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AND THE REST OF US!

## REVIEWS

ASUS TRANSFORMER PAD  
TF103C, LG G3, GIGABYTE BRIX  
GAMING, INTEL 4970K, LEICA T,  
NETGEAR, NIGHTHAWK X6,  
NOKIA 630 AND MORE!



## HOW TO:

BUILD YOUR  
WEB SITE  
WITH THE  
APP WE'RE  
GIVING AWAY!  
FULL TUTORIAL



## STEAM MACHINES

IS THIS THE OS TO TOPPLE MICROSOFT?



## TALES FROM TECH SUPPORT

LAUGH, CRY, AND LEARN



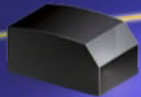
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# A little bit faster, now

The never ending quest for unnecessarily powerful PCs.

I do say this quite often, but this really is a fantastic time to give your PC some love. In these pages we review almost everything, and I'm in the fortunate position to be able to run a lot of the gear in my own home PC. I've in fact formalised this process by creating the Editor's Choice box, which we run in the A-List each issue. We added quite a lot to the other bits within A-List, so I simply didn't have the space on that page to update you on the changes I've made in the last couple of weeks. So, right here is the BenBox news:

## Graphics

Initially the build was based on a Radeon 290x (an Asus DirectCU II OC), and it's a gem of a card. But when the AMD 295 arrived in the Labs I gave it a run at home and quickly fell in love with its remarkable quietness, and of course, the insane performance. I haven't been a Crossfire fan in the past, but AMD's dual-GPU implementation have made me a convert.

## Storage

The first build included WD's hybrid WD Black2 drive, along

with several pure SSDs. The Black2 has 128GB of SSD space and 1GB of spinning hard drive. It turned out that I just wasn't using the 1GB of HDD because putting large or infrequently accessed files on the NAS instead gave almost as quick access times, and the 128GB of SSD just wasn't enough to warrant a permanent installation. Now – if you have this drive it's fantastic to use the SSD as a boot drive, but it just wasn't getting used in my own box. So out it went, and in went SanDisk's new Extreme Pro, which is used almost exclusively as a Steam drive.

Later in the year I'll make the jump to an X99 board, and probably update the CPU – as my 4770K seems to be from an unlucky batch that just won't overclock by any useful amount.

The fun will continue, and I hope that you, too, are relishing our scene, in which the PC gives as much back as you put in.



**Ben Mansill**  
Editor

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## REAL TECH ADVICE YOU CAN TRUST!

- Our tests are performed by experienced reviewers in our Labs in accordance with strict benchmarking procedures
- Our brand new benchmarks have been tailor-made to reflect real-world computing needs
- We put tech through its paces – seriously. From processing power to battery life, from usability to screen brightness, our tests are exhaustive
- We will always offer an honest and unbiased opinion for every review

## THE TEAM...



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"No worries, I'll just write it again for you" (David's champ response to Ben accidentally deleting his game review).



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I have a new motorbike

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# Inbox

if you have a story or point to make, send it in!  
tell us your anecdotes, opinions & tales of woe

## LETTER OF THE MONTH

I've just finished reading the story on the thirteen computers that changed the world [PC&TA August - Ed], I wished that the Tandy TRS80 and the Australian MicroBee (my first and second computers) had made the list, but they're up against stiff competition.

Speaking of old computers, do you want some of the *PC Authority* paper issues from 1998 and 1999 in excellent condition? This was the golden era of computers "3D Cards Game on!", "Voodoo2 vs Nvidia Riva TNT" and the "Pentium Killer? AMD's 600MHz Athlon on test" are some of the stories from that period.

### Les Overs

**Ben Mansill** replies: We received quite a few nice comments about that feature story! I think pieces like this provide terrific perspective, and perhaps, too, let us realise that every era is a golden age. One day in the future we'll surely also look back upon the scene we have today with similar fondness (and perhaps just a little giggle about how slow our PCs 'were'). We took Les up on his offer and now possess quite the collection of vintage *PC Authority* (before the '& Tech' was added) magazines. Look out in the next issue for a bit of a look back at those wonderful pages.

## M.2 TO BOOT

Has any of the motherboard manufacturers modified their bios to boot from M.2 HDD?

### Frank Heads

**Ben Mansill** replies: M.2 will be where the action is in the months ahead, or, right now if you're a *PC&TA* reader. Turn to page 28 for a nice explainer feature on all of the cool new flash storage options.

But yes – motherboards with an M.2 socket have been able to boot these drives since launch, and without a special driver or BIOS upgrade. The exception is M.2 drives without Legacy Option ROM or UEFI driver support (the Samsung XP941 falls into this category), but

BIOS updates are already available from the big four (Asus, Gigabyte, MSI and Asrock) to add bootable OS support to these drives too. You will also need to set the 'Boot\Secure Boot Menu\OS Type' to 'Other OS' to support UEFI Windows installation onto M.2 SSDs.

## ZINIO PC&TA

I subscribe to the Zinio online version of your excellent magazine. I enjoy *PC&TA* – it's definitely one of the better PC and tech related mags available today.

I was wondering – is an online database / catalogue of magazine content? What made me wonder about this was that I want to buy a NAS and I vaguely remember reading about a comparative test of NAS devices. Rather than laboriously opening up every edition of the magazine that I have and searching for articles on NAS drives, I went to the website hoping to find an index / catalogue etc of some kind. I didn't find one. My question to you is – is there a listing of some kind?

### Russell Southey

**Ben Mansill** replies: Alas, Russell, there is not. Once upon a time we did have grand plans for such a thing, but the logistics made realising that dream beyond our capacity. It's also related to the website and that we only put select content up, while only the magazine, Zinio version and iPad app have it all. For the NAS roundup you want issue 197.

