eTech

YOUR ELECTRONICS MAGAZINE

ISSUE 7



06 Connecting Electronics Design to Google SketchUp

rswww.com/electronics

RS



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Paradigm shifts are frequently driven by new ways of thinking as well as new technologies...

A combination of both has recently led me to a paradigm shift of an oft-heard phrase "Kids keep you young". This is, in fact, completely wrong... the new paradigm is that kids actually make you feel very old! Let me explain. Two recent events have produced this inevitable conclusion - my 15 year-old son has taken over my crown as the undisputed head of household technology and my 12 year old daughter has left me stuck for words with her questions over an old (not so old in my humble opinion!) rotary-dial analogue telephone. "What is the curly wire for Dad?... How did you walk around with it? Did you wind it up before dialling?...Weren't buttons invented then?"., and finally, the crushing blow... "Why didn't you just use your mobile?"!!

Well, in the spirit of enabling innovation, driving paradigm shifts and building the technology to enable future generations to confuse and frustrate their elders, we have focused on some new technologies in this edition.

Read here first about our exclusive IDF converter that enables PCB design tools to connect with the increasingly popular, and free of charge, Google SketchUp 3D modelling package (page 6). We review the trends in M2M (page 12), lenticular lenses (page 18) and the Engineering Renaissance (page 28). We also introduce the latest technologies in some of our regular features including Product News, Electronics Extras and, in this edition, a Design Review "mbed Sound Idea" (page 25).



Glenn Jarrett
Head of Electronics Marketing

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iSAY

OLLIE ALTHORPE, MANAGING DIRECTOR, STMICROELECTRONICS LIMITED SAYS:

"Time to Change"

Electronic components move in classical and readily defined phases, none more pronounced than the evolutions and revolutions of the MCU. The industry has already entered its latest phase, "Peripheral Count", with the wide adoption of 32-bit micros, principally enabled by ARM's empowering Cortex cores.

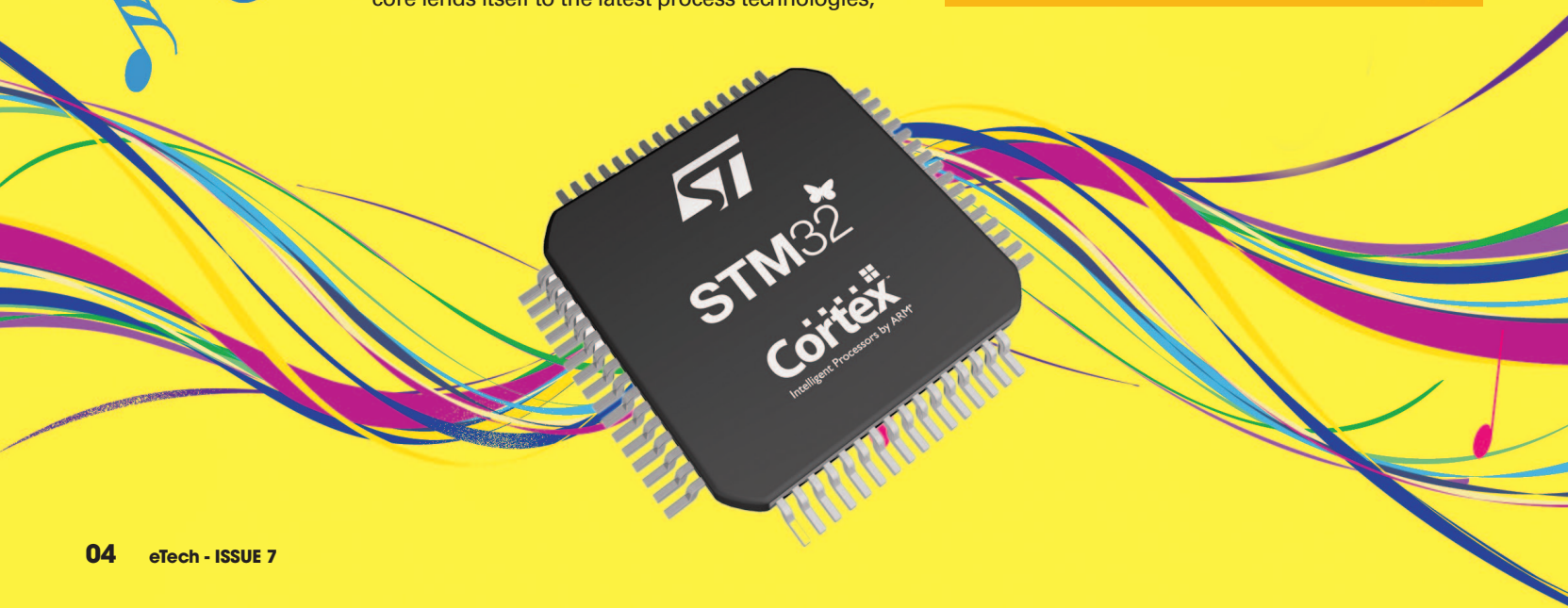
ARM's cores are selected by the majority of MCU vendors today in a wide variety of solutions, allowing these vendors to concentrate on efficient integration of the core subsystem with powerful peripheral and memory configurations. These decisions have motivated the leading 3rd party tools suppliers to support ARM based cores. In turn, this leads engineers to recognise that ARM releases them from the limiting stranglehold of a proprietary based core, providing access to the latest code-efficient and easy to use platform. The freedom of this approach allows the engineer to devote more of his time and skills in writing his application, rather than devising increasingly complex tricks to run older architectures at their limits.

For all but the very smallest memory sizes and pin-count microcontrollers, the percentage of die-area taken up by the core is negligible. In fact, as the ARM core lends itself to the latest process technologies, when even modest memory and peripheral mixes are applied, the unit costs can be very competitive versus 8-bit solutions.

STMicroelectronics embraced the Cortex-M concept at a very early stage with the STM32 family. Today the STM32 family contains more than 200 devices with many more planned over the coming year. See www.st.com/stm32.

With STM32 unit prices competitively set and low cost development tools, the STM32 offers a game changing software platform for the future. We believe it is "Time to Change". Many of your competitors already have.

Share your opinion on this at www.designspark.com/etech



Expanded Range of Tektronix Oscilloscopes

Extended product portfolio available to RS customers in Europe, Middle East and Africa (EMEA)



Under an extended partnership, RS will sell a wider range of Tektronix oscilloscopes, including the MSO/DPO3000 and MSO/DPO4000B Series. These new series provide customers with additional functionality allowing quick detection and diagnosis of problems in complex designs (see Product News for more information).

This announcement forms part of RS' strategy to be the design engineer's choice from concept through to production. "At RS we serve a wide range of design engineers, who each face their own particular challenges," commented Jonathan Boxall, Electronics Category Business Manager.

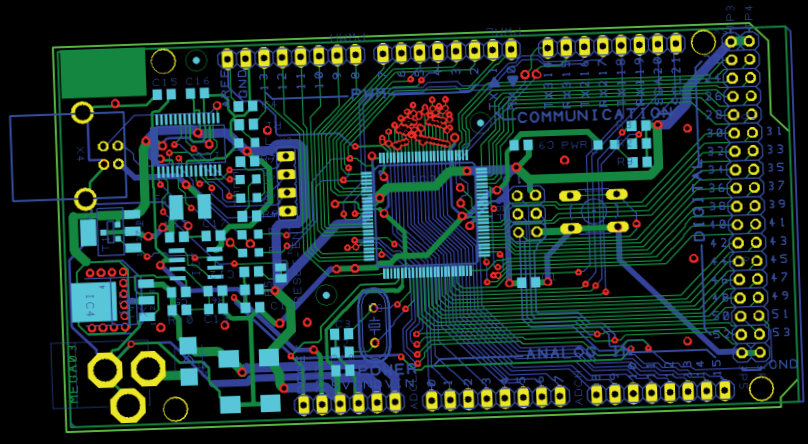
"We are therefore very pleased that, through this expanded agreement with Tektronix, we can now offer our customers an even greater range of test solutions, designed to address today's evolving technological challenges."

View the expanded range at rswww.com/tektronix

DesignSpark PCB wins New Product Introduction of the Year

Leading industry magazine announces RS as winner of independently judged award

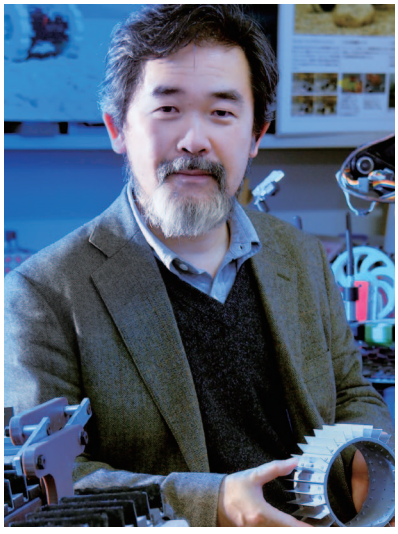
DesignSpark PCB has recently won the New Product Introduction of the Year in the PCB design Tools category from leading industry magazine Printed Circuit Design & Fab (PCD&F).



DesignSpark PCB received the award based on meeting a number of criteria including creativity, innovation and user friendliness, as voted for by an independent panel of practicing industry engineers.

Since launch, over 80,000 design engineers have downloaded DesignSpark PCB worldwide. Version 2.0 was launched in March 2011 adding user requested functionality including a 3D viewer.

For more information, and to download go to www.designspark.com/pcb



The Power of Space Exploration

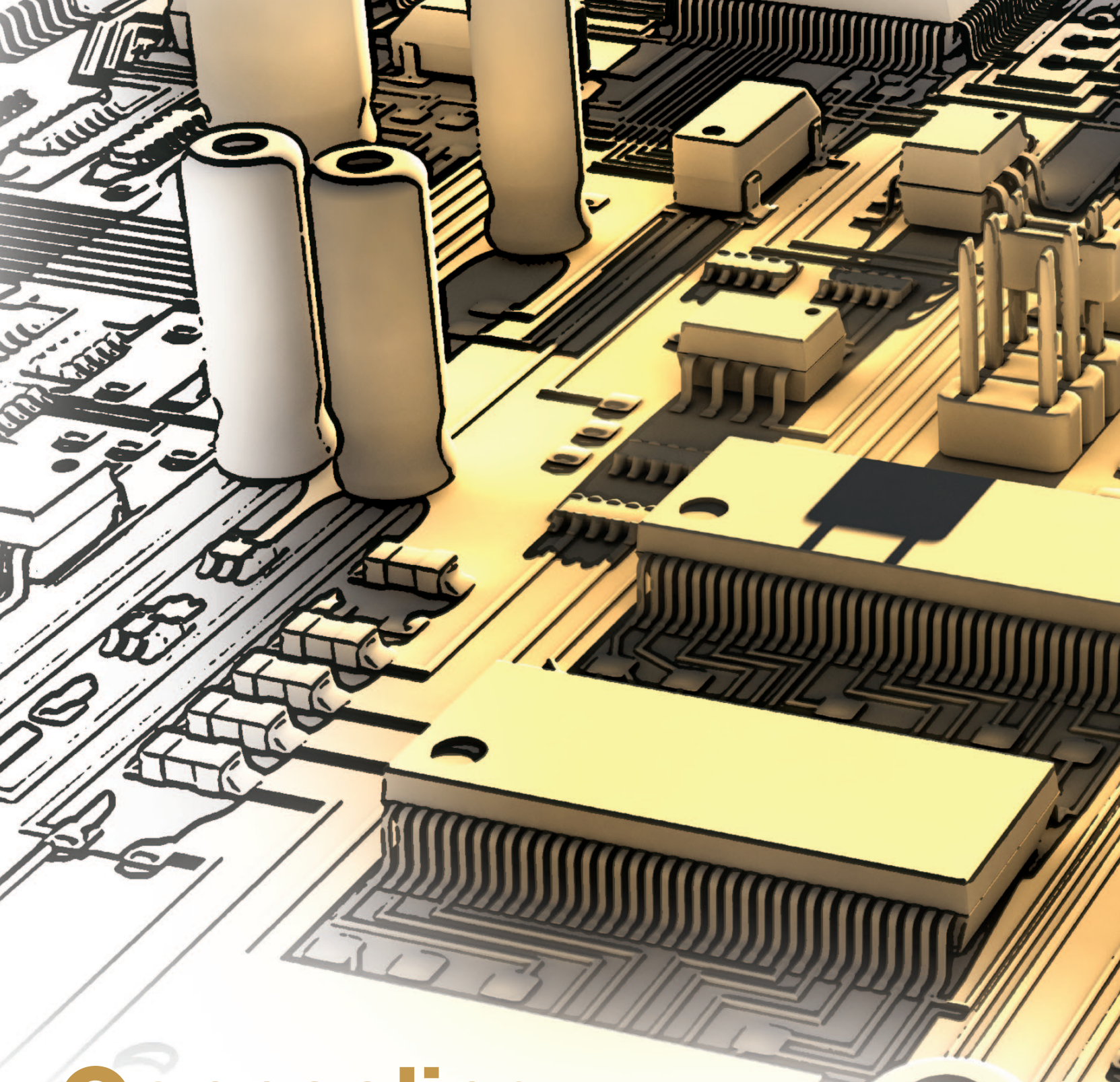
RS Components supports Tohoku University probe mission

In 2010, Asteroid Explorer HAYABUSA returned from the asteroid Itokawa. The mission was the first ever successful attempt at collecting material from a celestial body other than our own moon.

