typically takes less than five seconds. Because of the global growth of ISDN, a whole range of telecommunications applications that were once the domain of large corporations has now become cost-effective and easily available to even the smallest of businesses in remote and mobile environments.

The MPDS enables terminal to become simply connected to the Internet and the user is only charged by the amount of data that's been sent and received, rather than by how long the application takes or how long they are connected. The mobile IP is a perfect solution for many applications such as Web browsing, email sessions, E-solutions, database enquiries, IP/LAN connectivity, Intranet access and so on. The MPDS has been developed to provide transfer of packet data over Inmarsat networks, thereby giving users more efficient and flexible data transmission models. It operates on 64kb/s satellite channel, in both directions transferring High Speed Data (HSD) via the following configurations: 1. videoconferencing; 2. PC and LAN access; 3. mobile multimedia and broadband; 4. store-and-forward video; and 5. voice and audio broadcast.

Broadband GAN (BGAN)

The BGAN solution is a near-global satellite Internet and multimedia network with telephony, using portable or mobile terminals. The BGAN terminals are normally used to connect a laptop or palmtop PC to broadband Internet in remote locations, although as long as line-of-sight to the satellite exists, the terminal can be used anywhere.

The value of BGAN terminals is that unlike other satellite

Table 1: Comparison of Inmarsat satellites' main parameters

	Inmarsat-2	Inmarsat-3	Inmarsat-4
No. of satellites	4	4 + 1 spare	3 (inc. 1 spare)
Coverage	Global beam	7 wide spots + global beam	200 narrow spots + 19 wide spots +global beam
Mobile link EIRP	39dBW	49dBW	67dBW
Channelisation	4 channels between 4.5 & 7.3MHz bandwidth	46 channels between 0.9 & 2.2MHz bandwidth	630 channels at 200KHz
Satellite dry mass	700kg	1000kg	3000kg
Solar array span	14.5	20.7m	48.0 m

BGAN SUITABILITY

THE BGAN SERVICE IS IDEALLY SUITED TO THE FOLLOWING TYPES OF ORGANIZATIONS:

1. Those operating in remote and rural regions, including onboard all mobile devices and SCADA solutions;
2. Those needing to rapidly set up temporary offices for corporate and government applications;
3. Those organizations with employees that travel regularly countrywide or worldwide; and
4. Those organizations requiring backup or additional capacity at any urban or suburban site globally.

Figure 3: Mobile BGAN ground segment

Figure 4: Portable BGAN LAN

Internet services which require bulky and heavy satellite dishes to connect, a BGAN terminal is about the size of a laptop and, thus, can be carried around easily. The network is provided by Inmarsat and it uses three GEO I-4 satellites to provide almost global coverage.

Multiple manufacturers make BGAN terminals and they all have similar capabilities. The main two services that apply to basic BGAN usage are the standard background IP and voice. Data costs from the many ISP firms that offer BGAN service averages about $7.50 per background megabyte. Voice calling is on average $1 per minute and varies slightly, based on the destination of the call using landlines, cell phones and other satellite phones which are the most expensive.

BGAN is currently the fastest global data link available via a portable terminal. It can be easily set up by anyone, and has excellent voice service quality. It works on the L-band, avoiding rain-fade and other issues of the traditional larger satellite systems.

The BGAN standard IP service supports Circuit Switched (CS) and Packet Switched (PS) voice and data services and, depending on the BGAN terminal IP, it offers interactive (send and receive) data rates of up to 492kb/s (maximum bearer rate) over a shared connection. Streaming IP interactive rates are 32, 64, 128, 176 and 256kb/s, ISDN data rate is 64/56 kb/s ISDN; global voice up to 4kb/s (uses include 2-wire phone) or 3.1kHz audio; and data up to 64kb/s. The supplementary voice-services include SMS with 160 characters, voicemail, call waiting, call barring, call hold and call forward, over 4kb/s circuit-switched network and can be performed via a peripheral handset or headset.

The BGAN system is providing access through Inmarsat I-4 satellites on an L-band frequency using transmitter (at 1626.5MHz-1660.5MHz) and receiver (1525MHz-1559MHz) full-duplex operation (send and receive with bearer bandwidth of 200kHz).

Power options of BGAN are single BA-5590 type battery, 120/240AC power supply and standard vehicle DC adapter. Otherwise, BGAN is able to access three models of the Radio Access Network-Core Network (RAN-CN) interface in IMT-2000 networks.

The File Transfer Protocol (FTP) is used to transfer files between computers on a network. The FTP mode can be employed to exchange files between computer accounts, transfer files between an account and a desktop computer, or access online software archives. BGAN is completely secure and supports all major Virtual Private Networks (VPN) products and encryption standards.

Terminals can be connected quickly and easily to multiple laptops via wired or wireless connections, including Bluetooth or WiFi, depending on the terminal. Terminals can be used indoors (via external antenna) and outdoors, and are robust enough to withstand challenging environments and extremes of temperature.

Space and Ground Segment of BGAN

The Inmarsat network is providing services for mobile and semi-fixed users via the GEO constellation and the ground segment to other mobile or semi-fixed users or customers of the Terrestrial Telecommunication Network (TTN). Operational satellite

> The BGAN standard IP service supports circuit switched and packet switched voice and data services

Avionics Europe Is Introducing Preliminary Conference Programme

Avionics Europe, the region's premier conference and exhibition that discusses the issues and challenges in the future of commercial and defence avionics, has announced the preliminary conference programme for the event taking place in Munich, Germany from 21st – 22nd March 2012, with the launch of the Pre-Show Guide.

The conference programme, covering commercial and defence avionics technologies and challenges, will deliver two conference tracks with 50 international speakers, plus a series of technical workshops. The Pre-Show Guide can be downloaded from www.avionics-event.com.

Leading industry organisations, the Association of European Airlines, SESAR Joint Undertaking, EUROCAE and the German and Royal Aeronautical Societies will also be hosting a series of special forums, focusing on issues directly within the industry, that impact on the work and business of avionics professionals.

A high-profile opening keynote speech on Wednesday 21st March will see outstanding presentations from Mario Araujo, Director of Engineering at TAP Portugal, Michael Steinfurth, Head of CMAC Division at Eurocontrol, and Eric Stefanello, EADS representative and Prosky CEO (an Airbus company).

The opening keynote will be chaired by John Keller, Conference Director and Editor-in-Chief of Military & Aerospace Electronics, who will provide some thought-provoking questions to the proceedings.

With its annual gathering of avionics engineers and professionals, designers and pilots, Avionics Europe provides an ideal opportunity for delegates to learn and understand how future avionics issues, such as SESAR and NextGen, and new technologies in development, will integrate with ATM challenges, as the skies continue to become more crowded.

Avionics Europe will be celebrating its 10th anniversary in Munich in March. It is the industry leading conference with its unique delivery of high quality presentations and is the must attend conference for the avionics professional.

A full conference programme and further information can be found at: **www.avionics-event.com.**

AVIONICS EUROPE 2012

is taking place between 21st and 22nd of March at the M.O.C. Event Centre in Munich, Germany. To find out more go to www.avionics-event.com

look angle or elevation of BGAN equipment has to be at least 5° from the horizon, which is manually fixing until 90°.

The Inmarsat-4 global beam coverage is shown in Figure 1, and the spot beam coverage in Figure 4. In Table 1 is the comparison of the Inmarsat satellites' main parameters for the current and previous I-2 and I-3 constellations.

As with all GEO satellite connections, latency is an issue. Common latency is 1-1.5 seconds round trip for the background IP service. It is slightly better for the streaming services at 800ms to 1 second. This latency is mainly due to the great distance that has to be travelled before a packet can reach the Internet, but it is slightly exacerbated by the back-end technology, as normal latency over a VSAT system is roughly 550ms. BGAN users frequently use PEP software or other TCP packet accelerators to improve the performance.

Parts of the BGAN ground segment are illustrated in Figure 3, including M4 portable and vehicular BGAN equipment linked to the corded videophone, portable videophone, wireless video source and optional encryption device. The BGAN unit is connected via Inmarsat I-4 Spacecraft to the Ground Earth Station (GES), which is interfaced to the ISDN Telephone Network of TTN. The Portable BGAN can be linked in LAN via Bluetooth or WiFi with handset, videoset, headset, video camera and laptop/palmtop, while it can also be connected with a corded line with a laptop, handset and optional encryption device, as shown in Figure 4.

The portable or vehicular BGAN equipment can be simultaneously connected in a semi-fixed or mobile LAN infrastructure to different hardware configurations such as: a voice solution (ISDN phone, cordless phones and voice over IP – VoIP); remote corporate office or rural household solution (fax, laptop and cordless phones); a videoconferencing solution (videophone over IP – VPoIP, videoconference over IP – VCoIP and Web camera-set); and multimedia solution (PC, video camera and cordless phone). Now, the TES multimedia solutions are compatible with the Inmarsat mini-M standard and service.

The BGAN equipment can be employed in various sectors: tourism, agriculture, mining, surveying, oil and gas, construction, ATM and banking, emergency and disaster response, news gathering, broadcasting, industry, exploration, mobile office, onboard mobile, E-solutions, surveillance, distance monitoring and control, law enforcement, homeland security, defense and tactical management and a lot more. ●

Part 2 of this article will follow in the next issue of Electronics World magazine.

www.electronicsworld.co.uk

PUTTING FORWARD THE BUSINESS CASE FOR WIRELESS COMMUNICATIONS

LOOKING FOR THE RIGHT WIRELESS TECHNOLOGY AND THE RIGHT TECHNOLOGY PARTNER FOR YOUR BUSINESS IT'S NOT ALWAYS SIMPLE. BY **MARTIN POPPELAARS**, VP EMEA SALES, LANTRONIX

Companies in just about every industry are looking to wireless technology to connect serial devices and avoid the high cost of installing cable. Low-cost wireless links reduce installation and maintenance costs and provide mobility. However, designing an effective wireless-networking solution requires an understanding of today's complex wireless technologies, their benefits and their trade-offs.

With wireless technologies becoming increasingly pervasive in the marketplace, companies may be looking to these as a key business driver for 2012. But before any investment is made, it's important to take stock of the reasons for your businesses to go wireless in the first place: What technologies are currently available, where are they used and what benefits do they bring? In exploring this, the true value of wireless for the application can de determined and the right purchase can be made.

Local Area Networks (LANs) run on wire cable. Wire is expensive to install and difficult to reconfigure for changes in the production environment. It does not allow for mobility and there are certain places it simply cannot go. For instance, running cable throughout a factory floor is extremely difficult if not impossible. Because of these limitations, WLANs (wireless LANs) have become a hot commodity, revolutionising the way we work and do business.