# RAZER WINNERS

This month's letter of the month as well as best site comment will receive Razer Adaro stereo headphones valued at \$149.95.  
[www.razerzone.com/au](http://www.razerzone.com/au)



## TOP SITE COMMENTS

### Comment of the month

The main issue is that a social network is as good/useful as the number of people you know that are using it. Even Google is having a hard time getting a perfectly good social network to attract people. In the end if there is no one I know on it then there is no point in me lurking around. So the only viable options left are to stay with Facebook or leave Facebook, and therefore it becomes a matter of cost/benefit (where the cost is our souls and the benefit is staying together and breaking the illusion of separation). It's a tough call honestly.

**AncientWisdom on whether to stick with Facebook.**

The new Windows 8 start menu is \*not\* that big of deal really. If someone wants the old Start menu back, just use the program Start8 (a replica of the old Start menu).

**digitbyte on the most missed feature of Windows.**

John Hurt and Ian Holm not interested in video games? Or perhaps too old now? Or maybe wrong continent?

**FourEyedGeek on the lack of the two actors from Alien: Isolation**

Hopefully Corsair have improved the software. I had the M90 and I was not a fan of the Corsair config software. I've since moved onto the Razer Ouroboros and am much happier.

**dr\_h comments on Corsair's new mouse releases**



## Want to get in touch?

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Please limit letters to 200 words, where possible. Letters may be edited for style and to a more suitable length.

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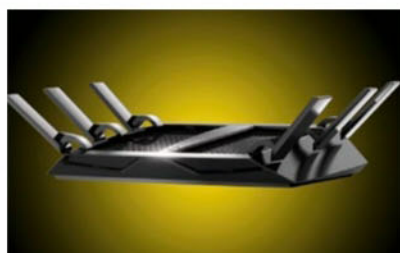




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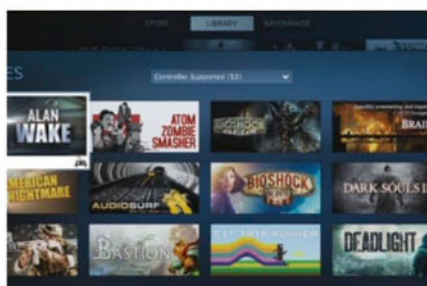


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**HOW TO STEAM BOX 86**

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# Tech News

The latest trends and products in the world of technology

## SHOP ONLINE WITH FACEBOOK



FACEBOOK AND TWITTER BOTH LOOKING TO MOVE BEYOND ADVERTISING.

**F**acebook is trialing a feature that will let people buy third-party products directly from its website.

The "Buy" button, which will appear on ads and Page posts, will enable "people on desktop or mobile ... purchase a product directly from a business, without leaving Facebook," the company said in a post to its business news section.

The social media company will also manage payment processing.

Facebook said it has taken steps to ensure the process is "safe and secure", promising that it will not share payment information with advertisers. Users can also choose whether or not to save their card details with the site.

Currently, only SMBs in the US are being invited to test the feature, with the company saying it will "share more information as [it gathers] feedback".

Twitter, too, is working on a similar system, following its acquisition of

CardSpring - an API that lets developers create online coupons, loyalty cards and virtual currencies that work with credit and debit cards.

Twitter revealed less detail on its system than Facebook, with the company saying only that it will use CardSpring's technology to enable "in-the-moment commerce experiences".

On its own blog, CardSpring said it will "continue to ... work with [its] publisher, financial and retail partners to create new, innovative commerce experiences for customers" as part of Twitter.

This is the latest step in the companies' battles to generate profit from ads.

Facebook has been quite successful in this area so far, generating US\$642 million profit in April this year, spurred mainly by mobile advertising. Twitter, meanwhile, hasn't seen the same level of gain. While its revenue more than doubled in the last quarter of 2013, it has yet to turn a profit.



## SCIENTISTS FIND A WAY TO CHARGE YOUR PHONE WITH DROPS OF WATER

MIT RESEARCHERS RECKON YOU CAN TOP UP A BATTERY WITH NOTHING BUT WATER – AND A FEW SPARE HOURS.

Researchers at MIT have discovered a way to harvest an electrical charge from water droplets – and the principle could form the basis for future gadget chargers.

As water condenses (think dewdrops) it can be made to jump from one specially-treated surface to a copper plate, gaining a tiny electrical charge in the process.

The charge may be small, but by building a special device consisting of interleaved metal plates (any conductive metal will work, so it could be made from aluminium, much cheaper than copper) enough energy could be harnessed to charge a mobile phone or other device.

It wouldn't be a quick process – the researchers estimate it'd take a cube-shaped charger measuring 50cm on each side about 12 hours to fully charge a phone – but in remote areas where electricity isn't readily available, it could prove a lifesaver. Literally. Of course, only charging the phone or other device with just enough juice so an emergency call can be placed will be a much quicker and more practical process. Either way, the right materials will need to be on hand.

There are other constraints besides time and tools: as water needs to condense, the process needs to take place in a humid environment and in a location that's colder than the surrounding air. A cave or river in a rainforest would work.

## OMNIFONE TO POWER PONO'S HI-RES MUSIC SERVICE

OMNIFONE HAS BEEN CHOSEN AS THE "CONTENT DELIVERY PARTNER" FOR PONOMUSIC'S HAUL OF STUDIO-QUALITY RECORDINGS.

**P**onoMusic, the Hi-Res music service that will accompany the PonoPlayer portable device, has formed a partnership with long-running online music platform Omnifone.