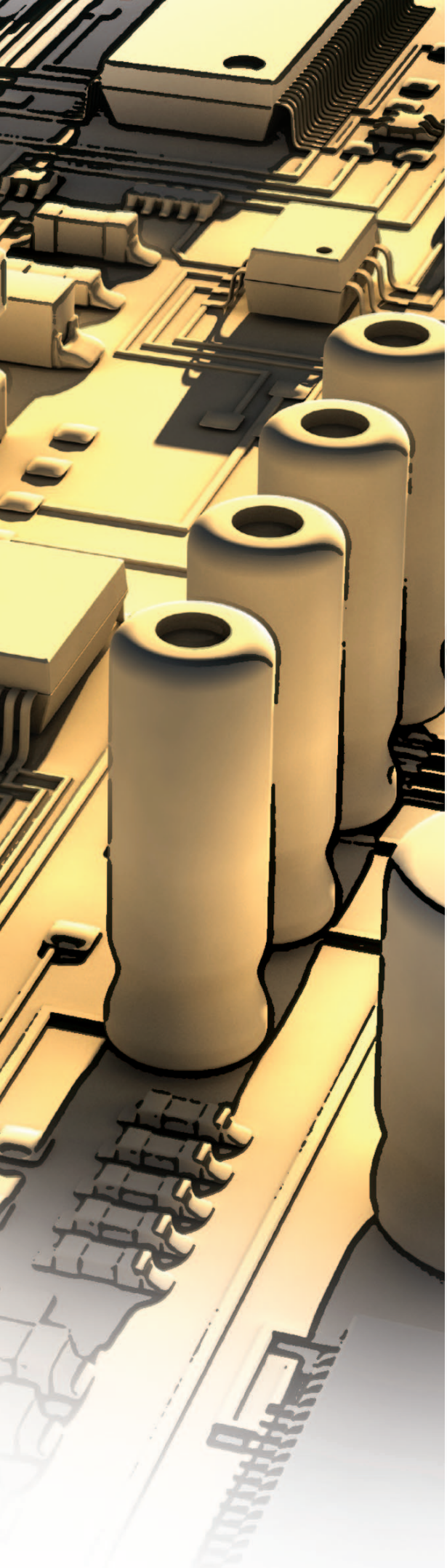
Professor Kazuya Yoshida of Tohoku University, one of the developers of the probing mechanism, explains why this was the most difficult aspect. "Itokawa is an astronomical object 300 million kilometers from Earth.

No one knew whether its surface would be soft sand or a hard monolith until the probe reached the asteroid. So we needed sample collection technologies that assumed every possibility." RS Supports Professor Yoshida's other researches and projects. He explains, "We mainly buy electronic components from RS for use in the development of robot test models. For components such as DC/DC converters that go out of stock frequently, we have created a system of standardising parts from the RS portfolio which means the products arrive on time and when they are needed".

For more information go to www.designspark.com/etech



Connecting Electronics Design to Google SketchUp



RS' free of charge IDF-to-Collada converter allows EDA tools to connect with the popular Google SketchUp 3D Modelling package.

Ever had a design that did not quite fit the mould? You have laid out the PCB and made sure that your design meets all the design rule criteria. Everything is going fine until someone points out that the stiffening bar needed to strengthen the outer casing fouls a connector.

These are the moments when the worlds of mechanical computer aided design (MCAD) and electronic (ECAD) collide. For years, they have proceeded along parallel lines and only interact at the very late stages of the design when everything is finalised and problems are discovered.

Designs that utilise standard package dimensions of a standard packaging format, there is less to go wrong. You can rely on the standard measurements for mounting holes to be confident that the PCB will go in the space provided – just as long as you have not used some very tall components. But this "safe" approach can only get you so far.

Heat is a concern for many designs. A hot-running processor will need a large heatsink that might block the cooling flow of air for other critical components. It is hard to see how airflow might be constricted from the pure 2D view of a PCB layout package. A much clearer picture emerges only when you move into the 3D world to see how the PCB, components, connectors and packaging fit together. The ability to do this earlier in the design is crucial to keeping project lead times to an absolute minimum. A better link between ECAD and MCAD is not just about avoiding mistakes.

Many of today's products demand a sleeker, more attractive look than a standard eurocard chassis. More electronics systems are having to fit in alongside moving mechanical components – and are constrained by the size and shape of these subsystems. If you can obtain as early as possible an interactive visual representation of the design, it is much easier to see how it works aesthetically and mechanically, and you can identify sizing or user-interface placement issues that aren't readily apparent in schematic mode.

Despite the attraction of linking the two domains together, the gap between ECAD and MCAD has taken a surprisingly long time to close. This is true even in big projects, such as those encountered in aircraft and automobile design. Problems with mismatched specifications that resulted in expensive rework for engineers on both sides of the gap led to a push to create standards that could link ECAD and MCAD tools together.

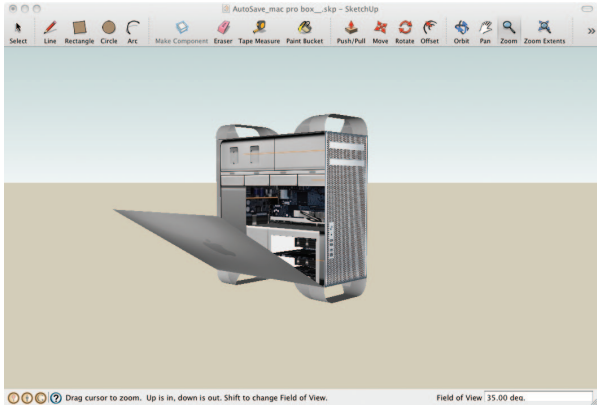
The main standards that were created came from the PDES consortium of which a number of the large aerospace and automotive companies were members. PDES came up with the STEP series of standards that included support for electrical and mechanical CAD data. However, support for these standards remains patchy. A few of the ECAD vendors decided to base their efforts on STEP but focused on building links to specific third-party tools such as Pro/Engineer or SolidWorks.

One of the more successful proprietary links was the Intermediate Data Format (IDF). Developed in the early 1990s, the format has evolved to include support for more 3D data and even thermal characterisation data to allow designs to be more easily passed to heatflow simulation software. IDF is now supported by a number of ECAD and MCAD vendors as a way of exchanging design data between their respective tools.

Continued page 08 >

< Continued from page 07

However, the MCAD tools that support IDF exchange represent a significant financial investment for engineering teams, especially if the bulk of the package design work is going to be outsourced to another specialist company. There is no real need to invest in an expensive MCAD infrastructure if another team or company has the tools needed to take a mechanical concept and turn it into mouldings, assemblies and CNC milling programs.



Free tools such as Google SketchUp have appeared that are ideal for creating realistic product design concepts and mock-ups. More importantly, SketchUp has been designed to allow collaborative design. Users can search for models that already exist in a 3D 'warehouse' of shapes and designs and build them into a design. So, if you see a packaging design that would fit your product and want to incorporate that into your electronic system design, it is simply a matter of downloading it. SketchUp even supports the interactive manipulation of moving parts, making it easier to see how an electromechanical system, possibly with flexible circuits will look and feel in different orientations, making it much easier to check whether a cable will interfere with other parts as it moves around.

The difficult part, until now, has been marrying the physical design of one of these SketchUp objects with the PCBs and connectors that need to fit inside it.

Natively, SketchUp does not support the IDF file format. Instead, data exchange is based around the Collaborative Design Activity (COLLADA) interchange file format. Maintained by the Khronos Group, the XML-based COLLADA format has become the key interchange format for people working in interactive 3D – its support for movable, interactive objects makes it a good choice for SketchUp. Unfortunately, it is not a format understood by ECAD tools.

To close the loop, RS Components has created a file converter that can take IDF files and rework them into the COLLADA format. By combining an ECAD tool which generates IDF files for use with MCAD software, with Google SketchUp, designers have available to them an end-to-end solution for visualising complete electronic systems in 3D.

Once a converted PCB layout has been imported into SketchUp, the designer can refine the look of the model. Connectors and other assemblies are represented in detail in the huge library of 3D component models that RS have assembled and made available for download. For example, pushbuttons and sensors can be moved into place showing how they will integrated with the PCB layout and the external packaging.

This capability gives electronic designers more power to make educated design decisions immediately rather than waiting for expensive prototypes, external modelling or spending valuable time convening design reviews. At the same time, electronic engineers can gain more insight into the MCAD domain and use that knowledge to create more manufacturable designs.

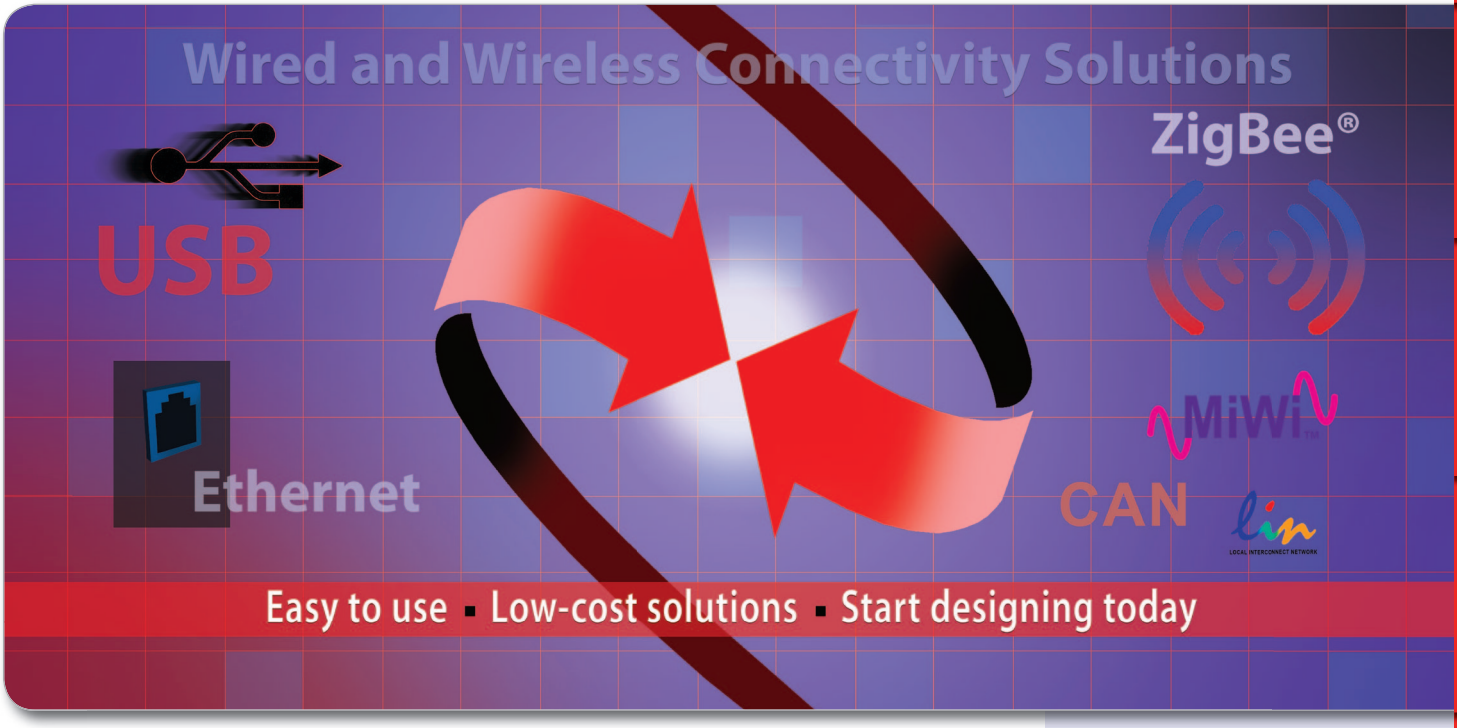
In that way, the full benefits of removing the metaphorical brick wall that always seemed to exist between the two disciplines of electronic and mechanical design will be realised.



Get more online...

To download the IDF converter go to the SparkStore at www.designspark.com

New Microchip Development Tools Simplify Design for Low Power Star and Mesh Wireless Networking



Microchip's latest MiWi™ Development Environment provides a complete ecosystem for designing star and mesh wireless networking products.

The MiWi development environment is optimized for low-power, low data rate, cost sensitive applications. Smaller foot-print relative to the open standard based ZigBee® compliant protocol stack.

Flexible Options:

Modules/PICtail™ Daughter Boards or Transceiver ICs are available for:

- 868Mhz ISM Band
- 915Mhz ISM Band
- 2.4GHz IEE802.15.4
- Connection to PIC® MCU via 4 wire SPI

MiWi PRO Mesh Networking supports:

- Up to 64 Hops, 8000 nodes

Simplified Wireless Application Development:

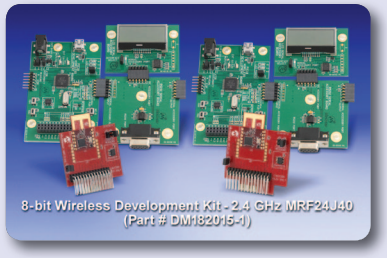
- Complete 8-Bit Wireless Development Kit (WDK)
- Ships with 2.4GHz PICtail Boards.
- Wireless Development Studio (WDS) has cross platform support for Linux , MAC OS® and Windows® operating systems

The development kit is ideal for applications in:

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Choice of three Microchip MiWi Free Protocol Stacks:

MiWi P2P, MiWi Pro Star, and MiWi Pro Mesh are free to download at www.microchip.com/miwi



New 8-Bit Wireless Development Kit features two low power MiWi nodes which may be powered by battery/USB/9Volts.