Surveying the Wireless Landscape

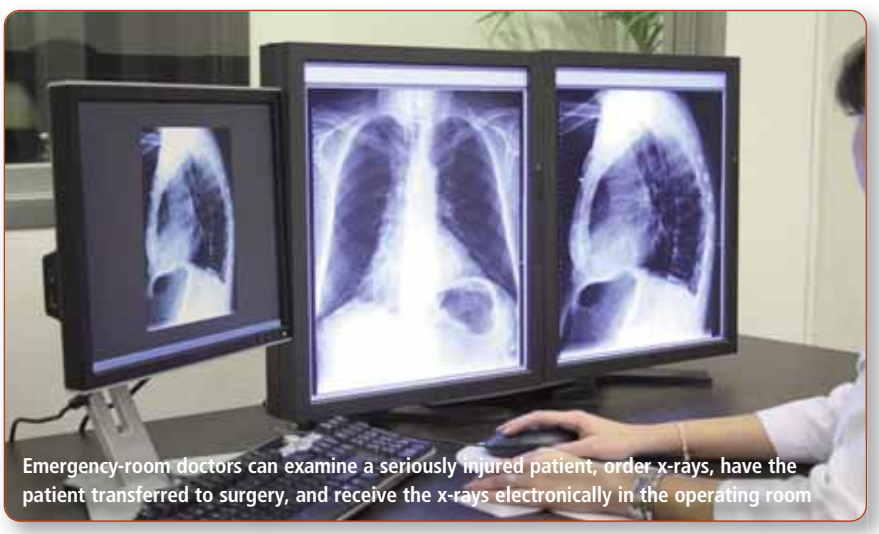
Today's popular wireless-networking standards are various and can prove very difficult to choose between. There are, however, important differences that are worth exploring in greater detail.

Wireless networks are realising significant growth in the healthcare industry due to the increased emphasis on work efficiency

900MHz Technology

The 900MHz technology is an unlicensed spectrum that has been commonly and traditionally used for portable phones, microwaves and wireless internet services.

Internationally, the 900MHz band is widely used for Global System for Mobile



Emergency-room doctors can examine a seriously injured patient, order x-rays, have the patient transferred to surgery, and receive the x-rays electronically in the operating room

Communications (GSM) mobile telephone systems or military communications. As a result, companies with sites around the globe cannot standardise on 900MHz-based solutions for all locations. But the 900MHz band suffers from a lack of interoperability, as vendors employ proprietary radio protocols. The industry, on the other hand, is moving towards standards-based systems, with multi-vendor support for common WLAN infrastructures. By contrast, Wi-Fi consumers are not restricted to a single vendor for upgrades and expansion of their WLAN systems.

Wi-Fi

In a mixed wireless network environment, it is important to select standards-based wireless products that are able to exchange and use information. Wi-Fi is a generic term that refers to any type of 802.11 network; the term is promoted by the Wi-Fi Alliance. Therefore, any products tested and approved as "Wi-Fi Certified" by the Wi-Fi Alliance are certified as interoperable with each other, even if they are from different manufacturers. A user with a Wi-Fi Certified product can also use any brand of access point with any other brand of client hardware that is also Wi-Fi certified. Users benefit from this interoperability by not being locked into one vendor's solution.

Bluetooth

Named after the Viking, Harald Bluetooth, Bluetooth is a short-range (10 metre) frequency-hopping protocol that links devices. Designed to operate in noisy frequency environments, Bluetooth uses a fast acknowledgement and frequency-hopping scheme to make a link robust. It avoids interference from other signals by hopping to a new frequency after transmitting or receiving a packet. Compared with other systems in the same frequency band, Bluetooth hops faster and uses shorter packets. As a short-range, low-cost, wireless solution, Bluetooth requires less operating power than most other devices. However, because it shares a specific radio spectrum, there is potential for interference with consumer appliances that operate in the same spectrum, such as cordless phones, microwaves and baby monitors.

Picking the Right Technology Partner

Over the past decade, wireless local area networks have played a key role in revolutionising the use of technology in our society. In the office and at home, and now across most business infrastructures, wireless connectivity is permeating every aspect of our lives. But as has been demonstrated, there is an abundance of complexities associated with wireless connectivity. The effort involved in understanding this technology and bringing it to embedded solutions can be daunting, time-consuming and expensive.

It is therefore important for organisations to seek out providers that can simplify the process. To capitalise on the growth in this space, they need a convenient, cost-effective and easy-to-install solution for adding wireless connectivity to their embedded designs.

Finding a provider that offers the flexibility to suit specific wireless requirements – with the ability to add connectivity modules to any product quickly and easily – is an important place to start. ●

THE REAL-WORLD BENEFITS OF WIRELESS

CAN BE SEEN ACROSS ALMOST EVERY INDUSTRY. SOME SPECIFIC EXAMPLES INCLUDE THE FOLLOWING:

Retail

A major music store has set up wireless kiosks that provide real-time streaming of music videos, seasonal fashion displays, ticket-selling services, local web access, on-line music sampling and other content residing on a video server.

In the future, retailers will be able to install RFID (radio frequency identification device) readers into their store shelves. With these readers, retailers will have the capability to detect when the shelves are empty and need to be restocked – all via wireless communication.

Transport

To reduce the costs of vehicle damage, a major rental-car agency is using a wireless system that allows damaged cars to be inspected and an appraisal prepared within two minutes. The company estimates that it will save millions of pounds per year on unrecovered costs. It also ensures that crucial customer information and signatures are not lost.

Healthcare

The medical and healthcare industries are seeking productivity gains as a result of the current nursing and doctor shortage. With this situation expected to worsen as baby boomers age and require more care, an increasing number of medical and healthcare industries are modifying their processes by building convincing wireless return on investment (ROI) models. Use of computer-based physician order entry (CPOE) and bar-code scanning for medications is expected to expand over the next few years and wireless communications networks are essential to their success.

As news of medical mistakes become more public, wireless applications are also becoming a key component in improving accuracy and quality of care in hospitals. Now hospital emergency-room doctors can examine a seriously injured patient, order x-rays, have the patient transferred to surgery and receive the x-rays electronically in the operating room. In addition, physicians can remotely check a patient's status, test results, medication schedules, or other information based on up-to-date entries made by nurses on their rounds. Quality of care improves dramatically as patient information is more accessible wirelessly and as more accurate information is recorded by immediate record keeping.

Manufacturing

A major facility control centre had problems operating process-control equipment on a legacy network that was independent of the LAN. To network-enable all of the process control equipment at the support centre would have required more than 1,500 feet of wiring and conduit spanning multiple buildings, a costly and time-intensive project. Instead, wireless device servers have been integrated to make all of the equipment in the support centre Ethernet-enabled. This solution also delivers significant time-savings, as over 500 PCs in the support centre have access to real-time information as it is generated by the process control equipment. This eliminates the need for a technician to patrol the floor and monitor each device individually, and speeds the response time when a failure occurs.

These examples prove that businesses of all types are finding that wireless networks meet the high availability and capacity requirements needed for their specific applications. Once a decision is made to deploy a wireless system, the overriding question then becomes one of standards.

RESOLUTION ENHANCEMENT OF IMAGES TAKEN BY A MOBILE PHONE CAMERA

DR GHOLAMREZA ANBARJAFARI FROM GAZIKENT UNIVERSITY, **DR HASAN DEMIREL** FROM THE EASTERN MEDITERRANEAN UNIVERSITY AND **DR ERBUG CELEBI** FROM CYPRUS INTERNATIONAL UNIVERSITY IN TURKEY PROPOSE A SUPER RESOLUTION TECHNIQUE BASED ON INTERPOLATION OF THE HIGH FREQUENCY SUBBAND IMAGES OBTAINED BY DISCRETE WAVELET TRANSFORM (DWT)

Interpolation in image processing is a method to increase the number of pixels in a digital image. Interpolation has been widely used in many image processing applications such as super resolution.

The interpolation-based super resolution has been used for a long time and many interpolation techniques have been developed to increase the quality of this process. There are three well-known interpolation techniques: nearest neighbour interpolation, bilinear interpolation and bicubic interpolation. Bicubic interpolation is more sophisticated than the other two techniques but produces smoother edges than bilinear interpolation.

> Carey et al have estimated the unknown details of wavelet coefficients in an effort to improve the sharpness of the reconstructed images

Image Resolution Enhancement

Image resolution enhancement in the wavelet domain is a relatively new research addition and recently many new algorithms have been proposed. Carey et al have estimated the unknown details of wavelet coefficients in an effort to improve the sharpness of the reconstructed images. Their estimation was carried out by investigating the evolution of wavelet transform extrema among the same type of subbands.

Edges identified by an edge detection algorithm in lower frequency subbands were used to prepare a model for estimating edges in higher frequency subbands; and only the coefficients with

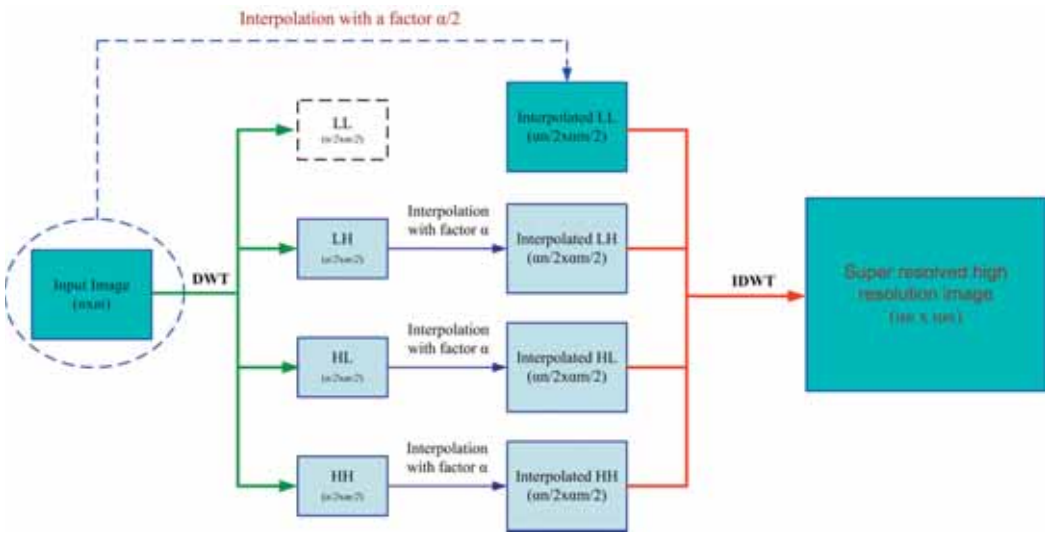


Figure 1: The block diagram of the super resolution algorithm

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significant values were estimated as the evolution of the wavelet coefficients. As these significant coefficients correspond to salient image discontinuities and consequently only the portrayal of those can be targeted with this approach.