Omnifone, which owns the cloud-based music service MusicStation (on which, among others, Sony's Music Unlimited runs), has been stockpiling studio master quality Hi-Res Audio files since 2006, already delivers fully lossless WAV and FLAC audio to its customers, and has promised to add DSD format files in the future. So it's already a pretty big deal when it comes to Hi-Res Audio, and the deal with Pono should only enhance its reputation.

It works both ways, of course, and Omnifone's infrastructure and tech should also help to establish PonoMusic in a crowded market as one of the premier Hi-Res Audio download services.

The PonoPlayer is the third highest grossing Kickstarter project so far, and is partly the brainchild of rock legend Neil Young (who has just taken over as CEO of Pono). The player will have 128GB of memory (those Hi-Res files take up a lot of space, you see) and two sets of audio outputs: one designed for headphones and one for connecting the player to a car or home stereo. The device will be priced at US\$399, and there's no definite news yet on Australian availability.



# MICROSOFT AXES 18,000 JOBS

MAJORITY OF WORKERS WILL BE LOST FROM NOKIA DIVISION.

**1**8,000 Microsoft employees will find themselves out of a job within the next six months, with the majority coming from the Nokia Devices and Services division.

In a letter to employees, CEO Satya Nadella said the decision was taken to build "the right organisation for [Microsoft's] ambitions" and "work towards synergies and alignments" following the acquisition of Nokia.

12,500 employees in the Devices and Services division will be made redundant, along with 5,500 from other areas of the business.

The loss of 12,500 former Nokia employees is, sadly for them, entirely predictable. Microsoft had a phone division in place and already staffed. It wasn't going to cull its own when newcomers were available to take the chop. The other redundancies were entirely predictable too, and quite possibly the first of a number of significant lay-offs to come. Microsoft is massively bloated and arguably out of control. It has to fix this, and fix it soon."

According to Nadella, Microsoft is "moving now to start reducing the first 13,000 positions", adding the "vast majority" of the remaining 5,000 employees set to be axed will be informed of the decision by January.

This is the most significant cut

in jobs the company has made in its 39-year history, representing 14% of its 127,000-strong global workforce.

CEO Nadella has been hinting at significant changes to Microsoft's organisational structure over the past few days and weeks.

On Friday 11 July, he issued a letter to employees about his vision for the company, stating "job responsibilities will evolve" and "priorities will be adjusted [and] processes will be simplified" - a phrase reiterated in this most recent letter.

Nadella described the decision as "difficult, but necessary", and promised all employees made redundant will be offered severance packages, adding that "everyone can expect to be treated with the respect they deserve for their contributions to this company".

It is not just jobs that are being axed either. The company's Nokia X Android devices, launched in February, also face the chop.

While it seems the relatively recent move to using arch-rival Google's

Android OS, the line will be mostly discontinued, while certain "select ... product designs" will be transformed into Lumia products running on Windows Phone.

"This builds on our success in the affordable smartphone space and aligns with our focus on Windows Universal Apps," he said.



## HOT... OR NOT

**HOT**

### OCULUS RIFT DEV KIT 2

A year after the now historic first dev Rift was released, the tweaked and improved version is now available. Well, sort of available. We've ordered ours, but the wait may be months... it features full 6-degrees of freedom head tracking, 960x1080 resolution and a low persistence OLED display.



**NOT**

### JAVA ASK TOOLBAR

We need Java on our PCs. We tolerate updates as frequent as a typical Adobe product. We should be able to trust a giant like Oracle. So why the flaming heck do they still try and shove Ask Toolbar onto our system? EVERY TIME! It's disgusting behaviour and we'd boycott Java in a second if it wasn't required by our favourite apps.



## GIGABYTE RELEASES NEW VERSION OF EASYTUNE

NEW ITERATION OF OVERCLOCKING APPLICATION BUILT WITH NEW Z87/Z97 BOARDS AND THE PENTIUM ANNIVERSARY EDITION IN MIND.

If you're a little leery of messing about in the BIOS to get your clocks running fast and smooth, Gigabyte's EasyTune app is made for you.

EasyTune's been around for a while, and is usually packaged along with new new Gigabyte mobos. However it works just as well as a standalone utility, and the latest

release has just come out.

Promising 'one-click overclocking' (we remember when you had to draw on your AMD Duron with a pencil to overclock!), the latest release is specially timed to work with new Z97 and Z87 motherboards, and the new chip release from Intel, the dual-core Pentium Anniversary Edition.



# Gaming News

All the news that's fit to print from the gaming world

## PC GAMING MARKET WORTH A LOT MORE THAN CONSOLES

ANALYST FINDS ONE PC SEGMENT THAT IS GOING GREAT GUNS

A statistic that PC naysayers love to reference is the steady decline of PC sales. Tablets, smartphones, and - many claim - gaming consoles are eating into the traditional market of the desktop PC we love.

Or so it seems.

While other devices might be slowing down notebook or general use PC sales, PC gaming is still worth far more money than the console market. Analyst Jon Peddie Research crunched the numbers and came up with a global dollar value for the current financial year of \$US21.5 billion - which is double the console market. This covers everything from the internal hardware of PCs, from processors to graphics cards, to peripherals such as keyboards and mice. While speculative, by 2017, that

number could be as high as \$US23.1 billion.

The reason that gamers are sticking with PCs is because of the power of the platform. "Committed PC gamers are generally not interested in pure content consumption platforms," said JPR's senior gaming analyst, Ted Pollak. "They are power users and pay thousands for the ability to play games at very high settings and then do business, video/photo editing, content creation and other tasks with maximum horsepower at their disposal in a desktop ergonomic environment."