Microchip Part Number - DM182015-1
RS Stock Code - 7264040

RS www.rs-components.com/microchip MICROCHIP

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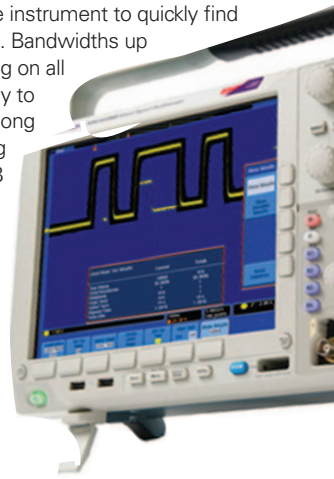
PRODUCT NEWS

TEKTRONIX MIXED SIGNAL OSCILLOSCOPES

Tektronix Mixed Signal Oscilloscopes MSO4000 Series & DPO4000 Series

■ MSO/DPO4000B Mixed Signal Oscilloscope Series users can analyze up to 20 analog and digital signals with a single instrument to quickly find and diagnose problems in complex designs. Bandwidths up to 1 GHz and a minimum of 5x oversampling on all channels ensure the performance necessary to see fast-changing signal details. To capture long windows of signal activity while maintaining fine timing resolution, the MSO/DPO4000B Series offers a deep record length of 20 Mpoints standard on all channels.

Online search term:
Tektronix *o40* *o41*



BASIC RANGE OF RS BRANDED PCB MICROPHONES

A range of microphones that covers all PCB mount applications.

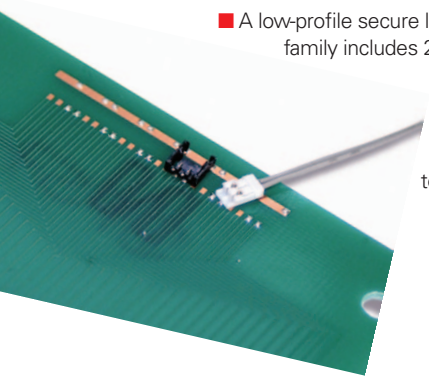


■ **Omni-directional condenser microphones. Available in either 6 or 9.7mm in diameter. Frequency range from 50Hz to 16KHZ allowing for acoustic input for HMI as well as sound level control in industrial applications.**

Online search term: RS microphone 724

HIROSE

Low profile swing lock connector



■ A low-profile secure locking power connector from Hirose. The family includes 2 or 3 way cable connectors and are rated up to 2.5 Amps at 50 Volts AC or DC. The unique locking structure provides secure engagement of the cable under tough conditions. There is an additional feature to prevent any sideways movement of the connector once locked in place.

Online search term: Hirose DF57

MOLEX EXTREME LPHPOWER™

High current, low profile connectors for backplane applications.

■ **The EXTreme LPHPower™ Connector is a mixed, high-current power and signal connector system designed with power blades parallel to the PC board. An extremely low-profile height of only 7.50mm allows greater system airflow while taking up 53% less space than traditional connectors with the same current rating.**

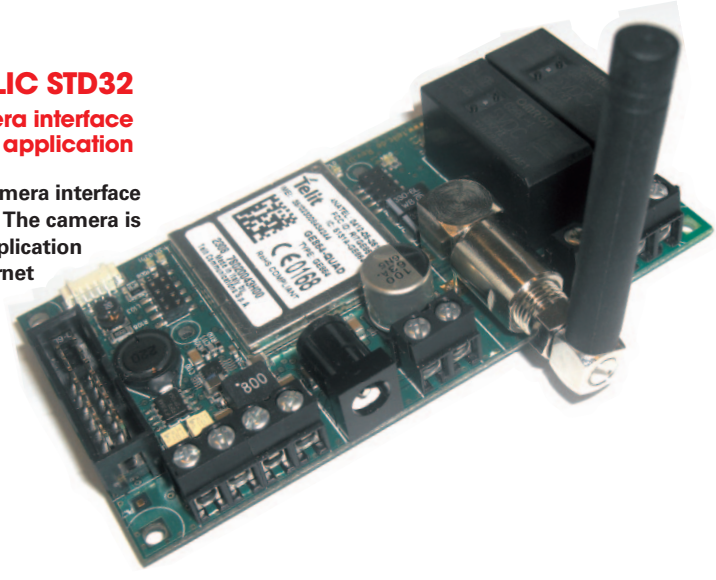
Online search term:
LPH power

TELIC STD32

STD32 GSM telemetry solution with camera interface and on-board web server application

■ **Compact telemetry device for professional use with camera interface sending photos via e-mail in alarm situations or on request. The camera is available as a Telic accessory (736-0810). The web server application enables you to configure the STD32 online via the internet (standard browsers such as Firefox or Internet Explorer) as well as to trigger a photo from the connected camera.**

Online search term: 736-0807



See more online - Over 5,000 new products are



TEXAS INSTRUMENTS BEAGLEXM123

Open hardware design with Beagleboard

■ **BeagleBoard-xM delivers ARM® Cortex™ -A8 MHz now at 1 GHz and extra memory with 512MB of low-power DDR RAM, enabling hobbyists, innovators and engineers to go beyond their current imagination and be inspired by the BeagleBoard.org community.**

Online search term: 716-0430





AMPHENOL TERRAPIN CONNECTORS

New range of robust, durable connectors

■ Originally designed for Military Ground and Marine applications, the TERRAPIN series of connectors are for applications such as LAN switches and routers which benefit from Gigabit Ethernet compatibility. The IP68 sealing of the TERRAPIN series make these connectors perfect for use on products such as unmanned ground sensors, surveillance systems. and in the growing renewable energy market.

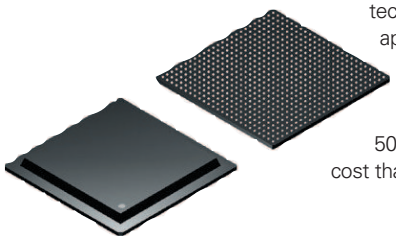
Online search term: "Terrapin SCE2 Series"

XILINX FPGA SPARTAN-6

Lower cost and power Spartan-6 FPGA from Xilinx

■ The sixth generation in the Spartan FPGA Series, the Spartan-6 FPGA family is fabricated on low-power 45-nanometer (nm) technology and is intended to serve consumer applications. It comes in LX and LXT versions where the LX includes DSP slices for fast parallel ALU work and the LXT includes high-speed serial communications. At up to 50 percent lower power and 20 percent lower cost than previous generations of FPGA, Spartan-6 delivers up to 760k logic cells.

Online search term: spartan 6 fpga





PLUG IN POWER SUPPLIES

ErP compliant RS Essentials Power Supplies

■ Introducing the ErP compliant RS Essentials range of UK and European plug-in power supplies. Covering a wide range of voltages, amps and power, in a compact lightweight package. They have the benefits of minimal no load power consumption and efficiencies of up to 86%, these latest products provide a cost effective solution to any design.

Online search term: rs erp

HARTING

Connector suitable for 10 Gigabit Ethernet

■ The Cat. 6, transfer class EA, modular Harting RJ Ethernet connector system provides a reliable data connection in industrial and harsh environments. It is based upon one of the smallest RJ45 Ethernet connectors to which 22awg cable can be connected using IDC technology.

Online search term: 714 855*



Machines ar
doing most

Machine-to-machine (M2M) communication has been with us for a very long time but it's the growth of communications networks, in particular wireless networks, that has led to rapid expansion. Growth in M2M communication is a trend that analysts forecast will continue.

Continued page 14 >



"Intelligent metering within utilities is well established. Companies such as the Danish utilities company Dong are at the forefront of intelligent metering."

Lance Hemmings
Product Manager,
RS Components.

re
of the talking



< Continued from page 13

ABI Research predicts that there will be 297 million M2M connections by 2015, 110 million of which will be in Europe. According to the Yankee Group, connections over cellular networks will reach 81.8 million in 2011, rising to 217.5 million in 2015. Whichever numbers prove to be the more accurate, it's clear that mobile networks are enabling this rapid expansion of connections.

Cutting out the human factor drives down costs and boosts efficiency

The primary business drivers for the adoption of M2M communication are cost reduction and improvements in business efficiency by minimizing human interaction with electronic systems. If elements within electronic systems can be made 'smart', they can be programmed to take actions based on the data they receive from other elements within the system. For example, if a vehicle equipped with asset tracking technology starts to move when it should be stationary (perhaps parked up overnight), a linked computer – which could be located anywhere in the world - might automatically generate a call to alert the appropriate local police force.

M2M applications: old and new

Perhaps the earliest M2M applications were for remote monitoring and control. Radio transmitters are often located on relatively inaccessible hilltops. Monitoring and controlling these installations without human intervention has significant cost saving. The next few years will see growth in control and monitoring applications such as this but car telematics, consumer electronics, vehicle fleet management, and intelligent metering will all see significant M2M expansion.



Car-maker Hyundai launched its BlueLink® telematics system earlier this year. This is designed to give drivers seamless connectivity between offices, homes, smart phones and cars. It's like a GPS system on steroids with over 30 features, including one that lets people who lend their car to someone else, perhaps their teenage offspring, see not only how far the car was driven but also the route taken and how fast the vehicle was traveling throughout the journey.

Consumer applications range from the now familiar electronic point of sale (EPOS) systems to relatively new innovations in the field of health. With ageing populations, health costs are spiraling everywhere, outpacing GDP in developed economies. If data on say, blood pressure, can be collected without patients having to visit their local surgery, cost savings are substantial. Some argue that the quality and quantity of data collected may also lead to better diagnosis and more effective treatments.

Remote asset tracking, in all forms of transportation, is another established application for M2M technology. Logistics operations use it to track deliveries. The need to secure assets and prevent theft is another reason for its adoption. Some companies use the technology to track to location of service engineers, enabling better customer service. With rising fuel prices, most transport operators are also using the technology as an aid to reducing consumption and therefore operating costs.

Intelligent metering is going to be one of the fastest growth areas for M2M communication over the next decade and every major mobile operator has done deals with utilities companies in the last year. Gas, water and electricity companies can all reduce costs through smart metering that measures consumption, historically or in real time. Of course, the electricity companies already have wired connections in place; it's simply – or not so simply – a matter of finding a way to transmit data reliably over power cables. Some projections suggest that there could be over 200 million smart electricity meters by 2015, making some of the analyst numbers quoted earlier seem rather conservative.

For telematics and telemetry, RS supplies everything from components and modules to plug-and-play finished products. For telematics with positioning, GPS modules from companies such as Fastrax (716-5283), and complete systems from Telic (736-0810 and 736-0801), simplify M2M provision, particularly for asset management. Telic and sister company CEP AG also manufacture GSM and day/night cameras to enhance the capabilities of their terminals, employing industry-recognised modems from Cinterion and Telit, amongst others.

For very simple data telemetry, RS offers a substantial range of RF transmitters. receivers and transceivers. From value brands such as HopeRF (731-2795) to more complete packages from Digi International and RF Solutions (704-3275), all requirements of the ISM radio band, and range, are covered.

Where additional base station intelligence is required, RS stocks many industrial single-board-computers (SBCs), both in standard motherboard and CoM formats. There are numerous add-in board options and SBCs can be supplied with or without CPUs (e.g. 716-6292). In the case of Commell products, there's a choice of ready-tested SBCs with both CPU and memory fitted and either a trial version of Microsoft XP Embedded or the full licence. When you need machines to talk to machines, talk to RS!.

Search the range of M2M related products at rswww.com/electronics

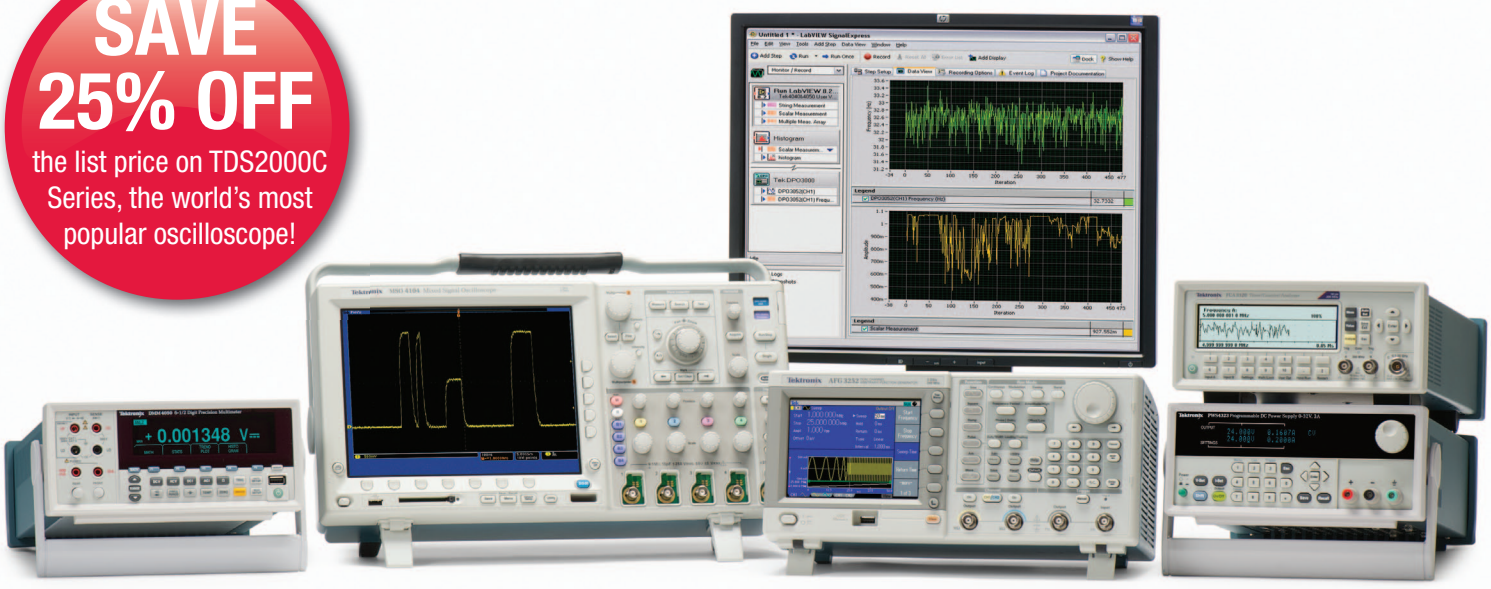
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Not Your Average Test Bench

Now it's easier than ever to debug those complex designs

SAVE 25% OFF the list price on TDS2000C Series, the world's most popular oscilloscope!