In this article, we are proposing a technique which generates sharper super-resolved images. The proposed technique, which is based on Demirel-Anbarjafari Super Resolution (DA SR) technique, uses the discrete wavelet transform (DWT) to decompose a low resolution image into different subband images. Then, the high frequency subband images are interpolated using bicubic interpolation. In parallel, the input image is also interpolated separately. Finally, interpolated high-frequency subband images and the interpolated input image are combined by using IDWT to achieve a high resolution output image.

The technique has been implemented in Java language in order to be installed on the mobile phones. The experimental results show the superiority of the DA SR technique over the available techniques.

The Proposed Image Resolution Enhancement Technique

The main loss of an image after being super resolved by applying interpolation is on its high frequency components (i.e. edges), which is due to the smoothing caused by interpolation.

Hence, in order to increase the quality of the super resolved image, preserving the edges is essential. In this work, discrete wavelet transform (DWT) has been employed in order to preserve the high frequency components of the image. DWT decomposes an image into different subband images, namely Low-Low (LL), Low-High (LH), High-Low (HL), and High-High (HH).

In the DA SR technique, DWT is used to decompose an input image into subband images. LH, HL and HH subband images contain the high frequency components of the input image. In DA SR technique the interpolation is applied to high frequency subband images. Instead of using LL, which contains less information than original input image, the input image is used for interpolation. Hence, using input image instead of LL subband image increases the quality of the super resolved image. Note that input image is interpolated with the half of the interpolation factor, α, used to interpolate the high frequency subbands, as illustrated in Figure 1.

By interpolating the input image by $\alpha/2$, and HH, HL and LH by α, and then by applying inverse DWT (IDWT), the output image will contain sharper edges than the interpolated image obtained by interpolation of the input image directly.

This is due to the fact that, the interpolation of isolated high-frequency components in HH, HL and LH will preserve more high frequency components after the interpolation of the respective subbands separately than interpolating Ξ directly.

User-Affected

Figure 2 shows the actual graphical user interface (GUI) window which is generated by JFrame in Java and is the main interface window on the mobile phone application; there is a location in which the user enters the enlargement factor. Also the user has the opportunity of super resolving the image by using either of DA SR technique, which is discussed in the work or bicubic interpolation.

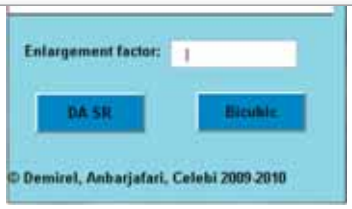


Figure 2: Part of the GUI of the programme for a mobile phone

Double clicking on the empty space opens a new window where the user can choose the low resolution image. Illustration 1 is showing the required class written in the MIDLet for the super resolution technique on the mobile phone.

Figure 3 shows the image has been uploaded into the software. As it is shown the image has some blocky effects which are not desired. In Figure 4 the uploaded image has been enlarged twice and super resolved by using the DA SR technique.

Due to the fact that the high

ILLUSTRATION 1: THE REQUIRED CODE SEGMENTS IN THE MIDLET WHICH IS USED IN ORDER TO SIMULATE THE DA SR TECHNIQUE

```
public class SuperRes {
 public void paint(Graphics g)
 // Load an image from the MIDlet resources
 if (image == null) {
 try {
            image = Image.createImage("/myimage.png");
 } catch (IOException ex) {
            g.drawString("Failed to load image!", 0, 0, Graphics.TOP | Graphics.LEFT);
 return;
 }
 }
 try{
 alpha = Integer.parseInt( textfield.getString() );
            }
 catch( Exception e ){
 Alert error = new Alert("Invalid alpha", "Please enter a valid enlarment factor", null,
AlertType.ERROR);
 }
 DWT dwt = new DWT( image, 1 ) ;
 Image LL = ImProcessing.resize( image, alpha/2 );
 Image LH = ImProcessing.resize( dwt.LH, alpha );
 Image HL = ImProcessing.resize( dwt.HL, alpha );
 Image HH = ImProcessing.resize( dwt.HH, alpha );
 IDWT idwt = new IDWT( LL, LH, HL, HH, 1 );
 g.drawImage(idtw.getImage(), 0, 0, Graphics.TOP | Graphics.LEFT);
            }
}
```

Figure 3: The software on a mobile phone with an uploaded low resolution image

Figure 4: The software on a mobile phone with the high resolution image

frequency subbands contain directional frequencies, embedding the interpolated high-frequency components (i.e. edges) into the reconstruction process by using IDWT introduces aliasing effects on the super resolved image as shown in Figure 4. However, the achieved gain on the quality of the image is much higher than the loss caused by distortion, and the super resolved image is sharper and less blurred.

New Technique

This article proposes a new super resolution technique based on the interpolation of the high-frequency subband images obtained by DWT and the input image. DA SR technique is using DWT to decompose an image into different subband images, and then the high frequency subband images are interpolated.

An original image is interpolated with half of the interpolation factor used for interpolating the high frequency subband images. Afterwards all these images are combined using IDWT to generate a super-resolved imaged.

The DA SR technique has been tested on well-known benchmark images, where their PSNR and visual results show the superiority of DA SR technique over the conventional and state-of-art image resolution enhancement techniques. ●

WHAT THE READERS SAY

REDEFINING THE SI UNITS

Redefining the SI units for electrical properties (EW, Technology, December 2011) may help a little but it does not explain the underlying mechanism, which is scaling according to Feigenbaum-Cvitanovic analysis, (similar in many respects to Renormalisation Group Theory), nor does it address the arbitrary nature of physical constants that Stoney, Planck, Eddington and most physicists are well aware of, which is why they rationalize c, h or h bar, G and k to unity thereby skating round the problem instead of facing it head-on and solving it as we have done at EW, Letters, page 43, July, 2011, Playing with Figures.

The QHE is an example of Liaponov exponents derived in 1895, the same year Kortweg and deVries formulated a sech function for soliton waves, which are exhibited in photographs in articles by Ivor Catt and Ian Darney which appeared in EW in 2011.

Libchaber and Maurer showed the importance of temperature in real dynamic processes, which Planck recognised as one of the most important Universal invariants, so we could start by rationalising the thermodynamic scale using fixed points for the freezing and boiling of water to the unit interval [0,1]. This gives absolute zero –2.731 5. Setting this to zero gives + 2.713 5 for the melting point of pure water, and 3.731 5 for the boiling point of water,cet par. This brings pressure into question; how might we rationalise P which is important in fluid dynamics too often ignored on solid-state treatments. The value 3.731 5 is very close to twice 1,865 510 774 .. (3.731 0) which might be worth investigating further.

I enjoyed reading Ian's letter, and look forward to much more on this subject because EW is leading the field as far as I can see; and why not?! The experts don't always get it right, as recent data for neutrino velocity seems to be suggesting.

Many thanks for an exciting year's debate and real progress.

Tony Callegari

DISAGREEING WITH THEORY

In EW December 2011 issue, page 37, Ian Darney writes: "In his letter in the September issue of EW Ivor Catt appears to believe that electrons are the only entities capable of moving electric charge from one location to another... I have no problem in accepting the fact that [photons] can also travel along conducting material." Here he disagrees with Establishment theory.

My article was within the Establishment (not my) theory. Under that theory (Theory N), when a battery is connected to a lamp, electrons travel along the connecting wires, with resulting field between the wires, which delivers the power ExH to the lamp. Ian Darney is arguing with theory which has remained unchanged for more than a century, not with me. Far from "believing" it, I disagree with Establishment theory, that current causes field, as you can see in my January/February articles, where I wrote: "I excluded electric charge and electric current in 1976 and published '*The Death of Electric Current*' in Wireless World in December 1980". My "belief" follows Heaviside (Theory H), that field causes current. I quoted him in Wireless World March 1979: "Now, in Maxwell's theory there is the potential energy of the displacement produced in the dielectric parts by the electric force, and there is the kinetic or magnetic energy of the magnetic force in all parts of the field, including the conducting parts. They are supposed to be set up by the current in the wire. We reverse this: the current in the wire is set up by the energy transmitted through the medium around it...." Put more plainly, field causes current, not the reverse. This along with his concept of "energy current" is Heaviside's most important contribution to science. A century later, Catt proposed "Theory C" in Wireless World, December 1982: "Nothing flows in the conductor; nothing happens therein. Heaviside was right to call it an obstructor. Half of the primitives in electromagnetic theory disappear, and it ceases to be a dualistic theory. ρ and J disappear, becoming merely the physically non-existent results of the mathematical manipulation of E and H, with no more significance than "circularity" [see Letters in Wireless World, June 1979, p82)."

> *Put more plainly, field causes current, not the reverse. This along with his concept of "energy current" is Heaviside's most important contribution to science*

On the same page as Ian Darney, Tony Callegari mixes up "yoctoseconds" with "The Catt Question". They are separated by a time factor of 1,000 to the power five. Although I propounded "The Catt Question" thirty years ago, I first heard of yoctoseconds from Tony.

Ivor Catt

WIN a FREE COPY OF Baxandall and Self on Audio Power book with Linear Audio and Electronics World!

Electronics World and Linear Audio have partnered to offer readers a chance to win a free copy of Baxandall and Self on Audio Power book.

Linear Audio, the tech audio publisher from The Netherland, has released a new publication: Baxandall and Self on Audio Power, a 120 pages strong reprint of classical Wireless World articles on audio power amplification by Self and Baxandall from 1978 to 1994. The collection includes a 35 page long previously unpublished personal communication on the subject from Peter Baxandall. This reprint has been made possible by kind permission of Electronics World's Editor in Chief and other © holders.

All you have to do to win is answer the question below.

In his 1994/95 WW series on power amplifier design, Douglas Self came up with a design where all known distortions had been minimized. What was the name he coined for that amplifier?

- Answer A – The Shameless Amplifier
- Answer B – The Distortion-less Amplifier
- Answer C – The Blameless Amplifier

Email your answer A, B or C to linearaudio@electronicsworld.co.uk, providing your: Name • Address • Company name • Job title • Your email address

We will announce the winner in a future issue and you will be contacted via email and the book will be dispatched to you by post free of charge.

ABOUT THE BOOK

Baxandall and Self on Audio Power has three sections:

Section One is Peter Baxandall's six Wireless World articles from 1978/1979. These focus on feedback and stability in power amplifiers, and are an excellent and compact overview of all the issues and solutions in making a very linear and stable power amp.

Section Two is Douglas Self's series of eight articles from Wireless World 1993/1994. These articles focus on the various types of distortion in power amplifiers, and how to minimize each of them.