"Nvidia, Intel, and AMD have enthusiast CPUs and GPUs that are so powerful," added JPR President Jon Peddie, "when combined with SSD's and fast memory they absolutely trounce the computing power and gaming capabilities of the newest console generation."



## WARMACHINE: TACTICS HITS STEAM EARLY ACCESS

TURN-BASED, STEAM- AND MAGIC-POWERED COMBAT LEAVES THE TABLETOP, FOR YOUR DESKTOP.

If you like your fantasy with a touch of steam and steel, then *Warmachine* - in any incarnation - might just be the perfect game for you.

*Warmachine* is a tabletop wargame in the mould of the popular Warhammer games, but with a decided steampunk flavour. Giant Steamjacks stride across battlefields while Warcasters control their creations and cast numerous fell magics. It's a low-model-count game of pretty serious tactics. It's a popular alternative to Games Workshop's famous Warhammer games.

And now, it's on PC and Mac, as well.

The *Warmachine: Tactics* kickstarter campaign was a phenomenal success, and backers have been enjoying the fruits of their charity since last month. But now anyone can join in, thanks to the game showing up today on Steam's Early Access program.

It's a bit costly - the game is \$US64.95 - and that only allows access to a single level of singleplayer, and one map for multiplayer. The cost, however, does include all updates and the full game upon release, plus 20 additional units for your armies.

At the moment, however, the game is earning a lot of negative reviews for the high-cost and limited amount of content. It's a reminder that Steam's Early Access is really tricky to get right. Still, backers seem pleased, so who can say. When the game's in a more complete state we'll check it out.

## XBOX ENTERTAINMENT STUDIOS SHUTTERED BY MICROSOFT

XBOX TELEVISION STUDIO CLOSED AMID MASSIVE LAYOFFS. BUT HALO TV SERIES IS SAFE

Mixed in among the 18,000 layoffs announced by a stream-lined Microsoft is the Netflix-inspired Xbox Entertainment Studios. The Studio was planning to work on and launch a raft of projects under the Xbox Originals moniker, including an adaptation of pen and paper roleplaying game *Deadlands*, and a US version of the Scandinavian show *Real Humans*.

These projects, and more, will now no longer be pursued.

343 Industries will however continue to work on *Halo: Nightfall* and the *Halo*

television series. Meanwhile, former Microsoft besties Bungie are the talk of the town with *Destiny* looking to be a hit.







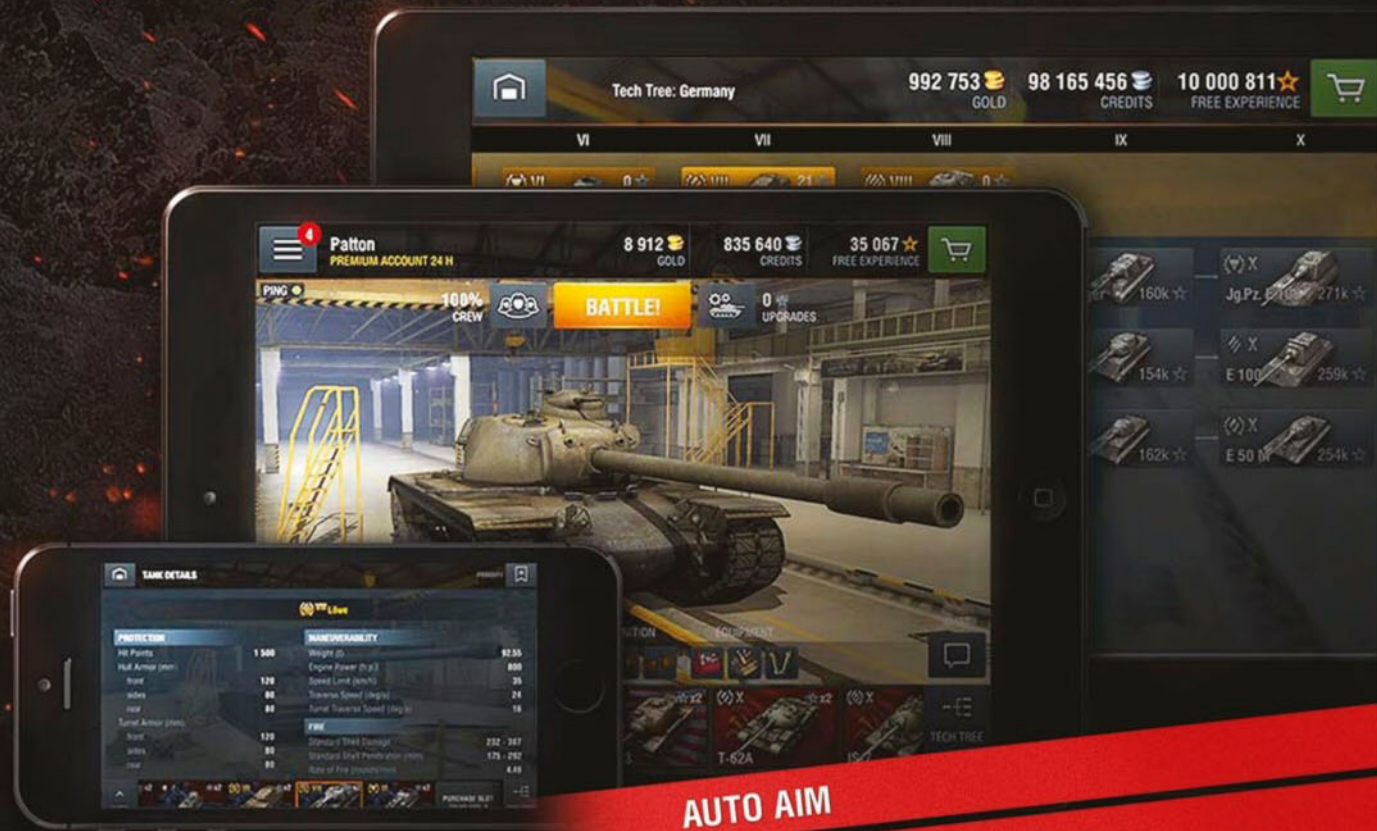
# WORLD OF TANKS BLITZ

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TEAM-BASED ONLINE BATTLES ON  
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# Chip News

Intel broadly does well as VIA resurrects Isaiah, and MIT NoCs our SoCs off as K|JINGP|N bowls over 2GHz. Confused? **Mark Williams** reports the latest chip news.