Debug is hard enough. Don't let your test instruments get in the way. Our test bench offers the same ease-of-use you've come to expect from our oscilloscopes. From dedicated buttons for common functions to USB ports for saving data. To simplify your most complicated tasks, you can connect your test bench with the included copy of LabVIEW SignalExpress™ from National Instruments. Control your Tektronix instruments right from your PC. Automate measurements and analyze data across multiple instruments. Capture and save results. Create reports. Take your test bench from average to extraordinary.

Basic Oscilloscopes

- 40 MHz to 500 MHz bandwidth
- Up to 25 automatic measurements
- Battery operation available*

*Depends on model.

Bench Oscilloscopes

NEW models added to RS portfolio

- 100 MHz to 1 GHz bandwidth
- Up to 20 MB record length
- Up to 4 analog and 16 digital channels
- Parallel and serial bus analysis
- Wave Inspector® for fast navigation of data

Arbitrary/Function Generators

- Up to 240 MHz bandwidth
- One or two channel models
- 12 standard waveforms, including arbitrary

Digital Multimeters

- 5.5 digit and 6.5 digit resolution
- Dual display
- Statistics, histogram and trending modes

Power Supplies NEW!

- Up to 72 V output range
- Up to 0.5 mV and 0.1 mA resolution

Timer/Counter/Analysers

- 12 Digit/s frequency resolution
- 50ps time resolution
- Measurement statistics, histogram & trend plots

Industry Leading 3-Year Warranty included with all Tektronix bench instruments.

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The evolution of scopes

Latest scopes add functionality without adding complexity or cost

Graham Cave, Product Manager, RS Components

Signals within electronic systems are becoming faster, more numerous, and more complex. The ability to capture fleeting glitches, instability or other signal errors puts ever more demanding requirements on measurement tools, and in particular oscilloscopes.

The design of scope probes has needed to evolve too, to ensure that loading effects are minimised and measured waveforms are faithfully reproduced on the instrument's display, whether that's integrated into a stand-alone scope or the instrument uses the display of a connected computer.

Today's oscilloscopes come in a bewildering array of shapes, sizes and specifications. Of the 350 models stocked by RS Components, just 20 are analogue versions – although for radio frequency applications these are still preferred by some engineers. Functionality, particularly with respect to waveform display, storage, manipulation, and reporting, has grown significantly in recent years. However, scope manufacturers have been diligent in ensuring that the interface between the instrument and the user has been kept as simple as possible. As scopes have become more useful, and more affordable, users have become expert in adapting them to address their individual test and measurement tasks. The time taken to identify faults, even within high speed, complex waveforms, has been greatly reduced. Here's the pick of some of the latest innovations in oscilloscopes available from RS.

PC-based scopes

For service engineers on the move, the PC-based scopes from PicoScope combine features that are integral to many high performance bench top instruments with small, lightweight, ergonomic packages powered from a USB 2.0 interface, through which the instruments also pass data . At their simplest, the 2104/2105 models are single-channel scopes not much bigger than probes yet capable of up 100 MS/s real-time sample rates with 25MHz analogue bandwidth. But PC-based instruments are not limited to the lower end of the functionality range. The PicoScope 6403 is a sophisticated, 350MHz bandwidth, 4-channel instrument capable of real-time sample rates up to 5GS/s and boasting a 1GS buffer memory for easy signal analysis – quite an achievement for a scope measuring just 255 x 170 x 40mm and weighing less than 1kg.

Hand-held instruments

Fluke Scopemeters are popular with maintenance engineers as self-contained, battery-powered digital storage oscilloscopes. Once again, small size is no barrier to high-end performance. The recently introduced Fluke Scopemeter 199C is a 2-channel scope that will operate for up to 4 hours from a rechargeable NiMH battery pack. It offers 200MHz bandwidth, real-time sampling at up to 2.5GS/s and a deep memory of 27500 points per input. There's a choice of advanced triggering modes and the input sensitivity range is from 5mV to 100V/division.

Agilent scopes

The Agilent Infinivision range of MSOs (mixed signal oscilloscopes) and DSOs (digital



signal oscilloscopes) includes products with real-time bandwidths from 100MHz to 1GHz. At the heart of these instruments is the MegaZoom III ASIC, combining fast waveform update rates and usable deep memory with smooth, responsive controls. The scopes are upgradeable, so you can start with a DSO and upgrade to an MSO later. At the top of the range, the 7000 series has an integral 12.1-inch XGA display but the instrument is only 16.5cm deep. The 6000 series comes with optional battery packs and scopes in the economical 5000 series weigh just 4kg.

Tektronix scopes

Tektronix MSO/DPO3000 mixed-signal, bench top scopes feature up to 20 channels (2 or 4 analogue and up to 16 digital), analogue bandwidths up to 500MHz, real-time sampling at up to 2.5GS/s and 5 Megapoint record length. With a suite of advanced triggers, the scopes have 9-inch displays, a 146mm deep footprint and weigh 4kg. Connectivity includes USB 2.0 Host Ports on both the front and rear panels and there is optional application support for power analysis and both HDTV and custom video analysis.

Isotech DSOs

The Istotech IDS8104 is an economical digital storage oscilloscope with a bright colour TFT LCD display, 1GS/s single shot sample rate and 25K maximum record length for waveform capture of multiple and complex waveforms. The 25GS/s equivalent time sampling mode maintains an effective high sample rate for fast timebase settings for repetitive signals. USB connectivity and PC communication software supports printer and PC communications and enables unlimited waveform and panel setup storage to USB flash drives.

LeCroy 50GS/s MSO

The MSO 104Xs-A mixed signal oscilloscope is a top-end instrument with integral touch screen aimed at embedded system design and debug applications. The 4-channel, 1GHz bandwidth model delivers real-time sampling at up to 50GS/s and a wide range of serial data trigger and decode tools for I2C, SPI, UART, Serial Audio, CAN, and LIN. The hardware allows for fast processing of long memory, even when looking at all 22 inputs.

Highlights of the latest oscilloscopes in stock from RS

Manufacturer	Model	RS Stock Numbers
PicoScope	2104/2105 models 6403	536-8799 and 536-8812 689-4700
Fluke	Scopemeter 199C	423-2813
Agilent	DSOX3054A	725-0435
Tektronix	MSO4104	689-9525
Isotech DSOs	IDS8104	619-5924
LeCroy 50GS/s MSO	MSO 104Xs-A	685-2756

View the latest oscilloscipes available from RS at rswww.com/electronics

3D comes to life without the specs



If the mythological Greek Cyclops – the giant with a single eye – had existed, 3D displays would have been wasted on him, or her. The reason we see in 3D at all is because each of our eyes receives a slightly different image from a given scene, simply because they're not in the same place. 3D vision is made possible by the 3 inches or so that separates them.

Early 3D gimmicks included book covers and postcards. As you change your viewing angle by tilting the objects from side-to-side, the image seems to change. A 'lenticular lens' makes this possible. It's an array of very thin, cylindrical magnifying lenses, or lenticules, set out in rows, made from a sheet of plastic.

Stereoscopic 3D effects were introduced in films during the 1950s. Images comprised two superimposed, slightly offset colour layers. By wearing so-called 'anaglyph' spectacles that placed a different filter over each eye, usually red for one eye and green for the other, it was possible to give the impression of a 3D image. It was a short-lived fad, not least because of the geeky look the glasses imparted to users. Viewers that wore normal spectacles found additional problems using the anaglyph versions. However, there has been a recent ressurgence of interest in 3D viewing, at least in part due to the highly acclaimed 3D movie 'Avatar' from James Cameron.



Viewing glasses are still normally needed to watch television in 3D. They come in active and passive versions. The active ones are battery powered and use moving or switchable elements to deliver a different image to each eye. The effective refresh rate of the TV image is halved, meaning that 3D-Ready TVs need a minimum refresh rate of 120Hz if viewers are not to experience image flicker. Active shutter TVs are now in production by both Sony and Panasonic, some with refresh rates of up to 240Hz.

Passive polarized glasses, like their early counterparts, just rely upon an optical material to help distinguish between the images delivered to each eye and can only be used with front-projection systems. This means that they are easier to use with projected images but the technology is difficult to implement in flat screen 3D TVs. They do not work with mature display technologies such as LCD, plasma or DLP but Korean manufacturer, LG, is backing this technology.

Dropping glasses

3D TVs, electronic games and even mobile phone displays that don't require users to wear special glasses are now beginning to appear. Perhaps surprisingly, many of them rely on the earliest 3D technology – lenticular lenses. Dubbed 'autostereoscopic', television screens consist of a lenticular-lensed flat screen that projects slightly different images at different angles so that our eyes can receive offset images that our brains interpret as 3D images. Philips and LG are both producing TVs with lenticular lenses. A similar technology known as 'parallax barriers' is being pioneered by Sharp. The challenge for 3D TV designers has been to overcome poor resolution and narrow viewing angles. Viewing angles are determined by the maximum angle at which a ray can leave the image through the correct lenticule. In 3D TV, 3D TV viewing angles of just 20 degrees are typical, outside of which viewers see double images on the screen.

At CEATEC 2011, Asia's biggest consumer electronics show, Toshiba unveiled an LCD 3D TV capable of 40 degree viewing angles, an achievement made possible by using software to optimise light emission from the centre, right and left of the screen, according to the company. Clearly, it is semiconductor processing power applied to decades-old lenticular technology enabling 3D TV. In the case of the Toshiba TVs, which were shown in 12-inch and 20-inch models, the final image has a resolution of 1280 x 720 pixels but it takes an LCD panel of 8.29 million pixels to achieve this because nine separate images are created and transmitted in the required direction through the lenticular overlay. The image processing engine is a Cell microprocessor developed jointly by Sony and IBM.

At this year's Consumer Electronics Show (CES) in Las Vegas, Toshiba also demonstrated a tablet PC with a 15.6-inch lenticular display that "when calibrated" produces a 3D image without the need for glasses. The clever part here is that the notebook's camera detects the angle at which you are viewing the display then dynamically calibrates it to give the best 3D experience.

Nintendo's 3DS gaming console, launched earlier this year, allows gamers to watch 3D effects without glasses. Its screen is manufactured using parallax-barrier technology developed by Sharp. A parallax barrier works in a similar way to polarising glasses and directs the light from two images slightly differently. The 'sweet spot' for 3D viewing is about 20-inches in from the screen. This, and the narrow viewing angle, mean that only one person can play the game at any one time, but the screen is switchable between 2D and 3D mode. Some UK newspapers have reported that Nintendo's using 3DS has caused dizziness, headaches and nausea. Time will tell if that's true, or if it's just caused by excitement surrounding the new technology!

It will be interesting to see if 3D display technology is now here to stay or if interest in it will, once again, fade away.

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Multicore

coming to a screen near you

By Marco Jacobs, VP Marketing Vector Fabrics



Having attended several technology shows at the beginning of the year, it's clear to me that multicore is finally really happening, and it's happening fast.

Intel's Sandy Bridge started shipping in January, with four x86 cores on board. Haswell, Intel's next architecture revision, defaults to eight cores. At the Mobile World Congress, nVidia showed off their Kal-El mobile phone and tablet processor with a quad core inside and targeted to go into production in August this year. Qualcomm announced their new Krait architecture, which includes up to four cores also. TI announced their new 10GHz DSP, which contains 8 high-performance VLIW cores running at 1.25GHz. Graphics architectures went from simple pixel pushing pipelines, to include virtex engines, then added programmable shaders and are now becoming general purpose multicore computer engines that are seeing rapid market adoption. This weekend, a friend of mine showed me his new phone, the LG Optimus 2X. The "2X" label stands for dual core; multicore is even becoming a topic the marketeers get excited about and highlight as a main product feature.

Why is everyone going multicore now? Multicore is here since it solves several challenges.

Many applications can be significantly sped up through parallisation. Higher resolution and multi-channel audio combined with high-definition, 3D video yields a better media experience. A media player contains graphics, audio and video, each of which can be split up over multicore cores to give more performance. Augmented reality and high quality gaming requires lots of demanding computer operations. Consumers want their browsers to load and render web pages instantly. Screen and camera resolutions are forever increasing to present and capture highest-quality imagery. Multicore is here because it addresses the challenge of satisfying this need for speed.