Section Three contains 35 pages of typewritten comments from Peter to Douglas' articles, and contains many hand-drawn graphs and schematics. This is material that has never been published before and offers a fascinating insight in Baxandall's way of thinking and his knowledge.

Baxandall and Self on Audio Power can be ordered from **www.linearaudio.net** as of now. Back issues Linear Audio Vol 0 and Vol 1, as well as the latest Vol 2, are also available.

MODES OF CONDUCT

In his letter in the September issue of EW, Ivor Catt flatly rejects the concept that current can flow in two directions along the same conductor. He writes *'I say that the idea that electrons can hop along down a conductor in both directions, waving to each other as they pass, is truly amazing.'* He appears to believe that electrons are the only entities capable of moving electric charge from one location to another.

As far as I am aware, Ivor has never mentioned the existence of photons in any of his articles. The Wikipedia definition of this entity is *'In physics, a photon is an elementary particle, the quantum of electromagnetic interaction and the base unit of light and all other forms of electromagnetic radiation'*.

Since photons can travel through solid material (glass), I have no problem in accepting the fact that they can also travel along conducting material. Light can be reflected back towards its source. So can current. The relationship between photons and electrons in a conductor can be likened to that between the wind and waves on the sea.

It is also possible for one group of photons to propagate along the facing surfaces of a conductor pair carrying differential-mode current, whilst another group propagates along the outer surfaces carrying antenna-mode current. There is a clear correlation between these two modes and those dubbed 'Odd' and 'Even' by Ivor.

> *Since photons can travel through solid material (glass), I have no problem in accepting the fact that they can also travel along conducting material*

Figure 1: Frequency response of the setup

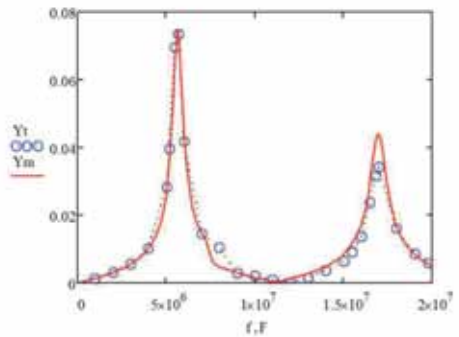
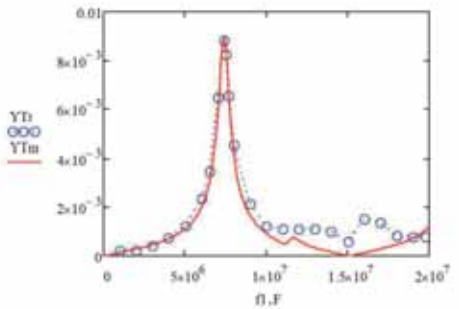


Figure 2: The response of the transfer admittance (amps per volt) over the same frequency range



Conventional transmission line theory is an analysis of the behaviour of differential-mode currents and voltages. It is possible to visualise the propagation of energy either as a movement of charge along a conductor or as an electromagnetic wave in the immediate environment. Since this analysis assumes that the current in the 'return' conductor is equal in magnitude but opposite in direction to that in the 'send' conductor, it effectively ignores the existence of the antenna-mode current.

An experiment (Circuit Modelling of Interference Coupling, pages 221-230. www.designemc.info) was carried out to investigate the behaviour of a conductor pair as a transmission line and to compare it with the behaviour of the cable as an 'accidental antenna'. The cable under test was a 15m length of two-core mains cable. A voltage transformer was used to inject a sinusoidal signal at the mid-point of one conductor. All cable terminations were open-circuit. A current transformer clamped round the other conductor was used to measure the differential-mode current. Figure 1 shows the frequency response of the setup.

The circles represent the measured values of the admittance; the ratio of the amplitude of differential-mode current to the source voltage (amps/volt). The frequency scale (Hz) is linear. The solid line is the response of a circuit model of the assembly-under-test; a model derived from the concepts of electromagnetic theory. The peak at 5.66MHz defines the frequency of quarter-wave resonance of a 7.5m line, corresponding to a propagation velocity of 170Mm/sec.

When the current transformer was removed, then clamped round both conductors, the measured current was that which propagated away from the cable into the environment; the antenna-mode current. Figure 2 shows the response of the transfer admittance (amps per volt) over the same frequency range as previously.

Again, the measured values are shown as circles whilst the solid line shows the response of the circuit model. This shows that the frequency of resonance of a 15m cable, acting as a half-wave dipole, is 7.55MHz. This corresponds to a propagation velocity of 227Mm/sec.

The fact that the propagation velocity for antenna-mode current is higher than that for differential-mode current provides evidence to support Ivor's conclusion that there are two modes of propagation, and that one mode is faster than the other.

The fact that the response of the circuit model matches that of the actual hardware demonstrates that existing electromagnetic theory is perfectly adequate to explain the phenomena. There is no need to bang the drum and insist that we need to devise a new theory of electromagnetics.

A more fruitful approach would be to review the way Circuit Theory is applied.

Ian Darney

AN ELECTRICAL COMPATIBILITY PROBLEM

I have an eccentric friend who objected to getting tingles (and small sparks) from the Antenna Socket, AV/VGA connections to his brand new wide screen TV. He found it impossible to integrate it with his "Hi-Fi" due to earth loop noise. After trying to get circuit diagrams and source replacement components, which he was convinced were faulty, he regarded the appliance as unsafe and not wanting anyone else to use it via the second-user market dumped it!

Connecting audio equipment to PCs and Laptops (especially when car or truck battery of "off-grid" inverter powered) can result in very bad AC derived noise. I have also known of several items of audio equipment have their input circuits damaged when connecting to modern Switch-Mode Power Supply (SMPS). This includes any subsystem requiring more than a small mains unit and needing an SMPS such as Laptops, Cameras, External CD Players, Access Point & Routers, External Hard Drives and increasingly SMPS are used for Mobile and Smart Phones.

The reason for this unfortunate state of affairs seems to have been overlooked by the IEE and other UK local electrical equipment standards authorities.

I have come to realize that American and Canadian 3-pin power sockets are different from the UK in that for historical reasons they have a large Earth or Chassis safety connection (large pin) but both "line connections" are live but 180 degrees out of phase, i.e. L1 L2 + E. This made it easy for 115 Volt systems to work alongside newer 230 Volt arrangements in terms of existing legacy wiring, switching and insulation.

To help British readers understand this difference: It permits a 230 Volts 3-Pin AC outlet to have a 150 volt (older style) appliance wired between EARTH and either (hot) pin. It also makes electrical stuff much safer (we use a similar "centre-tapped" system for 110 Volt AC {55-0-55 V} used on safety regulation compliant construction site and temporary outdoor installations).

Now since Far East principally aim to manufacture for the North American English speaking market, much equipment sold in the UK is wired as for the USA type of power socket configuration.

If you look at circuit diagrams (when available) of modern Switching Mode Power Supplies (SMPS) you will often/generally find two small high voltage HF noise and transient spike suppression capacitors (of high intrinsic safety with > 3kV rating), connected across the line inputs with the common connection taken to the "floating" appliance or equipment's chassis – this is the case even on two-wire power leads. Now when connected to a USA 3-pin socket these properly provide a virtual earth for HF and RF noise and fast transient "spikes". However, when used with UK power sockets, where the neutral line (the second line connection) is at nominal earth potential, these low value (< nF) capacitors form a very undesirable AC voltage connection (which a 50Hz is typically 125K Ohms) from line to the otherwise "floating" equipment chassis (Laptop Touchpad, USB, D Connectors etc). This is easy to check with a regular (10Mega Ohm) high impedance Voltmeter or Scope and you will find approx half the AC line/mains RMS voltage on a "two wire" SMP TV or Laptop or Camera chassis.

The situation is that the (laptop, camera, DVD player) chassis (signal common in normal unbalanced connections) is fed 165 Volts peak via a 125K-ohm "AC resistance" which if the earth return is say 40 milliohms (approx 2 metre of 2 sq mm cable) the "potential divider" formed of 125,000 ohms and 1/50th of an ohm puts a significant 26 microvolts of 50Hz AC on a connected unbalanced feed, which is well within the -60dB audible threshold for sensitive (Microphone and Amplifier) type low-level input signal levels.

Most desktop PC chassis have IEC connectors so they are grounded, but are not compatible with "clean" low level signals and if the "grounding connection" of the 3-pin connector is momentarily broken (as when hot plugging) the high voltage is momentarily applied to the "signal common" line.

The 162V peak, even at 125,000 ohms impedance, is quite enough to damage FET and IC input circuits. Such equipment will often pass the UK mandatory "Personal Appliance Testing" (PAT) safety testing regimes, although (presumably for this reason) "computer equipment" has been later exempted from the High Voltage Insulation Test.

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Henry O'Tani

IF YOU WOULD LIKE TO COMMENT
on this subject on any other that you have read on in Electronics World magazine, please write to the Editor at Svetlana.josifovska@stjohnpatrick.com

The publisher reserves the right to edit and shorten letters due to space constraints

PLEASE EMAIL YOUR LETTERS TO: SVETLANA.JOSIFOVSKA@STJOHNPATRICK.COM

embedded world 2012

28 February – 1 March, Exhibition Centre, Nürnberg, Germany

The embedded world Exhibition & Conference promises to bring the embedded community together in Nürnberg for the tenth year. This is one of the world's largest exhibitions for embedded technologies, and it continues to grow.

"The embedded world Exhibition & Conference is bigger and more international than ever," said Alexander Mattausch, Exhibition Manager at NürnbergMesse. "[There are] 23% more exhibitors already registered now than at the comparable time last year. The number of international companies exhibiting has also risen appreciably. Every third exhibitor registered is from abroad, which is 43% more."

Since starting in 2003, the numbers of exhibiting companies and the display space have more than doubled. Over 800 exhibitors (up 130% on 2003) presented their products and services in an area of some 34,000m^2 in 2011 (up 127% on 2003) and attracted more than 19,000 visitors (up 116%) to Nürnberg.

As a direct result of such growth, the exhibition is moving to the larger halls 1, 2, 4, 4A and 5 and the embedded world conference and electronic displays move into rooms in the NCC Ost (the Nürnberg Convention Center Ost).

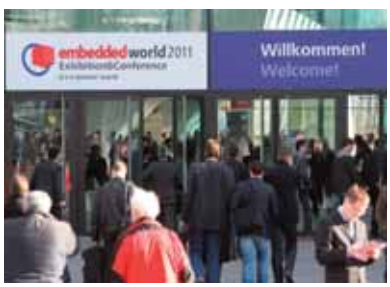
"The new location ensures a compact layout on one level and excellent access between the conferences and exhibition activity. We are very pleased about this anniversary present for embedded world," added Mattausch.