## CPU

### MOBILE BROADWELL SOON, DESKTOP LATER

Intel gave a small peak of its new Broadwell-architected parts at Computex recently. A few prototype laptop designs sporting the new chip were on show, many thinner than recent Mac Books and completely fanless.

Based on Intel's newly developed 14nm fabrication process it's expected Broadwell will bring some 30% odd savings in power. The good news is that laptop Broadwell parts are scheduled for release in August, the bad news is that desktop parts won't appear until early 2015.

### ISAIAH RETURNS

The only other chipmaker apart from AMD with a license to make x86 compatible chips, VIA Technology, has come from nowhere after a 2.5 year product drought since their 2011 'VIA Nano X2' branded processor (based on their 2008 'Isaiah' architecture) to show off a new CPU they're currently sampling. Dubbed 'Isaiah II' this is presumably a

rework of their previous architecture. Still sporting 64bit, it now has 4 cores and also supports many modern instruction sets like AVX2.0. Demonstrating it against an Intel Atom Z3770 (2W, quad core Bay Trail at 2.4GHz) and an AMD Athlon 5350 (25W, quad core Jaguar at 2.05GHz), like their previous Nano products, it's aimed squarely at the low performance, low power sector still. Bench in SANDRA, the Isaiah II at 2GHz holds up pretty well against the competition, trouncing the Atom in all metrics and swapping blows with the Athlon product. Expect to see availability in August.

### EXPERIMENTAL MIT CHIP

A group at MIT University have designed an experimental CPU dubbed 'Scorpio' to solve some upcoming CPU limitations. Their aim was to solve the problem of having many cores effectively communicate with each other as traditional bus layouts can only scale to around 8-10 cores efficiently. Their solution is a Network on Chip (NoC) design.

Each of its 36 cores sits in a mesh network on the die, each with its own router with communications occurring much like a LAN network. They also solved the big problem of cache coherency across so many cores, with a synthetic performance increase in this regard some 13-24% over current methodologies. When finalised, the designs will be open sourced and could lay the foundation of future many core SoCs.



## GPU

### TONGA

In a bid to counter Nvidia's recent power efficient Maxwell parts, word has spread that AMD has a codenamed 'Tonga' GPU in the works to replace its R9 280 and/or 270X parts that architecturally are quite old, being based essentially on the HD7870 GPU. This update should finally bring in the GCN2.0 architecture to AMD's mid-range parts as well as help with power draw and the size of the GPU die (and thus costs). Expected to feature 2048 stream



processors, 128 TMUs, 32 ROPs, and a 2GB GDDR5 frame buffer on a 256-bit wide memory interface, these should prove a nice replacement part for AMD's current line-up. Although the 256-bit memory interface is less than the R9 280's 384-bit one, higher clock speeds and more efficient architecture should more than make up for that shortcoming. Whispers suggest these could launch sometime in August.

### 2GHZ BARRIER BROKEN

Renowned overclockers K|JINGP|N and Tin were handed an EVGA GeForce GTX 780 Ti Classified K|JINGP|N Edition card for some torture testing. The result was a new GPU frequency world record of 2025MHz which allowed them to smash out an amazing 3DMark Firestrike Extreme score of 8793. Well done, lads!

### NVIDIA LEAK

Some pictures and specs have leaked of Nvidia's supposed next heavy hitting GPU.

Previous rumours said the tape out of Nvidia's GK104 replacement, the GM204, was to happen around April with availability late this year possibly early next year. The leaked pictures of the prototype seem to confirm that theory and if things go well could be available before year end.

With TSMC still stumped on making 20nm a reality, this chip will also be made on the venerable 28nm process.

The Maxwell architecture should mitigate much of the power requirement of staying on the 28nm process, much like the GTX 750 Ti has done. This chip should just be a supersized GTX 750 Ti, with a rumoured 7.9 billion transistors, 3200 CUDA cores, 200 TMUs, 32 ROPs, 256-bit wide GDDR5 memory interface and a 4GB frame buffer.

Pictures show an 8+6+6 pin configuration for power connectors implying a greater than 300W part, but being a prototype board this'll likely reduce down to an 8+6 or even 6+6 when it eventually gets to consumers.



# FIND YOUR PERFECT DISPLAY

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If there is one part of the computer that interacts with the users the most, it will have to be the monitor. The monitor acts as the key communication bridge between the computer system and its users, which also translates into the everyday usage experience, making it one of the most vital parts of your system. ASUS continues its search of incredible, and is proud to announce the launch of the three hero monitors to the Australian market, namely, the ROG SWIFT PG278Q, PB287Q and PB279Q, aimed to deliver the perfection to your everyday visual experience.