Designing a processor that is twice as powerful as the previous generation is no small task. Deeper pipelines, out-of-order, speculative issues, and superscalar execution all improve performance, but at diminishing returns. Ultimate performance goes up, but performance per square millimeter of Silicon actually goes down. Not so with multicore, which is relatively easy to implement. Simply replicate the design, and add interconnect. It's much simpler to implement a quad core processor, than to increase a single processor's performance fourfold. Multicore is here because it solves the hardware design challenge to deliver more performance.

One way to make processors more powerful is to introduce more pipeline stages, and increase the clock rate. More pipeline stages means there's less work done per stage. In addition, driving up the clock requires a higher voltage, resulting in a more than linear power increase, since power scales with the square of voltage. This isn't a very power-efficient approach, and already some time ago frequencies have stopped scaling when new process technology nodes were introduced. Using multiple cores lowers the average clock frequency, thus reducing energy consumption, even if there are more cores active at the same time. Multicore is here because it addresses the power consumption challenge.

When VLIW processors were introduced, they shifted computer architecture complexity toward the compiler. History now repeats itself with multicore architectures. The complexity is shifted away from the hardware, into the software. It's too late for a paradigm shift in software programming to adopt new parallel programming languages though. There's too much legacy code, there is a lot of software tools infrastructure and learning a new language isn't easy. One way to hide parallel complexity is behind APIs, and there are many: Pthreads, OpenCL, OpenMP, CUDA and others. Using APIs is a good idea, but only solves part of the problem. Structuring your code to take advantage of these parallel APIs is the real challenge. New programming tools are needed to analyze and partition the application in order to take advantage of the many multicore systems already shipping into the marketplace, and to harvest their available computing capacity. Multicore is here, and here to stay. The crux is in the programming.



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NFC and Bluetooth: Complementary or Competitive?



Connectivity is an area in the automotive electronics segment that is expanding significantly and is expected to trigger further incremental semiconductor usage in vehicles.

In particular, Bluetooth and near field communications (NFC) are two wireless technologies that are targeting in-vehicle connectivity. Both technologies have similarities and difference, which will determine how the two solutions will be used in vehicle applications.

Bluetooth becomes ubiquitous

Bluetooth, together with Wi-Fi, is the most diversified wireless technology, having been accepted in a wide variety of products ranging from mobile phones to laptop PCs, to tablets. This acceptance in various types of equipment has given Bluetooth a preferential path to be integrated in the car. There is a clear trend of consumer and mobile devices augmenting existing automotive infotainment systems.

To highlight Bluetooth's success, 93 percent of 2010 cars in the United States are available with Bluetooth, many having it as a standard feature. General Motors started bundling Bluetooth with OnStar, which is standard in-vehicle security and communications systems with most GM vehicles. According to IHS iSuppi infotainment technology availability data, Bluetooth is available on a little more than 69 percent of all models offered for sale in 2010, in the nine core countries tracked. Attachment rates for Bluetooth, currently about 24 percent worldwide, will rise to 59 percent by 2017, according

to IHS iSuppli data.
As a result, Bluetooth has become the de facto standard for wireless connectivity in vehicles, primarily used to accommodate hands-free calling with mobile phones. At the same time, there are new maturing alternative Bluetooth profiles to accommodate data connections for music, messaging, basic control functions – and now mobile apps – rendered on the smart phone.

NFC achieves limited automotive success

NFC is a technology that has been developed by Philips Electronics and Sony Corp. As can be inferred from the name, NFC is a connectivity technology that allows interconnection among devices within a range of about 4 to 8 inches (10 to 20 centimeters).

Fast and easy operations together with a high security level make the technology suitable for secure communications like monetary transactions, private data collection, ticketing and generic information exchanges.

NFC's main advantage is its intrinsic security level, ensured by the limited communications range of the technology that, together with a single point-to-point connection, will limit any interception possibilities. On top of the intrinsic security, NFC technology supports advanced cryptography, which makes NFC-based systems suitable for financial and other kinds of secure transactions.

Despite such advantages, IHS does not believe that vehicles will be driving the NFC market growth. In-vehicle applications are still limited and mainly driven by security applications, such as car access keys or car immobilizers. These are the applications where NFC will add value compared with already available and reliable technologies like Bluetooth, which is now widely deployed in vehicles.

The market driver for NFC technology is, and still will continue to be, mobile handsets, where the technology is expected soon on a wide scale,, reaching about 220 million units by the 2014 time frame.

Automotive solutions

It is clear that once such a wide scale deployment confirms NFC success, vehicles will also take advantage of the technology, allowing even more integration of devices like smart phones and related applications inside vehicles.

As for the present, NFC in automotive solutions is being offered by original equipment manufacturers such as BMW, by Tier 1 suppliers such as Continental and by semiconductor providers such as NXP. All three, along with some other entities, are pioneering the deployment of NFC technologies in automotive applications.

The main uses of NFC in vehicles are:

- Car access and car security
- Car interior setup according to different drivers, such as infotainment, telematics, engine/chassis setup and preference configuration.
- User authentication – car rentals
- Support to wireless communications – such as Wi-Fi and Bluetooth – due to reduced set-up time.

Complementary indeed

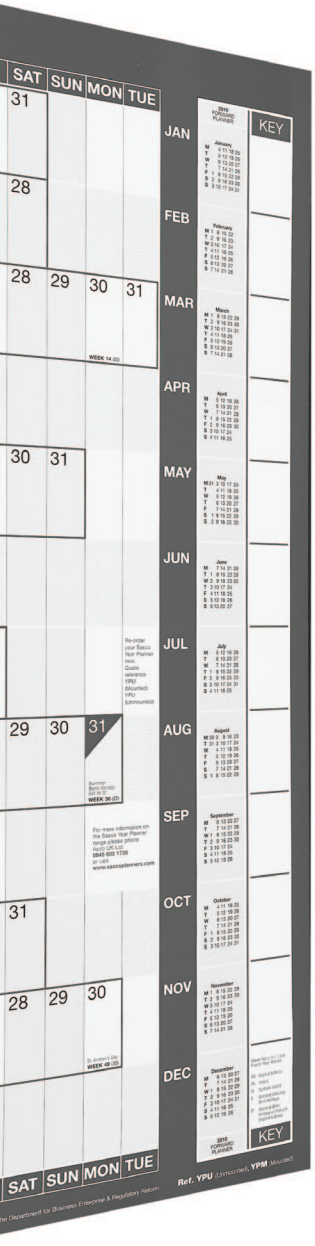
IHS expects NFC technology to be implemented in the car and coexist with today's more mature and diffused technologies, such as Bluetooth and Wi-Fi. As a result, Bluetooth and NFC will be complementary technologies. Not only will NFC's higher level of security allow more applications to be run safely in the car, its faster set-up time will also permit other wireless technologies to take advantage of NFC's faster authentication process.

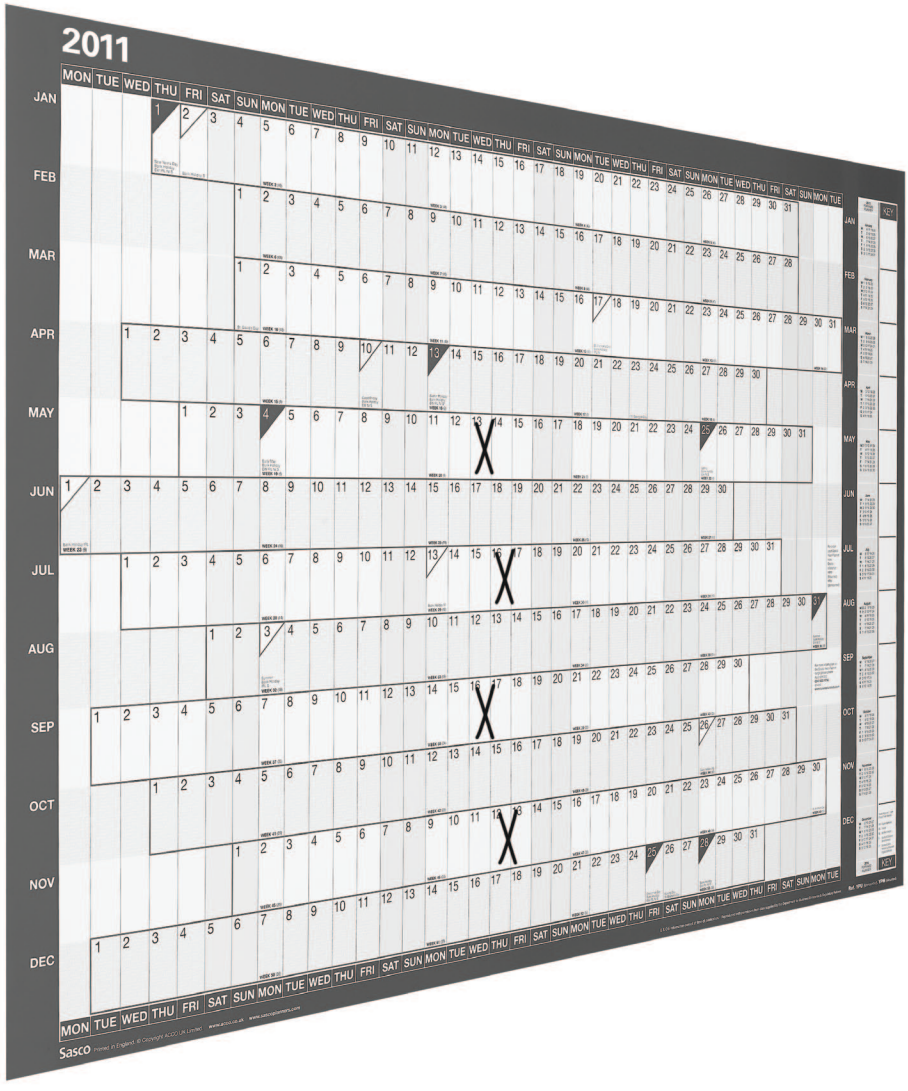
Finally, in terms of cost, according to the NFC forum, integration into Bluetooth or other wireless technology of NFC – not as a standalone device – will have a negligible cost impact, in the range of U.S. $0.50 per unit. Integrating the small NFC IP block in a tiny corner of a Bluetooth chipset, for example, will reduce the overall bill of materials (BOM) cost and will allow using system-on-chip (SoC) connections instead of more expensive ad hoc external connections.

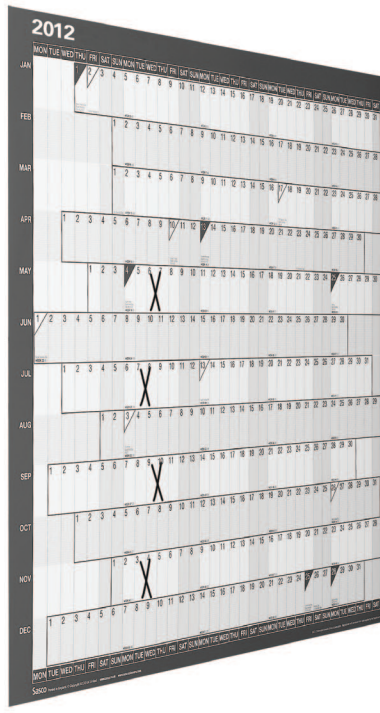
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	NFC	BT 4.0	Note
Security	High*	Good	*NFC higher security due to low distance for interception/ interference and Point To Point, together with crytography
Distance	~10cm	~1m	
Modes	Active/Passive*	Active	*RFID like
Power	<15mA*	<15mA	*NFC consumes more if interfacing passive RFID
BW	424kbit/s (848)	1Mbit/s	
Frequency	13.56 MHz*	2.4-2.5 GHz	*NFC would have less interference with WiFi
Connection	Point To Point	Personal Area Network	*NFC P2P do not allow contemporary multi connections
Set-up time	< 0.1 s	< 6s	

Table 3 presents specific NFC characteristics and a comparison with the Bluetooth 4.0 profile.







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mbed's sound idea

for a CD-quality audio reference design

By Loannis Kedros, mbed projects

Audio processing and amplification in commercial and industrial applications is normally implemented using an MCU's on-chip DAC, driving the ubiquitous LM386 amplifier.



The audio data is hard coded into the application binary file. There is growing demand for CD-quality audio in these applications but few simple, economical ways to implement it. CD quality audio, sometimes dubbed HQ Audio, is an audio signal sampled at 44.1kHz with a sampling resolution of 16 bits. At this quality, most people will not be able to detect anything missing from the original sound because frequencies up to 20kHz will be audible. (Nyqist-Shannon sampling theorem states that perfect reconstruction of a signal is possible when it is sampled at anything over twice the maximum frequency of the signal being sampled.) mbed took on the challenge to create a flexible, low-cost reference design and development platform around the mbed Microcontroller with an audio subsystem on a breakout board.

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Recent 32-bit MCUs have many more onboard peripherals than their earlier counterparts. Ethernet, CAN, USB (host and device) are now common options. FLASH and RAM have become the dominant factors in the silicon area, and hence cost, so adding new features is less expensive than before. The NXP LPC1768, at the heart of which is an ARM Cortex-M3 microcontroller, is the basis for one popular mbed Microcontroller board. This board provides intuitive hardware, software and APIs and is designed for rapid prototyping, enabling designers to experiment with new ideas.

Figure 1 shows a block diagram of the mbed Microcontroller and its interfaces. Although it is not shown on this diagram, one important feature of the board for digital audio applications is the inclusion of an I2S interface, a high-speed industry standard for providing high quality audio data in a digital format.