Embedded World Conference 2012

The 10th edition of the embedded world conference is the meeting place for all embedded system developers. It is also the mirror and flagship of a community that has become one of the key innovation drivers in the industry.

The programme committee of international experts has assessed the many papers submitted and assembled a top-caliber conference programme, which is intended primarily for embedded hardware and software developers.

A special highlight is the presentation of the projects of the European Joint Undertaking ARTEMIS, which provides an in-depth insight and outlook of the expected capabilities and use of embedded systems in the future.



Topics:

The embedded world Conference 2012 focuses on topics such as:

- **ARM Cortex Architectures**
- **Multicore**
- **Cryptography and Embedded Security**
- **Managing Embedded System Development and Life Cycle**
- **Software Development Methods and Debug Methods**
- **Internet Technology and M2M**
- **Low Energy Embedded Systems**

More information about the programme for the embedded world Conference 2012 and registration is available at: www.embedded-world.eu

Electronic Displays Conference 2012

The electronic displays Conference 2012 is considered as one of the top European B-to-B conferences in the displays sector.

Part of it are the presentations of over 40 papers in eleven sessions on topics such as human machine interfaces (HMI), graphical user interfaces (GUI) and display systems. Special focus is on touch-screens, 3D displays, automotive displays and the subject of future flexible displays based on printed electronics.

After each session there will be author interviews, providing an opportunity for attendees to ask specific questions.

There's a dedicated "Display Area" in hall 1 which will give conference participants the opportunity to experience new displays live.

The "ROBERT BOSCH Student Paper Award" will again be presented to students' papers on displays at the electronic displays Conference in 2012. Interested students can submit relevant papers via the conference website (www.electronic-displays.de) until 20 January 2012.

Additional Information

The organizers have confirmed that there will be free admission to the keynote speech for all the embedded event visitors.

This year the keynote address will be given by Mike Muller, Chief Technology Officer at ARM. Muller is one of the leading minds in the embedded community and his talk of current trends will present his visions of the sector.

The keynote will be given from 1pm to 2pm on 28th of February 2012.

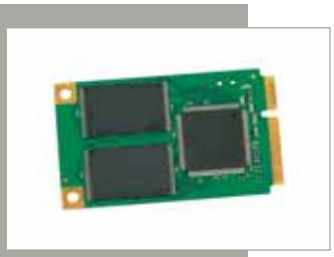
Toshiba Electronics Will Showcase Solutions for Industrial and Home Appliance Embedded Designs

Visitors to the Toshiba Electronics Europe booth at this year's Embedded World Exhibition and Conference will have the opportunity to see the latest hardware and software development tools for speeding the design, prototyping and testing of embedded systems for industrial, home appliance and retail applications.

Among the technologies to be unveiled at the event will be the BMSKTOPASM369 – a new starter kit for the first family of ARM-Cortex microcontrollers to combine Ethernet, CAN and USB host and device connectivity in a single IC. Software tools that speed and optimise embedded designs for motor control applications will also be announced and supported by live demonstrations.

Hall 4A, Booth 314
www.toshiba-components.com

Storage Solutions for All Industrial Applications



Swissbit presents its new industrial products, the C 400 series CompactFlash card and F-200 series CFast card (or SATA CompactFlash). They offer maximum available reliability for non-volatile memories thanks to read disturb management and impressive random accesses of up to 600 4k random write IOPS (input/output operations per second) coupled with optimised TCO (total cost of ownership). The S.M.A.R.T. values permit complete transparency and, in conjunction with other monitoring methods (e.g. life time monitoring), help to keep field problems to an absolute minimum. The C-400 CompactFlash and the F-200 CFast cards are available in densities up to 64GB with SLC technology.

Hall 1, Booth 516
www.swissbit.com

Broad Line Card from Mouser Electronics on Show

Mouser Electronics will showcase its broad line card, including the newest products and most advanced technologies at this month's Embedded World in Nuremberg, Germany, featuring a multi-media exhibit in Hall 1-434.Mouser's stand will highlight kiosks from supplier partners Laird Technologies, Olimex, ON Semiconductor and Freescale Semiconductor.

As an authorized distributor for more than 450 suppliers, Mouser is attracting an increasing number of European design engineers to its award-winning website. In addition to the newest technologies, Mouser offers a digital library of over 2,000 Product Knowledge Center (PKC) sites, plus data sheets, block diagrams and other training tools for design engineers.

Hall 1, Booth 434
www.mouser.com

Line-up of Products and Software from Pico Technology

Pico Technology, a developer and manufacturer of high-performance PC oscilloscopes and data loggers, has announced it will be showcasing its product range at Embedded World 2012. Pico Technology prides itself on offering innovative, high-quality and affordable alternatives to traditional bench-top test and measurement equipment, and has launched a number of exciting new products over the last few months, including its first 16-bit oscilloscope, and first mixed signal oscilloscope (MSO).

See them on stand 4 – 509 for a demonstration on the latest products and versions of the PicoScope software.

Hall 4, Booth 509
www.picotech.com

congatec Qseven Mini Carrier Baseboard Accelerates Design for Mobile Applications

The conga-QMCB is a mini carrier baseboard for space-critical applications based on the Qseven standard. Measuring just 145 x 95mm, this congatec board is easy to integrate and ideal for fast prototype design and compact, mobile applications.

The conga-QMCB is designed to accelerate evaluation at design-in, thereby speeding time-to-market. DisplayPort, HDMI and LVDS 18/24-bit graphics interfaces have been implemented, together with six USB interfaces and an Ethernet connection. Additional standard interfaces include high definition audio and a mini PCI Express socket, which can be used for WLAN. SD-Card, 2x SATA and CFast have also been integrated on the baseboard to enable the connection of mass storage devices.

The conga-QMCB is powered by a single 5V DC supply, and fully incorporates battery management signalling.

Hall 1, Booth 350
www.congatec.com

Green Hills Software Announces INTEGRITY 11

Green Hills Software has announced a major new release of its flagship INTEGRITY real-time operating system. INTEGRITY 11 includes performance, communication and ease-of-use features that address the demanding requirements of next-generation sophisticated embedded systems.

INTEGRITY 11 provides a new, highly optimized communications mechanism called GIPC (Green Hills IPC). GIPC is five times faster than Linux AF_LOCAL sockets. Native INTEGRITY, as well as Linux processes, executing in virtual machines, can take advantage of the super fast GIPC. Together with its support for POSIX APIs and higher-level middleware such as DDS and CORBA, INTEGRITY provides a wide variety of high performance communications mechanisms for developers.

Hall 4, Booth 325
www.ghs.com

Analog Devices Delivers a Range of Innovative Solutions at Embedded World 2012

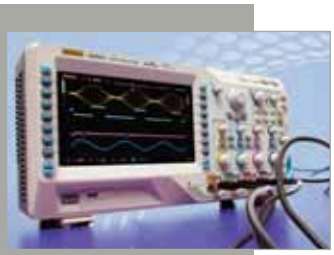
Analog Devices Inc (ADI) will show a range of innovative signal processing solutions for embedded applications designed for industrial, automotive, healthcare and other markets at Embedded World 2012.

The demonstrations at the ADI booth will include interfacing FPGAs to analog devices; interface and isolation; microcontroller/RF; process control; design resources and support, and others. In addition, the European Customer Interaction Centre staff members will be available on site at the ADI booth to provide live technical support.

To engage with ADI's experts online, join ADI's EngineerZone community, where you can get answers to your toughest design questions.

Hall 4, Booth 234
www.analog.com

DS4000 Series Digital Oscilloscopes from Rigol Feature Up To 500MHz Bandwidth



Rigol Technologies EU GmbH introduces the DS4000 series digital oscilloscope, featuring bandwidths (BW) of up to 500MHz. Designed to reduce test time in research, development and failure analysis applications, Rigol's DS4000 series digital oscilloscopes make detecting signal and device characteristics easier than ever with advanced waveform search, visualization and replay.

Rigol's DS4000 series features specifications of up to 500MHz BW with 4GSa/s sample rate, a standard 140,000 points of deep memory, up to 200,000 frames for waveform record and replay, and up to 110,000 waveforms/second/acquisition rate. In addition, with Rigol's innovative UltraVision technology, DS4000 digital oscilloscopes offer intensity grading display and real-time waveform record and display.

Hall 4, Booth 516
http://eu.rigol.com

Avnet Memec to Show Solutions for Industry, Smarter Energy and End-user Technology

Avnet Memec is committing its booth at Embedded World 2012 to demonstrating new solutions for smart innovation from the world's best semiconductor companies. "Electronic technologies hold the key to progress by innovating and by managing precious resources efficiently; it is vital for today's engineers to find out how to harness the latest advances," said Rainer Maier, Technical Sales Manager at Avnet Memec.

The booth, no. 122 in hall A4, will contain three key presentation areas, including multi-supplier technology-focused demonstrations, a focus area dedicated to suppliers PLX Technology, Marvell, Intersil and Echelon, plus the dedicated "Maxim Tech Lounge". Visitors will also have the chance to meet product experts from those manufacturers on the Avnet Memec booth.

Hall A4, Booth 122
www.avnet-memec.eu

High-Performance USB, Ultra-Low-Power and Wireless MCUs from Silicon Labs

Silicon Laboratories Inc will showcase its next-generation mixed-signal microcontrollers (MCUs) and development tools at Embedded World 2012 in Nuremburg, Germany, at booth 4A-211.

Silicon Labs will demonstrate high-performance USB MCUs for a variety of embedded applications; ultra-low-power MCUs and wireless MCUs targeting green energy, home automation and security systems; automotive MCUs for body electronics; and the company's latest development platforms and integrated development environments designed to simplify and accelerate the design process.

Silicon Labs's demonstrations will include not only a host of new mixed-signal solutions but also easy-to-use development tools that will significantly enhance embedded design productivity.

Hall 4A, Booth 211
wwww.silabs.com

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Low Power Pulsing Techniques Allow Faster NANO MEASUREMENTS

OVER THE NEXT SEVERAL ISSUES OF ELECTRONICS WORLD, **JONATHAN TUCKER**, CHAIRMAN OF THE IEEE NANOTECHNOLOGY COUNCIL STANDARDS COMMITTEE, WILL PRESENT THIS TUTORIAL ON NANOTECHNOLOGY-RELATED TEST AND MEASUREMENT TECHNIQUES

Although choosing the correct measurement topology and minimizing electrical noise are essential to improving measurement speed, these steps may be insufficient to the test needs of some nanoscopic materials. For example, some CNTs (carbon nanotubes) can switch 1000 times faster than conventional CMOS transistor switches, which is simply too fast for the nano-amp ranges of commercial picoammeters to handle. Demanding devices like these may require other techniques to improve the speed of impedance measurements.