## PB279Q, THE DREAM MONITOR FOR THE PROFESSIONALS

Professionals often desire for the biggest possible desktop space under the same physical size for the best possible efficiency, as well as having rich display colour in great accuracy from all angles. This is exactly what triggers the birth of this new professional monitor. Following the path set out by the award winning PB278Q, the PB279Q offers the beautiful 10-bit colour IPS Technology based 4K UHD display with the accurate 100% sRGB colour gamut under the incredible 178°/178°

▼ Supreme colour accuracy is critical in professional applications, and the ASUS PB279Q delivers!



wide viewing angle. The ASUS exclusive SplendidPlus, Flicker-free technology, Low Blue Light and VividPixel, assures sharp and crystal clear details is presented with great comfort. Its rich input ports (1 x mDP, 1 x DP, 4 x HDMI/MHL) support up to two Picture-In-Picture and four Picture-By-Picture input

**“Good monitors are great when they are used to fulfil the needs of its users.”**



▲ The ASUS PG278Q is packed with virtually all the top gaming feature you can imagine, including the stunning Nvidia G-SYNC.

is just perfect for the unique professional environment such as security systems, where each monitors may be used for multiple purposes. If you loved our PB278Q, then the PB279Q is one monitor you cannot afford to miss out.

## ROG SWIFT PG278Q, INSPIRED BY GAMERS, DESIGNED FOR GAMERS

The ROG SWIFT PG278Q stretches 27 inches across the diagonal, with an ultra thin bezel of just 6mm, and an ergonomic stand with full tilt, swivel, pivot, and height adjustment ability is the perfect gear for both single and multi-monitor gaming purposes. Its



▲ Step up to 4K with the remarkable ASUS PB287Q, a highly desirable piece of equipment for enthusiasts.

fine 2560x1440 WQHD 144Hz super fast 3D display comes with an amazing 1ms response, for the assurance to extract every last bit of a great gaming experience out of the GPUs.

Better yet, the beastly PG278Q is also powered by the amazing Nvidia™ G-SYNC™, 3D Vision and Ultra Low Motion Blur Technology, and of course, the ROG exclusive Turbo Key Technology, delivering non-stop silky smooth, crispy and tearing-free gaming experience no matter what you throws at it.

G-SYNC™ is a revolutionary new technology developed by Nvidia™ over several years. It allows the monitors to display the actual frame rate that is no longer limited by the screen's refresh rate. Look no further if you like to game, as the PG278Q will not let your sights off it.

## PB287Q, ULTRA FAST 1MS 4K DISPLAY IN STUNNING 10-BIT COLOUR

Like professionals, the enthusiasts also welcomes higher resolution displays, for a difference reason. Achieving more pixels into the same physical size helps to reduce the size of the jags in digitalized images, resulting in an incredibly fine presentation of computer image. It will be even more tempting if the display also presents high colour range with a ghost-free ultra fast responses.

This is what drives the development of the PB287Q, migrating the goodness of a beautiful 10-bit colour 4K UHD panel at an amazing 1ms response, supported by a professional ergonomic stand, bringing an ultra sharp anti-ghost image to the modern professionals moving up to 4K UHD application, whether you needs it for a single or multiple monitor environment.

Good monitors are great when they are used to fulfil the needs of its users. No matter what triggers you for your next monitor upgrade, there is definitely an ASUS monitor that suits your need.

# Most Wanted

Things we covet, are tech-that's-not-pc, or are just very cool



## ▲ MOMENT SMARTWATCH

While the big players fumble around with getting a smartwatch out the door that we'd actually want, Kickstarter has again, delivered. The Moment Smartwatch has just surged past its funding deadline, with almost US\$400,000 raised, of a US\$100,000 target. Backers, and we, here, see that it's a thing that all smartwatches should aspire to be. By that we mean it's lovely to look at, has genuinely useful functions, and boasts a 30 day battery. Well, they're the promises, at least. Compatible with iOS and Android, with Windows Phone probably to come, the Moment is but 1mm thick. Using backlit e-paper is the ticket to amazing battery life and exquisite thinness. It also has a small bay for expansion modules, which could include biometric functions, or inductive charging. We also love that incoming messages are displayed on the inside of the wrist, for your privacy.

[www.momentsmartwatch.com](http://www.momentsmartwatch.com)



## ◀ NEXT LEVEL RACING SIM CHAIR

A proper sim racing cockpit is a serious bit of kit, and speaks volumes of your commitment to the virtual sport. There are the sort that fill a room, have hydraulic motion feedback and wrap around screens, costing tens of thousands of dollars, there are basic frames costing just a couple of hundred to a grand (with wide choice available through Pagnian Imports, the supplier of this product), and there is this.

It's a proper racing chair mounted on a standard office chair wheel base. Ostensibly, it's intended for actual sim racing, but equally it excels at simply being a particularly cosy and comfy chair at which to sit at your desk performing more mundane tasks. At just \$299 delivered it's about the price of a regular office chair. Grab the conspicuous red one for office envy, or the marginally stealthier black one to improve your chances of getting it past the budget controller.

[www.pagnianimports.com.au](http://www.pagnianimports.com.au)

## ▼ WORX LANDROID

There are people out there who enjoy mowing their lawn. Probably. Well, unlikely... Thankfully, the robot age has gifted us with an elegant solution. The WORX Landroid is a battery-powered robotic lawnmower, much like the indoor Roomba (though we don't recommend letting kittens ride this bad boy). At each pre-programmed date and time you set, Landroid will set off on its lawning adventure, and can return to base all by itself when running low on juice. Like all good robots, it's programmed to not kill humans, and if you're having trouble justifying this \$1199 purchase, you can always argue that because it's zero emission you're doing your bit to save the planet while you sit on the couch gaining weight, at least until it's time to empty its accumulated lawn clippings, as automating that part of the process is a challenge for future generations.