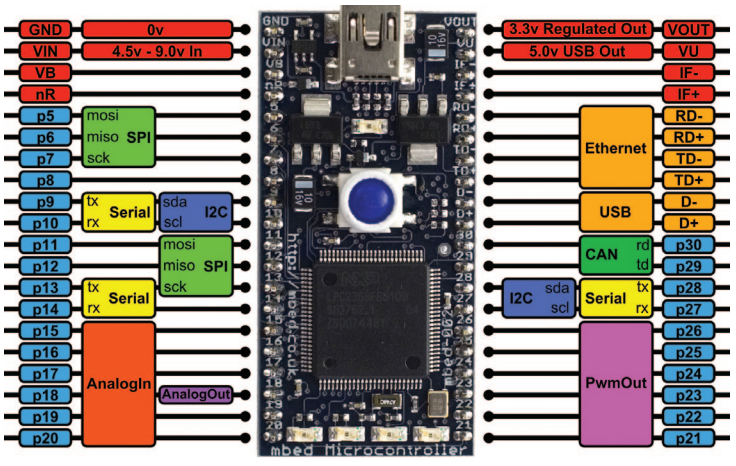


Figure 1: mbed Microcontroller and interfaces

The audio breakout board was designed around the TLV320AIC23B from Texas Instruments. The device, which includes an I2S interface, is a sigma-delta, stereo audio codec capable of sample rates from 8kHz to 96kHz and featuring a third-order multibit architecture. The ADC has -90dBA and the DAC -100 dBA signal-to-noise (A-weighted at 48kHz), enabling HQ audio recording in a compact, power-saving design that consumes less than 23mW during playback. The board has 3.5mm stereo input and output jacks and operates from single 3.3VDC power supply.

Combining the audio subsystem on the breakout board with the mbed Microcontroller results in a flexible, easy-to-use reference design, shown in Figure 2.



Figure 2: the HQ audio development platform showing the audio subsystem (top left) and the NXP LPC1768 mbed Microcontroller (top centre)

The hardware includes USB, SD Card, Ethernet and motor driver interfaces. Reference driver code and software libraries are in development and will be featured in a series of DesignSpark blog posts.

Schematics and PCB layouts for both the audio breakout board and the development platform are already available and can be downloaded from DesignSpark (see links below). The mbed Microcontroller module is available ready-assembled (RS part number 703-9238).

This is the first stage of a project that will see ongoing development over the coming months.

To search for the mbed microcontroller (703-9238) go to rswww.com

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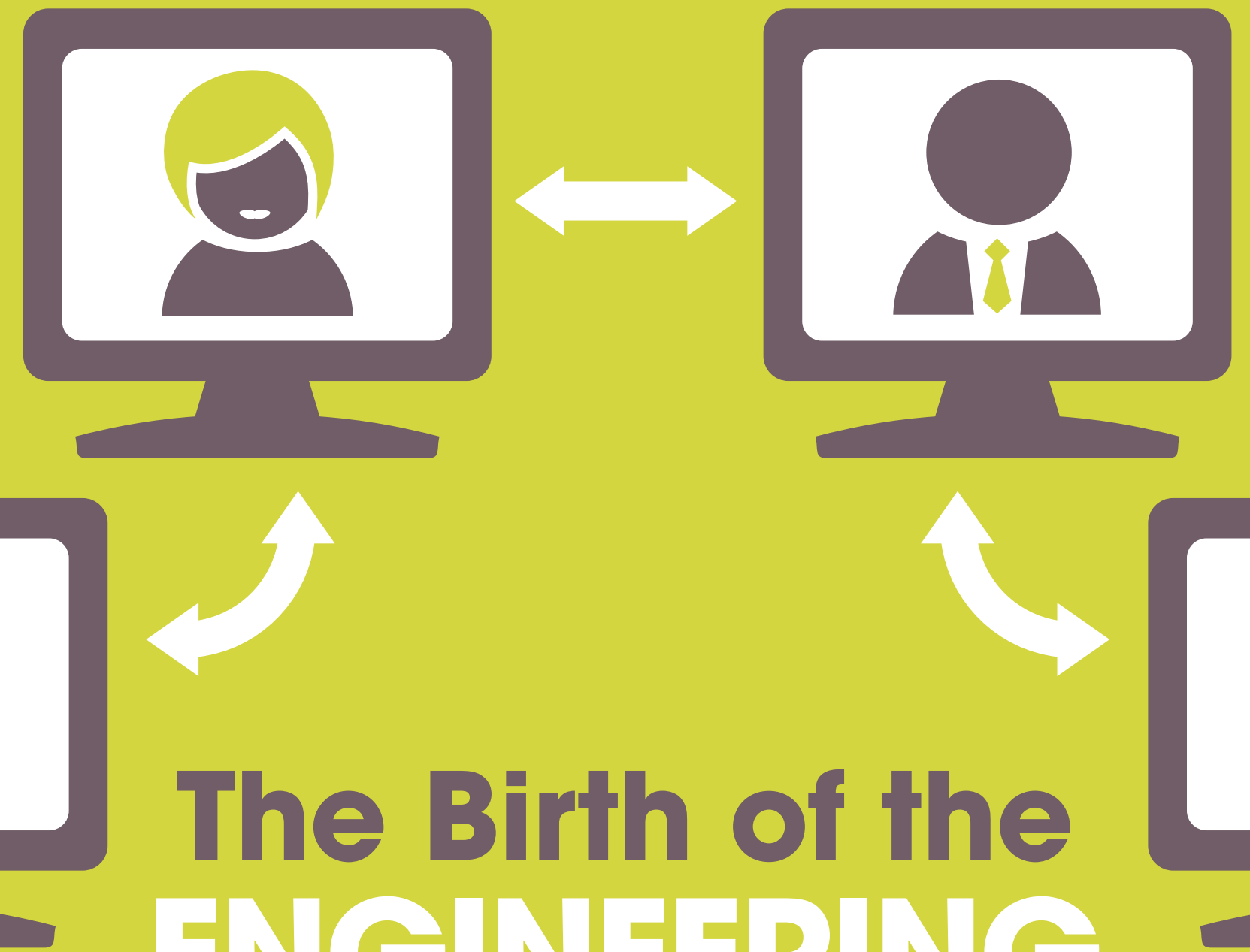
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The Birth of the ENGINEERING RENAISSANCE

By Andrew Back, co-founder, Solderpad

Developments in recent years suggest that we may be on the cusp of an engineering renaissance. Significant advances are being made in key areas such as tools, technology, principles and methodologies, and at the nexus of which is an ever growing desire and ability to engage in engineering practices.

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> “Social Web and tools for online collaboration, has served to accelerate the development of technical communities.”

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Individual developments in and of themselves may appear far from profound and in many cases it would be easy to trivialise these else simply regard them as temporal phenomena. However, when viewed as a part of a much larger shift their vitally important role and combined effect becomes apparent.

A period that spanned the nineteenth and early twentieth century can be seen as having given birth to many current engineering practices. Then, early innovation across technical disciplines frequently took place at a grassroots level and was often fuelled by an individual's desire to understand, experiment and invent. Recent developments are lowering the barriers to engaging in engineering practices and are fostering far-reaching social participation, and once again the amateur is playing a pivotal role.

Sustainable Communities

Some of the earliest adopters of new technology are intrepid non-experts that possess a do-it-yourself ethic, and as the level of interest has grown user groups and publications have sprung up to serve the needs of these nascent communities of interest. Examples of this have included amateur radio societies and magazines, home computing and tape recording clubs*. Whilst to a greater or lesser degree these have provided the support of a network and opportunities to share knowledge, their modes of communication were frequently broadcast (one-to-many) in nature and high latency, and the network limited in terms of discovery, growth, speed and potential.

The advent of the widespread availability of Internet access and beyond this the Social Web and tools for online collaboration, has served to accelerate the development of technical communities. Where previously a niche interest may have proved unable to sustain a community due to the relatively small number of actors involved and their geographic dispersion, such factors have largely been mitigated via online tools. From e-mail and mailing lists, through wikis and social networks, to electronic design tools and version control systems; much is now possible that not very long ago represented a major challenge and search/discovery, connectedness and instant many-to-many communications are now taken for granted.



Whilst online collaboration may be seen to have supplanted geographically organised groups this is not the case, and indeed it has given birth to many such groups and provided a medium for the transmission of patterns for collaboration that are centred upon a physical location. A canonical example of this being the recent proliferation of hackspaces – also known as hackerspaces, hacklabs or makerspaces. Typically autonomous in nature, these serve to provide a physical space where people with a shared interest in electronics, computing, science, art and much more can meet, share ideas and collaborate. The growth of which is perhaps not wholly dependent upon online tools, but these have clearly served to expedite both their development and proliferation.

> **"Thanks to online collaboration and unprecedented levels of connectedness there continues to be an exponential growth in innovation taking place amongst grassroots technical communities."**

The engineering social landscape today is almost unrecognisable when compared with the period spanning the birth of many current engineering practices and the advent of online collaboration. Related advances in recent years have spawned an explosive growth in engineering communities that are not only extremely diverse in nature but, importantly, increasingly inclusive. The significant positive effects of which may already be observed and we are only at the beginning of this journey.

Tools play a critical part in engineering and a lack of access to them can present a formidable barrier to entry. However, recent developments in low cost technologies and services for prototyping and manufacturing are helping to lower this barrier. For example, 3D printers

and laser cutters/engravers are now available in desktop configurations and are within the reach of the individual, and there has been a significant growth in services supporting PCB and hardware prototyping and small-scale manufacturing efforts, e.g. the Ponoko 'making system'*. The design artefacts for these more often than not lend themselves to collaborative development and are increasingly the product of a culture of sharing. Meanwhile, workshop tooling and electronic test equipment continues to become more affordable and community efforts ever more inventive, e.g. the RepRap self-replicating 3D printer* and the Pay It Forward printing initiative*.

This is not only good news for the individual and smaller enterprises but also for shared facilities such as hackspaces, which are subsequently able to better support a broad spectrum of creative practices with only modest funds. Whilst the spread of hackspaces means that the curious and new to engineering or those with limited resources are, with minimal commitment, able to gain access to tools and support in their use.

The Future is Open

The same principles that underpin the success of the Web and open source software are now driving a wider engineering paradigm shift; open collaboration, liberal licensing and empirical standards are enabling participation in the development of hardware, and the creation of novel approaches to many problems that were previously considered intractable for technical or economic reasons.

Whilst at first it might be difficult to imagine how methods employed in the development of open source software may be applied in support of the development of hardware, the last few years have given birth to countless projects which have gone on to demonstrate that the development processes are not so dissimilar. Noteworthy open source hardware (OSHW) projects include the aforementioned RepRap 3D printer, the Arduino microcontroller platform* and the crowd-funded USB protocol analyser, OpenVizsla*.

With open source hardware come new challenges, such as how to ensure the freedom of a design in perpetuity - as can be effected via the "copyleft" mechanism* with open source software - and how to enable online collaboration around design artefacts that take pictorial form rather than code. However, it is still relatively early days for OSHW when compared to the more mature open source software paradigm, and such issues will be addressed in due course.

The Role of Industry

Industry has a vital role to play in these developments and there are significant opportunities for grassroots communities and established commercial organisations to work together. Both in support of common goals such as fostering learning and the development of new technology, and in the creation of new jobs and market opportunities. However, organisations will typically need to look beyond familiar customer bases and sources of innovation to form these relationships, and it may prove useful to consider communities in a similar light to engineering schools and hackspaces to technology incubators.

As with commercial software solutions, it is not the case that commercial hardware must be assembled exclusively from either open or closed technologies and not a mixture of the two. OSHW can be combined with proprietary technology, subject to being able to comply with licensing conditions. Thus the OSHW opportunity is not limited to simply new and/or entirely "open" products, and indeed it is a great deal larger than this. For example, a group of manufacturers may choose to collaborate on the development of open source technology that is common to all their products but that is not their core business. Analogous to competing database vendors all contributing to the Linux kernel, this could be designs for e.g. safety controls, power supplies or interfacing. It is important to note that this is not the same as providing specifications alone or a restricted use reference design, and organisations that stand to gain the most from the OSHW development paradigm are those that participate with intent that is clear, honest and aligned with community principles.

Conclusion

Thanks to online collaboration and unprecedented levels of connectedness there continues to be an exponential growth in innovation taking place amongst grassroots technical communities. Recent advances in principles and methodologies, tools and technology are democratising the hardware development process, whilst fostering a growing interest in engineering practices and creating new market opportunities.
Whether you're new to the field or a veteran, and a hobbyist, at a start-up or with a long established organisation, this is an immensely exciting time to be involved in engineering as a dizzying spectrum of new possibilities opens up.



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JUST SQUEEZE.



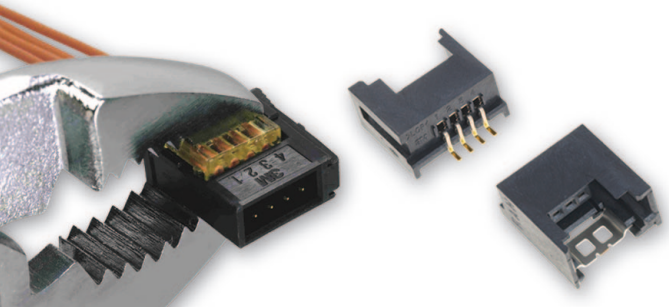
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The 3M Mini-Clamp Connector doesn't require any special tooling for wire preparation or termination. All you need is a pair of pliers. It accepts wire diameters ranging from 0.8 to 2.0 mm. The semi-transparent cover allows the IDC wire termination to be inspected for reduced maintenance work. Its compact design also saves board space. Get the 3M Mini-Clamp Connector and take advantage of proven IDC technology from 3M today.