Low power pulsing techniques may offer a partial solution to this problem, and are available in some SMU designs. The idea is to use a much higher test current or test voltage and apply this large stimulus for a short sourcing cycle. The larger stimulus will lower the sourcing noise (by improving the signal-to-noise ratio) and improve the rise or settle time for a voltage pulse or current pulse, respectively. Quieter sources require less filtering and permit a shorter sourcing cycle time (narrower pulse width). A larger source stimulus also increases the response current or voltage so that higher instrument ranges can be used, further minimizing the effects of noise. Because there is less noise, the measurement acquisition time (integration period) can be shortened, allowing for faster measurements.

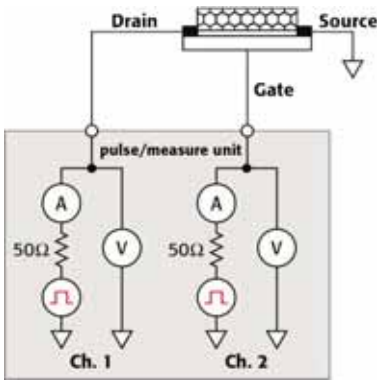


Figure 1: Circuit diagram for measuring the pulsed I-V characteristics of a CNT FET

Pulsed I-V testing can be performed on a variety of devices made from CNTs, semiconductor nanowires, graphene-based devices, molecular-based electronics and MEMs structures such as switches. Characterizing the electrical properties of these delicate nanoelectronic components and materials requires instruments and measurement techniques optimized for low power. Low temperature materials, nanodevices and sub-micron silicon structures can easily be altered or destroyed by the heat generated when making traditional DC measurements. Pulsed electrical testing reduces the total energy dissipated in a device and, thus, the potential for damage. Pulsed I-V measurements can also prevent current drifting in measurements that can occur during traditional DC measurements. For testing CNT FET-based sensors, gate pulsing allows faster refreshing of the sensor.

To make the pulsed I-V measurements, the nanodevice under test is excited for a very short time-interval with a voltage pulse high enough to produce a quality measurement. This pulse-width can range from tens of nanoseconds to milliseconds in length, depending on the impedance and capacitance of the device or the application. The waveform capture mode can be used to verify an appropriate pulse width prior to the actual pulsed I-V sweep.

As an example, an ultra-fast pulsed I-V measurement configuration for a carbon nanotube-based FET is shown in Figure 1. In this diagram, Channel 1

Characterizing the electrical properties of delicate nanoelectronic components requires instruments and measurement techniques optimized for low power

is connected to the drain of the CNT FET and Channel 2 is connected to the gate. The source terminal of the CNT is connected to the pulse/measure unit's common terminal, which is the outside shell of the coax cable. If measurements must be made between any three of the terminals, then a second high-speed pulse/measure unit must be added to the system. Figure 2 shows one of the commercial systems now available, optimized for high-speed pulsed measurements.

Self-heating due to excessive electrical current through the DUT is an important potential source of error in nano research applications. A test current that's too high may even lead to the catastrophic failure of irreplaceable experimental devices or materials. Therefore, instrumentation must automatically limit source current during device testing. Programmable current and voltage compliance circuits are standard features of most SMU-based test systems with pulsed current capabilities and may be required to avoid self-heating of some low resistance structures.

When an elevated test current is required, it must be short enough so that it does not introduce enough energy to heat the DUT to destructive temperatures. Nanoscopic devices tolerate very little heat, so the total energy dissipated in them must be maintained at low levels. In addition, care must be taken that the magnitude of the test current is low enough that the DUT's nanoscopic channel does not become saturated. For instance, a current channel that's 1.5 nanometers in diameter severely limits the number of electrons that can pass through it per unit of time. Some nanoscopic devices can support only a few hundred nanoamps of current in their conductive state. Thus, a device's saturation current may define the maximum test current, even in pulsed applications.

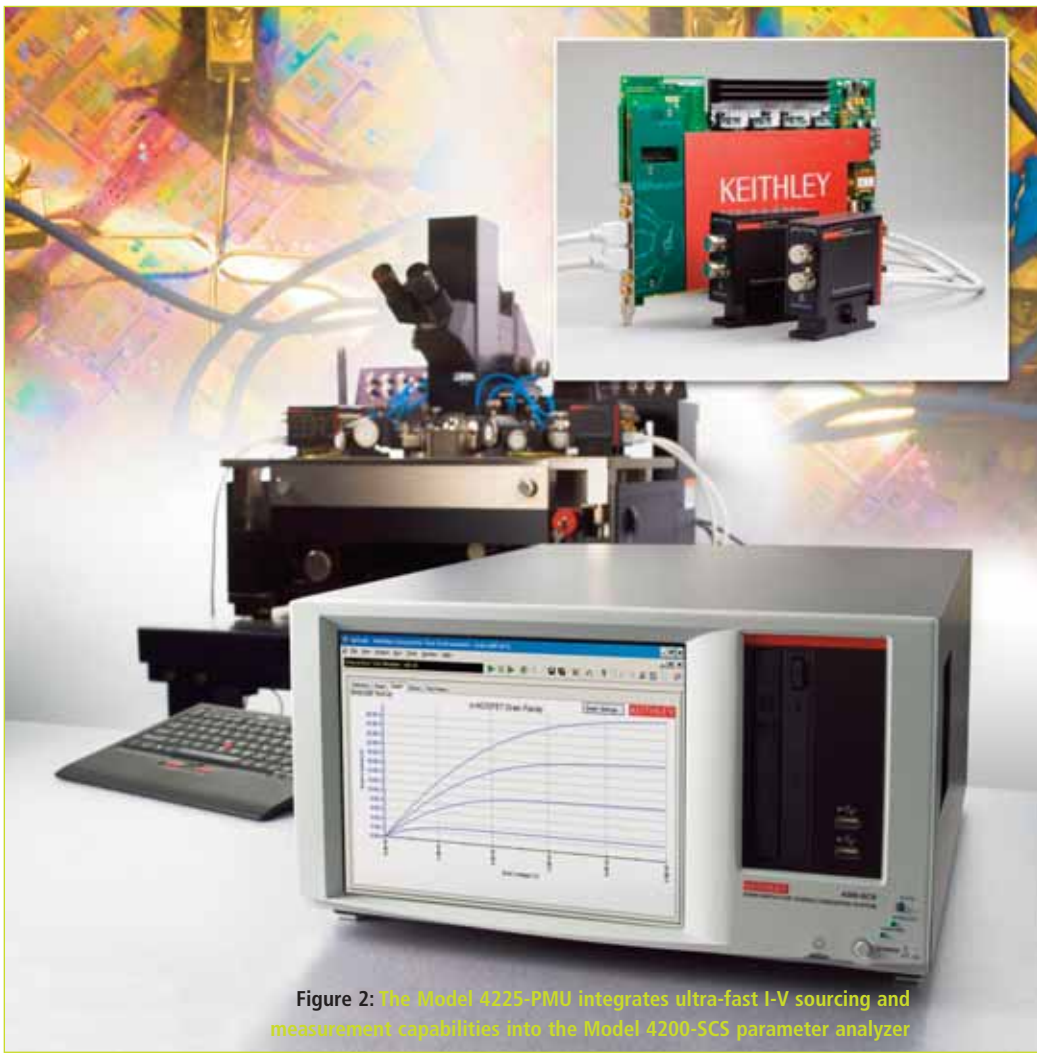


Figure 2: The Model 4225-PMU integrates ultra-fast I-V sourcing and measurement capabilities into the Model 4200-SCS parameter analyzer

Equation 1 illustrates how duty cycle and measurement time in pulse mode affect DUT power dissipation. To calculate power dissipation in pulse mode, multiply the apparent power dissipation (V·I) by the test stimulus time and divide by the test repetition rate:

$$P_p = P_a \times T_t / T_r \qquad (1)$$

where: P_p = **Pulse power dissipation**
P_a = **Apparent power (i.e. V·I)**
T_t = **Test time**
T_r = **Test repetition rate**

Pulse mode techniques are also useful for density of state measurements using a low impedance connection, such as through a nano-manipulator. Pulsing allows measurements at I/V locations that were previously uncharacterizable due to particle self-heating.

FURTHER READING

WATCH A FREE 30-MINUTE PRESENTATION ON HOW TO PREVENT DEVICE DAMAGE AS A RESULT OF SELF-HEATING:

How to Avoid Self-Heating Effects on Nanoscale Devices. An e-book on additional pulsed I-V test applications is also available online.

Rugged IP67-Rated Screw Coupling Circular Connectors

A series of rugged, high-reliability screw coupling circular connectors is announced by Weald Electronics, a UK manufacturer of connectors for military and industrial applications. Designed to meet the requirements of BS 9522 F0014, the IP67-rated LMG range is ideally suited for use in any harsh environment where a high resistance to vibration, the ingress of liquids and a very rugged construction are high priorities.

The LMG range comes with either an aluminium alloy shell with a fine thread coupling or a brass shell with a coarse thread. Designed for AC or DC and low frequency applications, these multi-contact circular connectors come with polychloroprene inserts and solder contacts. Weald Electronics can supply LMG connectors with 2 to 26 contacts in 19 contact arrangements.

Current capability is up to 60A depending on size, and the connectors are available in various finishes including RoHS-compliant and can be supplied with 360° EMC screen termination.

www.wealdelectronics.com

Second Generation Intel Core i7 Processor-Based 6U CompactPCI Blade

Adlink Technology introduces the PICMG 2.0 compliant cPCI-6210 Series, a 6U CompactPCI processor blade based on the latest quad and dual-core second generation Intel Core i7 and Intel Core i5 processors and up to 16GB DDR3-1600 memory support. The cPCI-6210 is a performance computing solution with enhanced management features such as PICMG 2.9 compliant IPMI, remote management based on Intel vPro technology and optional Trusted Platform Module (TPM) for security management, and is suitable for applications in the military, communications and industrial control segments.

ADLINK's cPCI-6210 Series offers outstanding processing and graphics performance for applications requiring reliable, scalable CompactPCI products with the latest quad-core CPU, 2D/3D graphics engine with multiple displays. Dual independent display functionality is provided via dual-mode DisplayPort and DVI-I graphics interfaces. The DisplayPort interface supports single-link DVI or HDMI with a passive adapter cable and analog VGA output via an active adapter cable.

www.adlinktech.com

ACAL BFI LAUNCHES NEW 200W AC TO DC MODULES

Acal BFi, a division of Acal, announces the launch of a new range of embedded power supplies from specialist manufacturer SL Power, which feature 90% efficiency and one of the smallest heat footprints in AC to DC conversion.