[www.worxlandroid.com](http://www.worxlandroid.com)





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# Skype hack attack

It pays to be vigilant.

**T**here've been some spectacular hacks on social media, business sites and customer databases in the last few of years – some of the big ones include Sony PlayStation, Adobe, Yahoo, Facebook, SpamHaus, Twitter, SnapChat and Skype to name a few. This year we've also dealt with the Heartbleed vulnerability.

In the context of these security compromises, we need to stay vigilant to any unusual activity on accounts and regularly change passwords. However, a stolen password or email from one account can then be used to initiate a hack on another account as it's information provides a gateway.

Investigator has heard from a reader about how his Skype account was recently hacked. Chris writes that he had been offline for a few days while he was updating his computer. When he got back online a few days later, he tried to log in to Skype, but his usual password didn't work. This was the first incident that alerted him that something could be amiss.

"I also received an email from PayPal noting an auto-payment to Skype. I then investigated the Skype login error and discovered that my account had been suspended due to suspicious activity."

The hacker initiated an auto-payment using the method Chris last used for Skype credit payment and used those credits to make calls to Russia. They're only small amounts, which wasn't immediately obvious.

It was the email from PayPal regarding the payment and the login error Skype that alerted him that he may have been hacked. Chris set about trying to contact customer support, but didn't have much luck on the Skype site. He eventually got in touch and explained his account had been hacked and that unauthorised payments had been made out of his account.

"Skype did place my account in suspension about 24 hours later, but recovering and removing this suspension proved to be time



consuming with more identity verification procedures to comply with than what enable the account to be hijacked in the first place."

"There is a guided account recovery procedure that requests too much information to be relevant and that ultimately failed to work anyway." "Once actual contact was established they did refund the unauthorised payment, but not the \$10-\$15 prior balance in my account. The only way I could see to restore my contact list was to restore from the manual backup, where previously after migrating to a new PC or operating system this was all automatic on login. Recovering the account allowed me to cancel the auto-payment within Skype, although I had already done that in PayPal. All up, it took over a week to recover my account and obtain the refund (partial anyway)."

The Skype hack and the ease with which his account was compromised and the unauthorised transactions gave Chris the reason to do a bit of his own research.

"From my limited research, it appears that Skype hijacks are more common than one would think. It appears that it is an easy task to hijack a Skype account through the

user's email address and once they have access, any account that has had previous credit purchases can be used to activate the auto-payment. It's usually a small, inconspicuous amount at first and multiple small calls or sms are made on the account."

**"The hacker initiated an auto-payment using the method Chris last used for Skype"**

"I have a Microsoft Live account linked to the Skype account, so I wonder if the Microsoft breach allowed the Skype hijack. At the time, I changed my Live password when notified, but not the Skype password unfortunately."

Investigator contacted Microsoft about how to re-instate a Skype account and asked if a hacker can access a Skype account if they know the email address and if a Microsoft email address is used to log in to Skype, if it makes it easier to hack the account.

Microsoft said the easiest way to recover your account is to visit the Skype Online resolution center. There, you will need to provide some information about yourself and your account. Another way to recover your account is by contacting Skype Customer Service by chat."

"Connecting to Skype through a Microsoft account provides added benefits which include enhanced password recovery so you can reset your password by receiving a security code sent by SMS or email, and an optional two-step verification to help keep your account more secure."



**ROSALYN PAGE**

has been a journalist for over 10 years specialising in the areas of consumer issues, technology and lifestyle. Rosalyn is the 2008 winner of the Best Consumer Technology Journalist at the IT Journalism awards. Her work is published in a range of newspapers and magazines

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# BECOME A TECH SUPPORT SUPERHERO



ARE YOU CALLED TO THE RESCUE WHEN FRIENDS AND FAMILY RUN INTO TECH TROUBLE? WE'VE ROUNDED UP THE TOP TIPS AND TRICKS FROM INDUSTRY EXPERTS AND *PC & TECH AUTHORITY* WRITERS AND READERS TO MAKE YOUR (UNPAID) JOB A BIT EASIER

**I**f you're a *PC & Tech Authority* reader, the following scenarios are no doubt familiar: when dad's broadband goes down, he calls you first - not Telstra. When mum's printer won't stop spitting out error pages, it isn't HP she picks up the phone to - it's you. You're also the go-to for friends with busted laptops and family members with malware infections.

While it's nice to be needed - and to have the skills to help - unofficial tech support can be a thankless, never-ending task. As our Real World Computing columnist Mark Newton says: "The best bit of advice I can give is never let on to friends or family that you know anything about computers."