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3M

Quick Questions



Key Facts	
Company name	**Peak Production Equipment**
Year established	**1984**
Location	**Letchworth, Hertfordshire**
Number of employees	**42**
Key market	**Electronics Manufacturing – principally Defence and Aerospace**
Website	**www.thepeakgroup.com**
Interviewee name	**Frank Nuttall**
Interviewee position	**Managing Director**

What is your latest product?
PXITest Desk and PXITest Rack.

What differentiates your products?
The quality of the build and the ease of access for engineers who use them.

What new technologies does your product employ?
It is not so much new technologies but using our experience of our market. Working with major aerospace, defence and automotive manufacturers on the development of test equipment for their new products, we get a good in-sight into emerging technologies and then employ this knowledge in our products.

Give an example of the impact one of your products has on, or the benefits it provides to, the end user.
Standard test racks have been around for some time now but they are not designed for the test market. When racks are filled with expensive electronic test equipment, they soon start to heat up when switched on and it is very common for this equipment to overheat and fail. Also, getting access to equipment installed in the rack can be extremely difficult. When we designed our test desk and rack, we thought of all these negative aspects and put in place solutions. For example, our equipment has space to allow for good air cooling, generated by fans installed both at the foot and top of the racks to ensure good circulation. They have access panels on the sides so engineers can gain easy access to their test instrumentation. We have also developed our own power distribution units, including safety e-stop circuitry.

How do you learn about new technologies?
We keep abreast of developments via the trade press and exhibitions but, more importantly, from our customers.
Test is often at the forefront of new technology as, for products to come to market, a test routine must be developed for them. We are actively involved in this process.

What RS service do you find most useful in your job and why?
The ability to purchase on-line, using a number of internal "buyers" for our account. This has speeded up the purchase process significantly and greatly improved our administration.

What technology do you foresee having the biggest impact on your next product?
The drive in test is always to obtain the quickest throughput of product but with the highest degree of confidence in the accuracy of the test process. The drive to "shrink" test instrumentation onto smaller instrument cards (pcbs), with faster processors / higher capacity will see a broader range of generic test instrumentation come to market and our challenge will be to keep pace with this technology.

What is the biggest threat to your business?
I suppose, ultimately, if electronics manufacturing technology developed to such a stage where manufacturers had complete confidence in their manufacturing processes, the need for test would disappear and, with it, us! Realistically though, I think there will always be a need to provide that "warm" feeling that products work as expected so the test industry will be around for a while yet. For ourselves, we cannot afford to be complacent but always to be looking to keep pace with changes in technology.

Where do you see your industry in 5 years?
Quicker, faster, better! The changes we have seen over the last ten years have been significant, largely driven by leaps in computer technology (processors, software etc) and there is nothing to suggest that the pace will slacken. The drive will be towards constantly improving the fit, form and function of test equipment and, although I cannot be sure where will be in five years time, I am sure we will be looking back to now and thinking "how archaic was that"!

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ERGONOMIC ELECTRONIC CUTTERS

A range of ESD cutters from Erem for use in precision and standard electronics applications

■ MagicSense moulded ESD soft-touch grips and internal Magic springs which provide constant spring force for over one million cycles.
Online search term: Erem ergo electronic cutters

ANSELL HYFLEX 11-125 ESD GLOVES

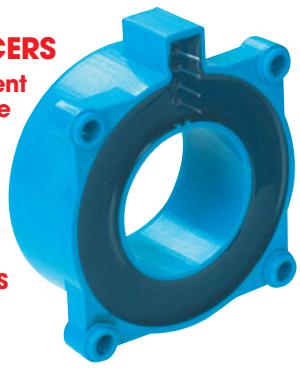
Outstanding comfort and product protection from ESD

■ **Hyflex 11-125 is especially designed for micro-electronic work where electro-static discharge (ESD) must be avoided. The thin design improves the handling of ever smaller components. Moreover, nitrile foam ensures that the gloves are guaranteed free of dimethyl formamide (DMF) ensuring that surfaces stay clean and uncontaminated.**
Online search term: Hyflex 11-125

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ESD screwdriver set with chrome vanadium molybdenum steel blade with matt chrome finish.

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Online search term: 469-7096



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Online search term: 724-3655

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Online search term: 537-2619

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CAMERA INTERVAL TIMER
With infrared remote control

By Jean-Pierre Gauthier (France)

As a passionate orchid-grower, I wanted to photograph these beautiful flowers as they opened, so as to understand and admire their blossoming. I first tried to do it using my camera's remote control, but that wasn't very practical. Taking a closer look at my camera's instructions, I noticed that the shutter and focus commands were accessible via a jack socket. That was just what I needed...



The camera shutter operating system described here makes it possible to take photos at a predefined interval, or to trigger two cameras together for stereoscopic shots. This device makes it possible, for example, to take a series of photos every 30 minutes of a flower as it opens, a baby bird hatching, etc. so as to include them in a video. The system was originally designed for a Canon EOS camera, but it can readily be adapted for other cameras that are able to be remote controlled.

The timer is capable of taking from 1 to 100 photos at intervals from 1 second to 59 minutes, 59 seconds, with or without pre-focusing. The parameters are stored in EEPROM. An alphanumeric LCD uses four lines of 20 characters to show the number of shots taken and display menus to help you configure the device. The backlight is controlled by the microcontroller.

If necessary, you can adjust the focus and shot at any time between shots by using a remote control compatible with Sony's SIRC protocol [3]. Once all the photos have been taken, the timer goes into stand-by mode to save power.

A simple circuit

Thanks to the use of a microcontroller, the circuit itself (Figure 1) has been kept simple: four push-buttons, a liquid crystal display, and a few additional components are all it takes to control the camera.
The shutter and focus commands are produced using two relays RE1 and RE2, driven by transistors T2 and T3. The two relays connect the contacts of the jack socket K6 to ground via the switches in S5. Figure 2 shows how to wire the jack so as to be compatible with a Canon camera.
Provision has been made for two additional terminal blocks (K4 and K5) in case the project is going to be used to drive something other than a Canon camera. In this case, the positions of the S5 switches depend on the application.

Each output has an LED to let you see at a distance if one of the relays is on or not. The buzzer BZ1 offers the possibility of producing an audible signal, for those instances where you might not be able to see the LEDs.
The remote control signal is picked up by IR detector IC3.
Transistor T1 is used to enable the backlight only when it is needed — a handy function that all too often still gets overlooked.
Thanks to regulator IC1, the circuit can be powered from any voltage between 8 and 12 Vdc.

Technical characteristics

- PIC16F886 microcontroller
- Compatible with Sony SIRC remote controls
- Number of photos programmable between 1 and 100
- Interval programmable between 1 and 3,599 s
- Automatic standby
- Optimised for Canon EOS camera, but can be used for any other purpose

Software

As for every microcontroller circuit, the software is what makes all the functions possible. Here, the software (available free from [1]) has been written in C and compiled using the free 'lite' version of the Hi-Tech C for PIC10/12/16 compiler (version 9.70) [2].

Interaction with the software is achieved via a series of menus, around which we navigate with the help of the four push-buttons S1–S4. Their function depends on the menu selected and is displayed on the LCD using little 'icons'.

If S1 is pressed while power is applied to the circuit, the software goes first into configuration mode before going into normal mode. A series of menus appear that let you configure the remote-control keys (Figures 3 and 4) that will be recognized by the timer (see Table 1, don't use the same code twice!) and the number of photos to be taken (Figure 5). In these menus, pressing S2 decreases the value displayed, while pressing S3 increases it. S1 lets you store the value in the EEPROM and go on to the next menu. S4 is only used in the third menu, where it offers the possibility of enabling the backlight.

In normal mode, a menu is displayed (Figure 6) that shows the status of the buzzer (S3) and pre-focus (S2). Pressing S4 brings up a new menu where S2 and S3 are used to set the time delay between shots from 0 to 3,599 seconds (i.e. 1 hour less 1 second, Figure 7). For user convenience, if you keep one of these two switches pressed, the value increases or decreases automatically. This function works in the other menus too.

Pressing S4 starts shooting. The Focus output is active for 400 ms ten seconds before each shot is taken (if pre-focusing has been enabled, of course). Depending on how the buzzer is configured, this event may be accompanied by an audible signal. Firing the Trigger output, also for 400 ms, also activates the buzzer (if enabled). The elapsed time is displayed briefly, and pressing S3 lets you mute the buzzer.
The number of photos taken is updated then displayed on the LCD after each shot (Figure 8). Pressing S4 for at least 2 s allows you to stop the count at any time and go back to the start menu.

If the timer finishes its program without being interrupted, it plays a little tune and then goes into stand-by. You then have to reboot it, or 'wake it up' using the remote control, followed by a long (at least 2 s) press on S4 to start a new series of photos.

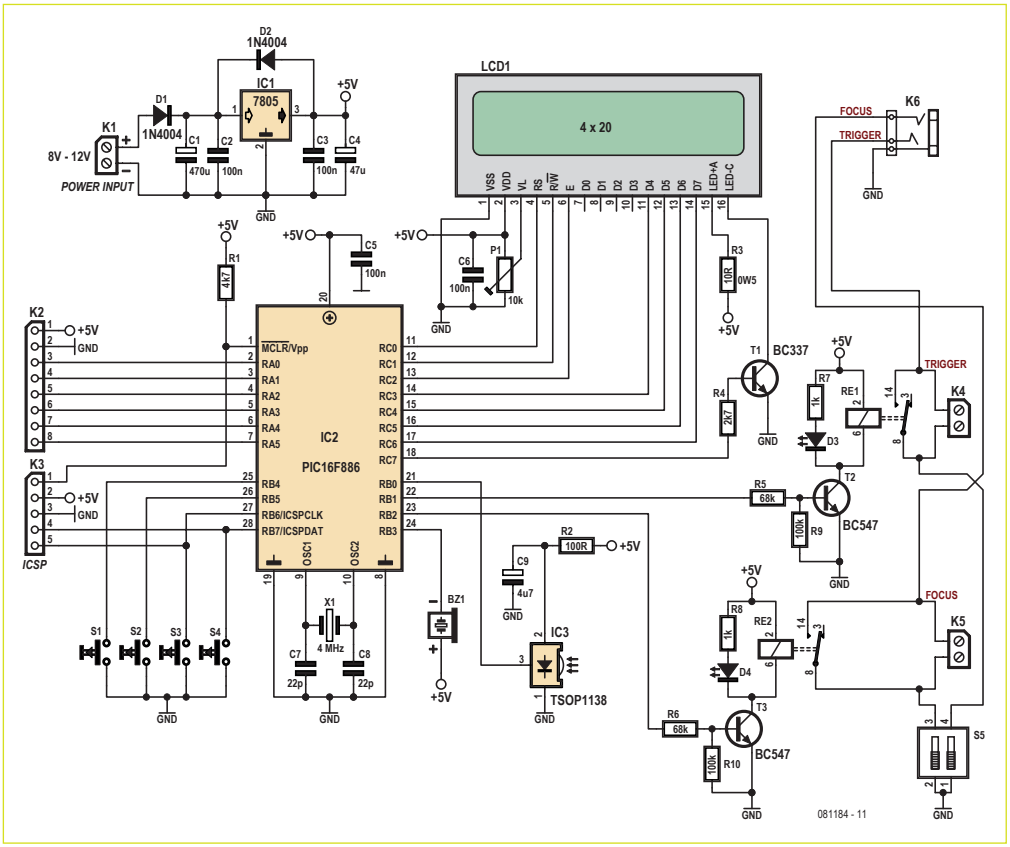


Figure 1. The timer is a basic microcontroller project.



Figure 2. Here's how to wire up the control plug for the Canon camera.

Table 1:
The codes for some of the keys on an SIRC remote control, as seen by the timer. It only accepts codes between 128 and 137, i.e. the '0' to '9' keys.

HEX	decimal	key
0x80	128	1
0x81	129	2
0x82	130	3
0x83	131	4
0x84	132	5
0x85	133	6
0x86	134	7
0x87	135	8
0x88	136	9
0x89	137	0
0x8C	140	1-
0x8D	141	2-
0x90	144	Program+
0x91	145	Program-
0x92	146	Volume+
0x93	147	Volume-
0x94	148	Mute
0x95	149	Standby
0x96	150	Normal
0xA5	165	TV/Video
0xB4	180	+
0xB5	181	-
0xB6	182	Sleep
0xBA	186	Display
0xBC	188	Select



Figure 3. Setting key 1 of the remote.



Figure 4. Setting key 2 of the remote.



Figure 5. Setting the number of photos to be taken.



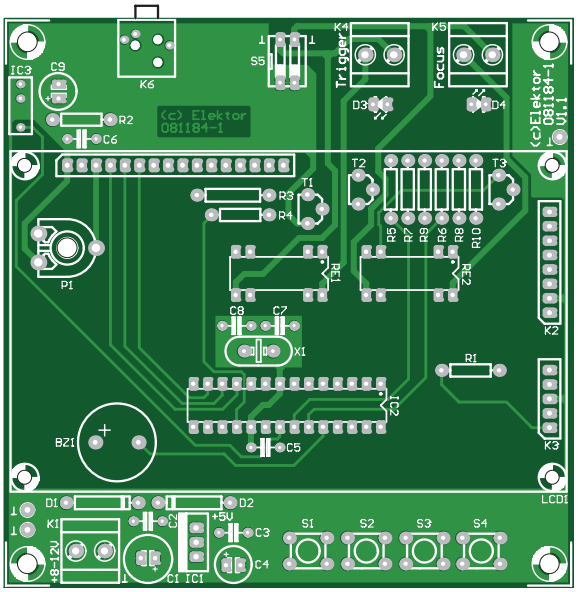
Figure 6. The first menu in 'Normal' mode.