The CINT1200 family comprises eight models with output voltages from 12V to 48V, and up to 200 watts of output power, from a wide input range of 90V to 264Vac. The space-saving CINT1200 AC to DC modules measure 3" (7.6cm) x 5" (12.7cm), with a height of just 1.3" (3.3cm), allowing them to easily fit into a 1U chassis.

Designed to meet the stringent EMC requirements for industrial and information technology equipment (ITE) applications, the CINT1200 modules are HALT tested for durability and offer a three year warranty. The modules are CE marked in accordance with the low-voltage directive and are approved to ITE standards making them suitable for worldwide applications.

www.acaltechnology.com

World's First SyncE Timing Devices to Support OTN Clock Rates

Microsemi Corporation announced the availability of the world's first single-chip, standards-compliant Synchronous Ethernet (SyncE) solutions allowing the transmission of SyncE over Optical Transport Network (OTN) channels without the need for additional rate conversion phased locked loops (PLLs).

The new ZL30153 and ZL30154 timing devices support Ethernet clock rates and all OTN clock rates. Using Microsemi's single-chip solutions for both SyncE and OTN applications allows telecom equipment manufacturers to support multiple services over a single network and lower timing solutions costs.

The new ZL30153 and ZL30154 SyncE timing devices support flexible input and output rates and are fully compliant to SyncE standards. Microsemi's previous generation SyncE solutions, as well as currently available competitive solutions, only support Telecom and Ethernet clock rates. The programmable digital PLLs in both devices synchronize to any clock rate from 1Hz to 750MHz. This allows the one pulse per second (PPS) global positioning system (GPS) signal to be used directly as an input reference. In addition, the programmable synthesizers generate any clock rate from 1Hz to 750MHz.

www.microsemi.com

VERSATILE TIMERS FAMILY AND A POWER MOSFET FAMILY FROM X-REL SEMICONDUCTOR

Following the announcement of its XTRM products family (-60°C to +230°C) of high-temperature and extreme reliability electronics components, X-REL has now announced the availability of five new products belonging to two product families:

XTR650 Versatile Timer: being able to operate from supply voltages from 2.9V to 5.5V; XTR2N0400 High-Temperature 40V N-Channel Power MOSFET: family parts offering reduced leakage currents while providing high drain currents a low RDS(on); and XTR2N0800 High-Temperature 80V N-Channel Power MOSFET: offering reduced leakage currents while providing high drain currents and low RDS(on).

"To fulfill the demanding specifications of timing and Power MOSFET generation in high-reliability and high-temperature applications, X-REL has developed robust and easy to use timer and transistors," said Lydie Ferreira, marketing and partnerships manager at X-REL.

Targeting applications such as power conversion, control, data acquisition, timing and signal conditioning, X-REL products offer enhanced reliability and superior performance over existing solutions.

www.x-relsemi.com

THE INDUSTRY'S SMALLEST SINGLE-PACKAGE POWER SUPPLY MODULES

ROHM has recently announced the development of the BZ6A series of ultra-compact power supply modules that integrate an inductor, capacitors and all the other components needed for power supply into a single package. According to a ROHM 20/09/2011 survey, the result is the smallest size in the industry (2.3mm × 2.9mm × 1mm), making them suitable for high-density mounting applications.

The BZ6A series integrates a BU9000X series 6MHz high-speed switching power supply LSI directly into the board and includes all necessary components in a single package. High performance is ensured in the industry's smallest form-factor. The all-in-one configuration eliminates the need for external components, simplifying design time. Additional features include a wide input voltage range, from 2.3V to 5.5V, making them suitable portable devices utilizing 5V USB, as well as an output voltage range between 1.0V and 3.3V, ensuring compatibility with a variety of sets.

www.rohm.com/eu

MICROCHIP EXPANDS MCU PORTFOLIO WITH PIC24F 'GA3' FAMILY

Microchip announces the expansion of its eXtreme Low Power (XLP) microcontrollers (MCUs) with the PIC24F 'GA3' family, which features the industry's lowest active current for 16-bit Flash MCUs, as well as several flexible new low-power sleep modes.

The PIC24F 'GA3' devices feature 150 microamperes/MHz active current, as well as six DMA channels, which allow a routine to be executed with less power consumption and increased throughput. The family offers a new low-power sleep mode with RAM retention down to 330nA. Additionally, these are the first PIC MCUs with VBAT for battery backup of the on-chip real-time clock calendar. With these features, plus an integrated LCD driver and numerous other peripherals, the PIC24F 'GA3' devices enable more efficient, less expensive designs for consumer thermostats, door locks and home automation; industrial products such as security, wired and wireless sensors and controls; portable medical devices and medical diagnostic equipment; and metering products in addition to other applications.

www.microchip.com/get/0KJV

20W DC/DC Converters From Powersolve Feature Highest Power Density

Powersolve announces the THL-20WI series of DC/DC converters designed to provide 20W from a metal package measuring just 25.4 x 25.4mm with an industry standard pinout. Height off the board is just 10.2mm.

With an ultra-wide 4:1 input voltage range of either 9-36VDC or 18-75VDC, the Traco Power THL-20WI series features adjustable output voltages from 3.3 to 15V and an operating temperature range of -40°C to +75°C.

The new DC/DC converters feature short circuit protection, remote on/off, input/output-isolation specified to 1500VDC and an input filter which meets EN 55022, class A.

www.powersolve.co.uk

TIME SIGNAL RECEIVER MODULE

Micro Analog Systems Oy has just announced the availability of its EB6180B1COB module for Time Code Reception (RCC). The new, tiny, time-signal receiver module comprises of a ferrite antenna and a small PCB that includes a MAS6180B1 AM receiver IC, accompanied with the necessary filter crystal and capacitor components. The MAS6180B1 AM receiver IC converts the time code signal into series of digital pulses which can be directly processed by an appropriate digital circuitry such as microcontroller unit (MCU). From the signal information such as time, date and daylight saving can be easily retrieved.

The use of a ready-made module gives users a cost-effective solution with an optimized RF design. The included, tuned, ferrite antenna increases the value of this module even further.

Different versions are available for the 77.5kHz German DCF77 time signal and the 60kHz US WWVB, British MSF and Japanese JJY60.

www.mas-oy.com

CUSTOMER-PROGRAMMABLE LINEAR HALL-EFFECT SENSOR IC

The new A1357 from Allegro MicroSystems Europe is a high-precision, customer-programmable, linear Hall-effect sensor IC with a pulse-width-modulated current-sourced two-wire output.

Featuring a wide ambient temperature range of -40°C to +150°C, the A1357 device is targeted at the automotive and industrial sectors, particularly in applications where signals have to travel over relatively long distances in noisy environments.

The A1357 converts an analogue signal from its internal Hall sensor element to a digitally encoded PWM output signal with a frequency of 1kHz and a duty cycle that is proportional to an applied magnetic field. The coupled noise immunity of the digitally encoded PWM output is far superior to the noise immunity of an analogue output signal.

The monolithic BiCMOS circuit in the A1357 integrates a Hall element, precision temperature-compensating circuitry to reduce the intrinsic sensitivity and offset drift of the Hall element, a small-signal high-gain amplifier, proprietary dynamic offset cancellation circuits, and PWM conversion circuitry.

www.allegromicro.com

NETWORK AUDIO MODULE WITH DUAL-BAND 802.11N CONNECTIVITY

Frontier Silicon has announced the launch of Milan, the industry's most advanced module for high volume networked wireless speaker and docker applications. Milan allows OEMs and ODMs to build cost-effective home audio products that give consumers the capability to play digital music from their smartphones, tablets or personal computers wirelessly via a high fidelity audio system.

In step with trends in networking, the Milan module has included the next generation 802.11n WiFi technology operating in the 2.4 and 5GHz bands in an audio module. The 5GHz band is un-crowded and is an ideal choice for consumers looking for a robust and uninterrupted audio streaming experience.

The Milan module comes with the highly customizable Network Sound (NS) software development kit that supports a comprehensive range of features including DLNA Digital Media Renderer for audio streaming using UPnP, audio playback from auxiliary I2S input, iPhone/iPod/iPad docking via USB and audio post-processing for bass, treble and 5-band EQ control.

www.frontier-silicon.com

AVNET Abacus

ENPIRION'S EN5339 COMBINES POWER DENSITY AND LOW NOISE

Avnet Abacus announced the availability of EN5339 from Enpirion, which is claimed to be the smallest 3A point-of-load DC-DC converter around. Targeting embedded computing applications as well as solid-state drives, the 3A EN5339 system-on-a-chip integrates the controller, power MOSFETs, compensation network and inductor into one highly compact solution that significantly reduces the engineering and design effort traditionally associated with discrete DC-DC converter designs.

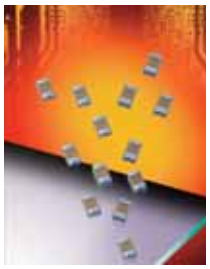
Keeping up with the demands of embedded, industrial and storage applications, the EN5339 enables a 20% footprint reduction and a 40% lower profile compared to previous Enpirion 3-Amp products. With a footprint of just 55mm² and a profile of just 1.1mm, the EN5339 is particularly suitable for high-density embedded computer-on-modules which typically require such a small area and low profile to enable under-side PCB mounting. The POL converter is suitable for equipment based on a diverse range of form factors such as Ultra COM Express, PC104, Qseven, ATCA Advanced Mezzanine Cards (AMC), Compact PCI and others.

www.avnet-abacus.eu

AVX's 0402 MLO RF Inductors Offer Tight Tolerance in a Reduced Footprint

AVX Corporation has developed a multilayer organic RF inductor in a 0402 case size that offers tight tolerance in a small footprint. Providing high-Q and high self-resonance, the RoHS-compliant MLO 0402 Series inductor features an inductance range of 1nH to 32nH.

It is based on a patented multilayer low loss organic (MLO) technology, and as such represents a major shift from traditional ceramic and thin film passive SMD components. "Since Copper Organic Inductors (COIs) are polymer-based and use high conductivity copper interconnects in a multilayer fashion, the ability to fabricate these components on large area substrates and in laser-direct imaging allow for improved cost and tolerance control," said Larry Eisenberger, product manager at AVX.



The low profile MLO 0402 Series inductor also offers high SRF (self-resonant frequency) and can support frequencies above 1GHz. These advanced devices are expansion matched to printed circuit boards, allowing for improved reliability.

www.avx.com

Digi-Key's Dustin Jarshaw receives prestigious Harwin Chairman's Award

Harwin, hi-rel connector and SMT board hardware manufacturer, has named Digi-Key's Corporation's Dustin Jarshaw as the recipient of the company's prestigious Chairman's Award. As Product Manager, Jarshaw is responsible for developing Harwin sales at Digi-Key, the leading high service distributor and during the first year, sales have grown at an unsurpassed rate all around the world.