Figure 7. Setting the interval between two shots.



Figure 8. The screen during shooting.



Component List

Resistors (5%, 0.25 W unless otherwise indicated)	RS Stock No.
R1 = 4.7kΩ	707-7726
R2 = 100Ω	707-7587
R3 = 10Ω, 0.5 W	707-8063
R4 = 2.7 kΩ	707-7704
R5,R6 = 68kΩ	707-7814
R7,R8 = 1kΩ	707-7666
R9,R10 = 100kΩ	707-7824
P1 = 10kΩ trimpot, horizontal	473-473

Capacitors	RS Stock No.
C1 = 470µF 25V radial	711-1110 or 628-3790
C2,C3,C5,C6 = 100nF ceramic	652-9995
C4 = 47µF 16V radial	706-0539 or 414-9036
C7,C8 = 22pF ceramic NP0	652-9838
C9 = 4.7µF 16V radial	188-2976

Semiconductors	RS Stock No.
D1,D2 = 1N4004	708-7975
D3,D4 = LED, red, low current, 3mm	708-2787
IC1 = 7805, TO-220 case	516-5938
IC2 = PIC16F886-I/SP, SPDIP28	399-432
IC3 = TSOP1138, 38 kHz IR receiver	708-5550
T1 = BC337	131-1430
T2,T3 = BC547	545-2248

Miscellaneous	RS Stock No.
BZ1 = piezo buzzer, lead pitch 7.62mm	535-8253
RE1,RE2 = relay, miniature SPST-NO, 5 VDC	256-2005
K1,K4,K5 = PCB terminal block, lead pitch 5mm	467-0388
K2 = 8-pin pinheader, lead pitch 0.1 inch	681-2997
K3 = 5-pin pinheader, lead pitch 0.1 inch	681-2981
K6 = 2.5mm 3-way jack socket	-
LCD1 = LCD, 4x20	720-0226 or 720-0235
S1-S4 = SPNO pushbutton	479-1413
S5 = 2-element DIP switch	712-2570
X1 = 4MHz quartz crystal	693-6936
SPDIP28 socket for IC2	600-7877
PCB, Elektor # 081184-1 [1]	

Remote control

As indicated above, the timer can be controlled by a Sony remote control or any other remote capable of 'speaking' SIRC [3] — for example, a 'universal' remote. The remote lets you activate the Trigger or Focus outputs manually at any moment (except in stand-by) without affecting the program currently running. It also lets you 'wake up' the circuit, in association with S4. This is possible through the use of an external interrupt, provided by IC3.



If your version of the timer works first time, it's thanks to Daniel in the Elektor lab. If it doesn't work, then it's entirely your own fault.

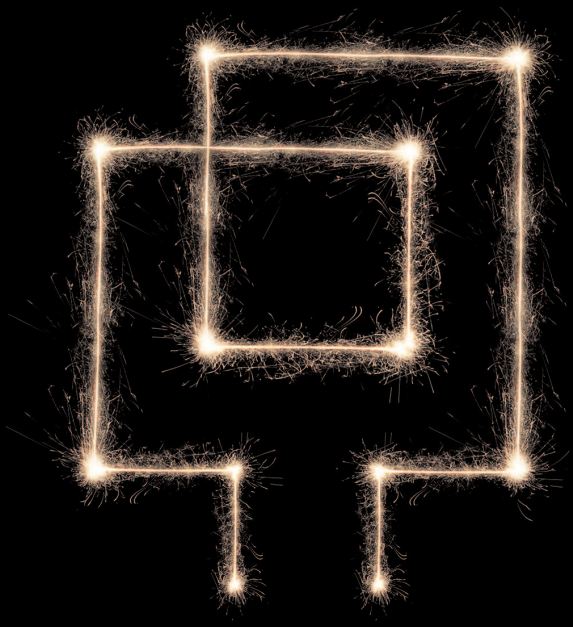
Table 1 shows the correspondence between the remote control key number (as seen by the timer) and its function as envisaged by Sony. (081184)

Internet Links
[1] www.elektor.com/081184
[2] www.htsoft.com/downloads/
[3] picprojects.org.uk/projects/sirc/

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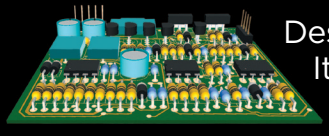
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How to play:

As with standard sudoku, every row and column and 3 x 3 square must contain the numbers 1 through 9 exactly once. The grid is composed of shapes with a dotted outline. At the top of each shape is a number, this signifies the sum of the cell. For example; if there is a shape composed of two cells with a '3' in the corner, the total of those cells is '3'. From that you can tell that the values of the cells must be '1' and '2' or '2' and '1'. It is not permitted to repeat a number in a shape. If you have a sum of 8 across three cells, this cannot be '2', '4', '2' as the '2' is then repeated in the shape.

No numbers are placed in the grid to start with, unlike in normal sudoku; however you can work out every number withno guesswork but applying logic alone to reach the unique solution for each puzzle.

17		11	22		18		25
14						12	
	7	20	28	13			29
17					7		
						21	
	23	10		5			9
		14	33				12
				11	17		
							10

Name: .....

Job Title: .....

Ship-To-Number: .....

Tel: .....

E-mail: .....

Send your completed Sudoku to:
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Answers can be found at

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How well do you know Silicon?

1 How many valence electrons does Silicon have?

a.

2 What element is added to Silicon in the production of transistors to increase the number of free electrons?

a.

3 Who in 1824 discovered the element silicon?

a.



4 Does the density of Silicon increase or decrease when moving from a solid to a liquid state?

a.

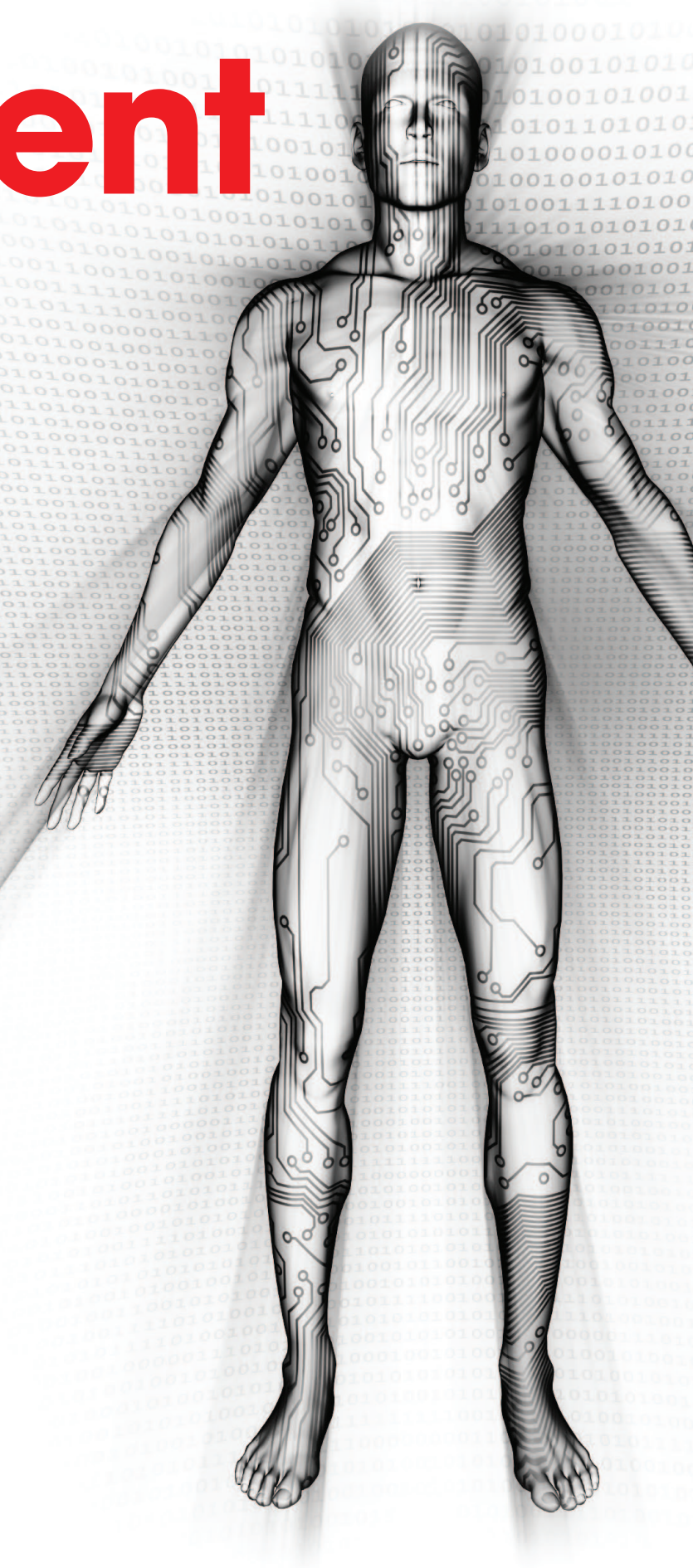
5 By mass, approximately how much of the Earth's crust is made from Silicon?

a.

Match the Unusual Units of Measurement with the Definitions

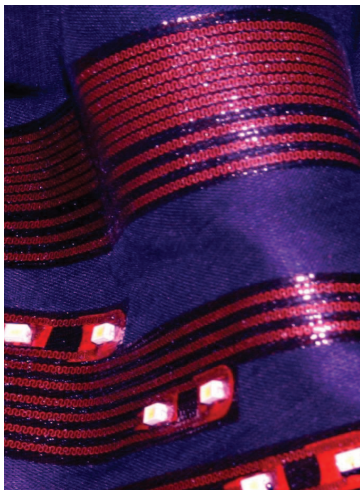
FLOPS	A measure of quantity of data or information, equal to 4-bits
Shake	Unit of energy equal to 1044 joules
Furman	Unit of measure for pain
Foe	Dimensionless unit used in telephony as a statistical measure of telecommunications
Jansky	Measure of hotness of a chilli pepper
Nibble	Unit of electromagnetic flux used in radio astronomy
Erlang	A measure of computing power
Scoville	A measure of kinematic viscosity defined as 1cm2/s
Stokes	An angular measurement equal to 1/65,536 of a circle
Dol	A short period of time, equal to 10ns

Intelligent Fabric



Electronics and microsystems can be integrated into even the most delicate clothing fabrics – and not only displays and light-emitting diodes, but also sensors and control electronics.

The secret lies in stretchable circuit boards which are currently being developed by scientists at the Fraunhofer Institute for Reliability and Microintegration IAM in Berlin in collaboration with researchers at the Berlin University of Technology as part of the European research project "Place IT". The substrate material is a flexible thermoplastic polyurethane (TPU) foil . TPU is already widely used in the textile industry due to its excellent resistance to wear and tear. The conductor tracks are structured into the substrate in tiny meander patterns, allowing them to stretch.



There is a broad range of potential products. Intelligent fabrics can be used in any application that requires body data to be measured and monitored – examples include a shirt that monitors babies' breathing to prevent sudden cot death, and an "intelligent" bandage capable of detecting secretions or using pressure readings to ensure the bandage is not too tight. The researchers are also developing plasters that use electrical stimulations to accelerate wound healing.

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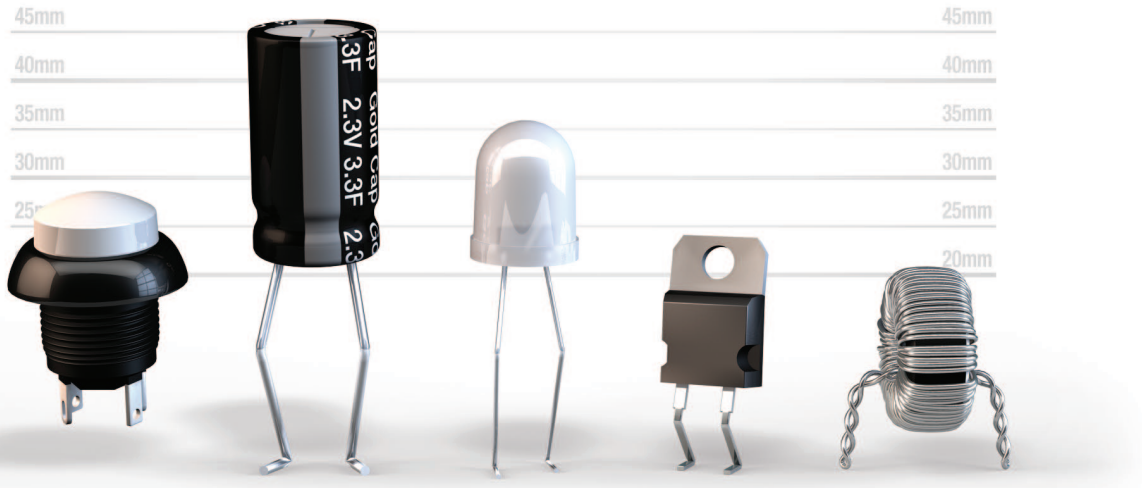
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