"Distributors such as Digi-Key play an important role in supporting design engineers as they develop new products. Therefore it is vital that we have an excellent relationship with our partners as we open up new markets for our high-reliability connectors and cost-saving PCB boardware products," said Damon de Laszlo, Chairman at Harwin.

"Dustin has been highly influential in establishing our business through Digi-Key. He has been our product manager since launch and his drive and determination has seen Harwin rapidly climb Digi-Key's connector supplier rankings," he added.

www.harwin.co.uk

New flame retardant EMC shielding gasket from Kemtron

Kemtron, the British manufacturer of RFI/EMI shielding gaskets, materials and components has launched a flame retardant, low smoke, low toxicity EMC shielding gasket. It is tested and approved to the international standard UL94V-0 by Underwriters Laboratories for flame retardancy, file number E344902. It is also tested for smoke density to BS 6853:1999: Annex D.8.3and oxygen index to BS EN ISO 4589-2:1999 confirming the material meets to requirements for minor internal use on vehicles category 1a, such as gaskets for electronic enclosures, making it highly suitable for applications in underground transportation, trains and other safety critical applications.

The material is a nickel-coated graphite, loaded into silicone elastomers. The gasket, product name SNG-FR, provides a highly electrically conductive path between mating flanges of an electronics equipment enclosure giving a high level of RFI/EMI shielding. The material can be supplied as an extruded strip in various profiles, "O" rings or flat die cut gaskets.

www.kemtron.co.uk

Randomization and Functional Coverage Capabilities With OS-VVM

Aldec, in collaboration with SynthWorks Design, announced the availability of Open Source - VHDL Verification Methodology (OS-VVM).

OS-VVM delivers advanced verification test methodologies, including constrained and coverage-driven randomization, as well as functional coverage, and provides advanced features to engineers designing ASICs and FPGA-based applications using VHDL.

VHDL and Verilog have allowed design engineers to create complex digital projects, however, the challenge was how to support system-level design requirements. In recent years, new language standards such as SystemVerilog and SystemC have emerged to aid in performing advanced system verification tasks, leaving VHDL designers with the dilemma of learning a new language.

Benefits of OS-VVM include: access to advanced randomization and functional coverage capabilities (previously available only within system-level methodologies); balance in the randomization is achieved by interacting with the functional coverage model, resulting in fewer cycles; the initial randomization is refined by using procedural code which can easily mix directed, algorithmic, file-based methods and additional randomization; and others.

www.aldec.com

ALL-ELECTRIC CAR IS READY TO RACE

Lola Group and Drayson Racing Technologies (DRT) have launched their ground-breaking Lola-Drayson B12/69EV all-electric prototype racing car as part of International Motorsport Business Week on 11th of January 2012 at the MIA International Low Carbon Conference.

The objective of the project is to construct an electric ultra-high performance vehicle based upon the current Lola LMP1 chassis. This vehicle will be used for the following purposes:

- As a technology demonstration platform for the novel technologies being developed by the project consortium.
- As a time attack car to break the lap records for electric vehicles at tracks around the world and as such generate publicity and business opportunities for Lola, DRT and their partners. These tracks include street, circuit and hill climbs.
- As a demonstration of the speed potential of an electric vehicle (EV) – lapping circuits faster than a current LMP1 diesel.
- To support the event's objective of promoting environmentally-friendly technologies.

The event was headlined by Lola-Drayson B12/69EV project pioneer Lord Drayson, former UK Minister of Science and Innovation, alongside current UK Minister for Trade and Investment, Lord Green.

PROFESSOR DR DOGAN IBRAHIM, Near East University in Nicosia, Cyprus: Green racing and long-awaited all-green car is here at last! It is all good news that the prototype of an all electric racing car has been launched. It is obvious that this event will be the start of a new era in car racing.

Although a racing car, this new vehicle demonstrates the speed potential and the efficiency of electric cars. It is very interesting that the new EV is claimed to be faster than a current LMP1 diesel. I hope that this new development provides a wider interest for the car manufacturers to design and develop all-electric cars for the general public use.

BARRY MCKEOWN, RF and Microwave Engineer in the Defence Industry, and Director of Datod Ltd, UK: I am probably biased against this venture as it features Lord Drayson, who was partly responsible for the UK Space Agency venture and abandoned (with just cause) the Government/MoD to pursue this "hobby". Nevertheless, as a technology demonstrator it has merit and permits the creation of both knowledge and skills bases in the UK for this enterprise. But I have never believed that electric vehicles shall replace petrol vehicles even if the price of oil goes up to $200 a barrel – there are just far too many barriers in place. So the issue for this technology is finding its niche.

However, if this venture were to locate to the proposed £250m new racing circuit near the Brecon Beacons in Wales, backed by the Duet Group and a true industrial cluster relationship were established it could be successful.

HAFIDH MECHERGUI, Associate Professor in Electrical Engineering and Instrumentation, University of Tunisia: In the field of non-polluting energy the electrical car is the most environmentally-friendly and cleanest solution in transport. In fact, it is the future cities' best road alternative as the area of road transport is more polluting than any industry sector. The electric car is, indeed, the challenge for all participants in these sectors.

The Low Carbon Racing Conference in which the Lola Group and DRT have participated is an opportunity and a challenge of the 21st century to encourage more technological developments in a field where the planet currently suffers the most from ecologically. The economic element of it is also going to encourage an innovative competition which will bring only advantageous results for the human race.

This conference discusses the revolutionary technological future of the electric car having a silent motor without gas exhausts, especially in cities. In effect such a meeting is of big importance as it will reveal the advances of the new environmental cars and will fix the perspectives of the investors in this industrial sector such as the Lola Group and Drayson Racing Technology. I believe it is necessary to encourage more effort into this area.

It is clear that electric cars are going to take some time to fit in, but one day electric vehicles will have to become a contender to petrol vehicles, and when they do it will be very interesting to see the changes they bring

MAURIZIO DI PAOLO EMILIO, Telecommunications Engineer, Italy: Electric cars have several potential benefits compared to conventional internal-combustion based automobiles that include a significant reduction of urban air pollution as they do not emit harmful exhaust pollutants from the onboard source of power at the point of operation (zero exhaust emissions); reduced greenhouse gas emissions from the onboard source of power depending on the fuel and technology used for electricity generation to charge the batteries; and less dependence on oil.

Despite their potential benefits, widespread adoption of electric cars faces several barriers and limitations. As of 2011 electric cars are significantly more expensive than conventional internal combustion engine vehicles and hybrid electric vehicles due to the additional cost of their lithium-ion battery packs.

So where is electric motoring going in the future? Right now, it's very difficult to predict. It is clear that electric cars are going to take some time to fit in, but one day electric vehicles will have to become a contender to petrol vehicles, and when they do it will be very interesting to see the changes they bring.

If you are interested in becoming a member of our panel and comment on new developments and technologies within the electronics sector please register your interest with the editor by writing to Svetlana.josifovska@stjohnpatrick.com

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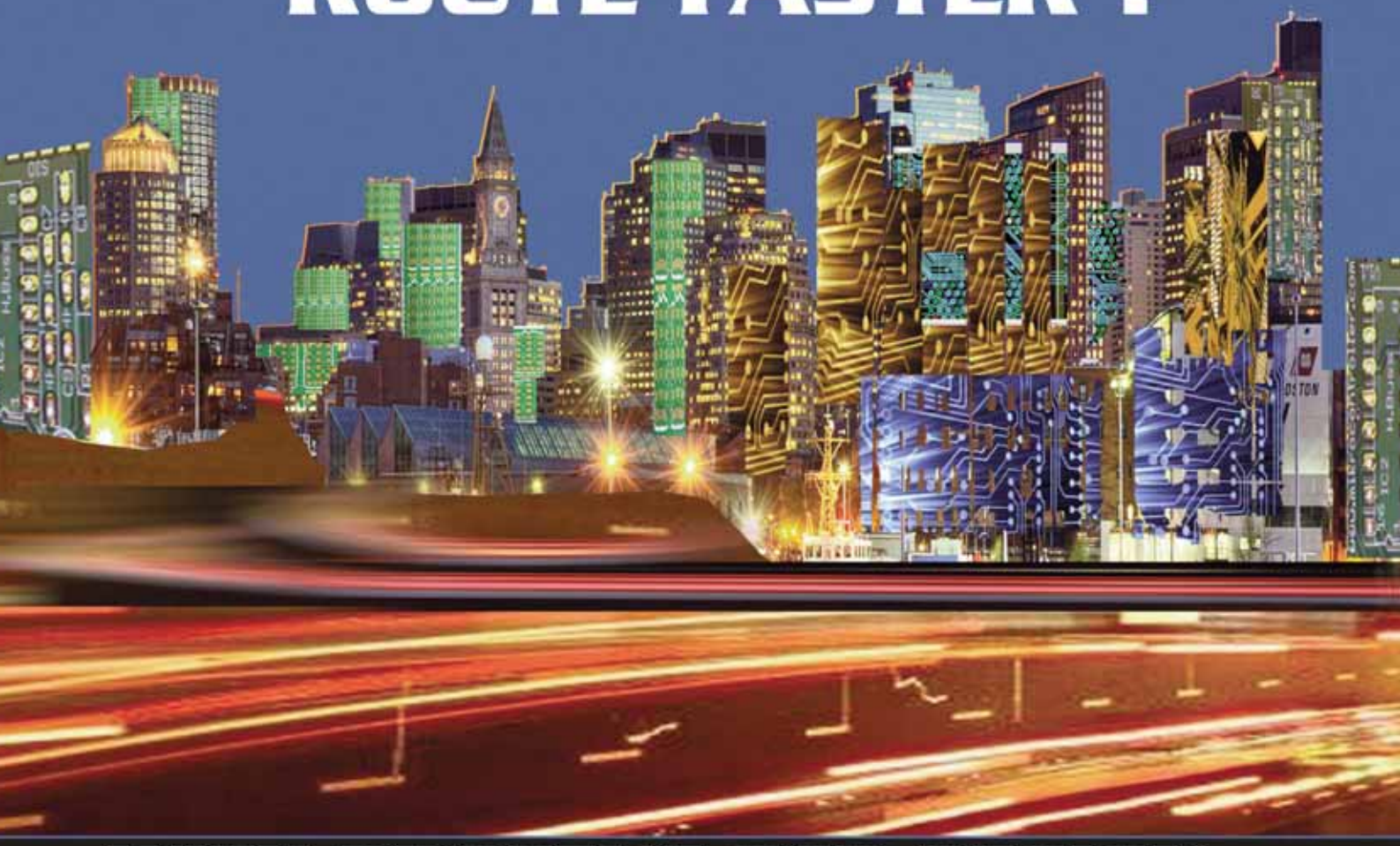

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