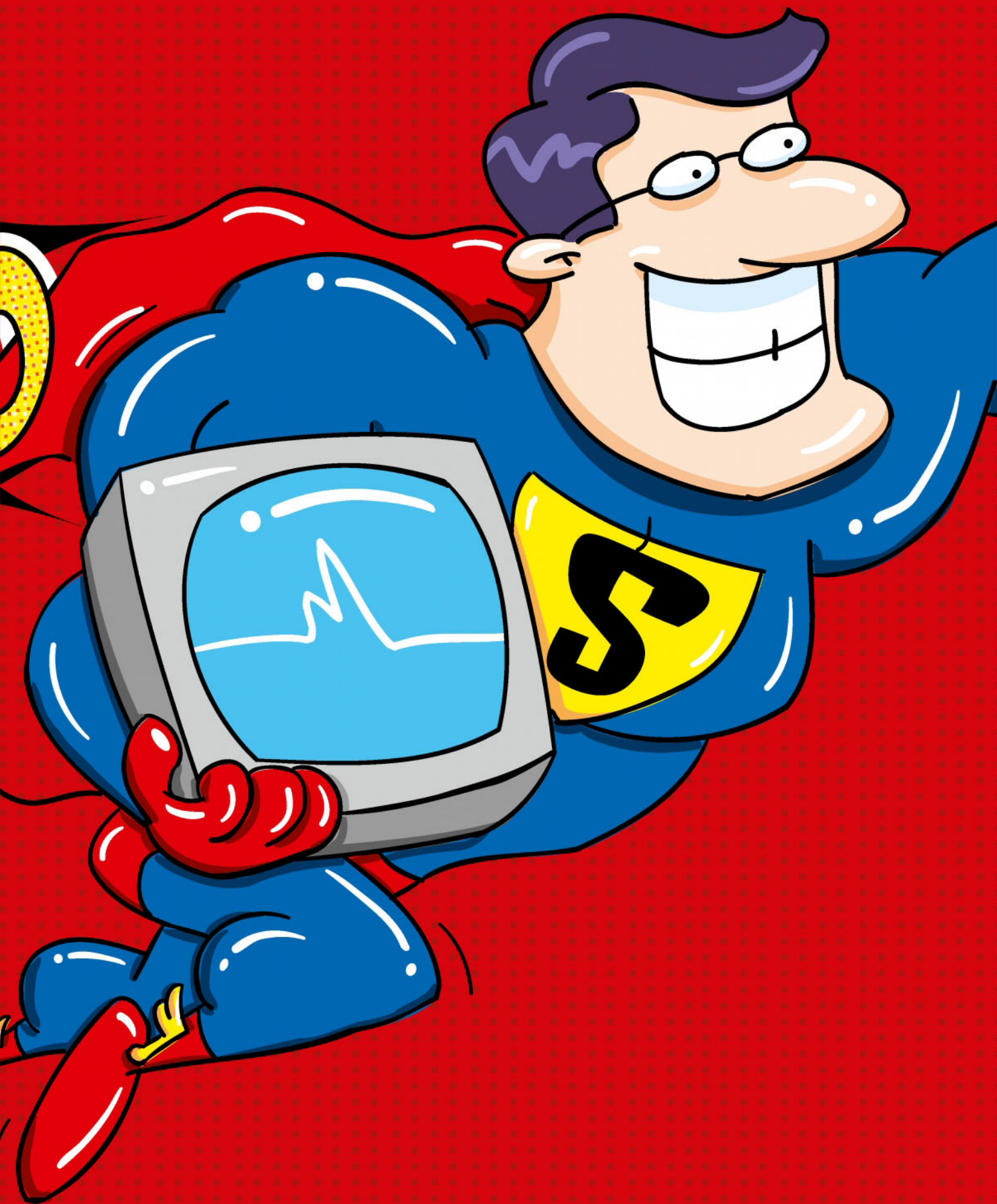
We salute your long hours of frustrating, unpaid work and your underappreciated and poorly

understood skills. To help make the job a little easier, we've gathered up the best tips and tricks from our own team of experts, industry specialists and your fellow readers - thank you to all who submitted advice. As well as taking an in-depth look at remote desktop tools, we also reveal some tech support horror stories that will make you laugh - or cry.

## START RIGHT

As unofficial tech support for your family and friends, you may be asked to help set up their new PC or laptop. "Take the time to do the job correctly and spend extra time checking things so you don't have to go back later," says Leigh Wood, director of Node IT Solutions. Start with good buying advice. If a frequent





support “customer” is shopping for a new device, encourage them to buy equipment with which you’re familiar. If your mum uses the same laptop as you, it will be easier to fix the common problems, since you’re likely to face them yourself. You’ll also have the hardware in front of you for times when you’re troubleshooting over the phone.

Reader Roger Greenwood suggests buying simpler devices or opting for Chrome OS, which automatically updates every time you reboot it. “For non-technical relatives with anything old such as XP or Vista, buy them a Chromebook and download a few apps and extensions,” he says. “It will be the best \$400 you spend this year.”

Once you’ve set up their hardware, take photos so you can reference the images when questions crop up down the line, such as which port to use. John Cordiner, from Dell’s social outreach services, advises noting the make and model of hardware, such as the PC, the router and the printer, and making a list of installed software – or downloading a tool such as Piriform’s Speccy to get this information – since it will help you find the right drivers.

As you would on your own PC, create a proper backup system, set up software updates to run automatically, and install antivirus. This way, when the latest security scare hits the headlines, you can assuage their panic by putting on your most reassuring voice and telling them “it’s okay, you have up-to-date antivirus and it scans all the time,” says writer Tim



Danton. Choose antivirus you’re familiar with to make it easier to troubleshoot.

“Some malware packages – Bitdefender leaps to mind – have a silent mode that automatically blocks things without asking the user what to do,” adds tech editor Darien Graham-Smith. “This can spare you the odd phone call.”

A little education regarding what is and isn’t safe to click on can help avoid problems in the future, adds Dell’s John Cordiner. “Get your nearest and dearest out of the habit of clicking on every link they see and you’ll save yourself a lot of work.” Reader Dan Hedly suggests showing those you support what their

antivirus pop-up messages looks like “to reduce the risk of them being fooled by those dreadful ‘There’s a problem with your PC’ pop-ups.” He also advises dedicating time to preventative measures. “For family, routine maintenance whenever you visit needn’t take long and will save a lot of pain down the line.”

### BE PREPARED

If you’re carrying out a lot of unofficial support, being prepared can save hours of time when problems arise. Columnist Mark Newton advises filling a USB drive with useful utilities and installs for browsers, antivirus and anything else you might need; don’t assume you can download it when you get there. “I have friends whose internet connection is at best 0.5Mbps/sec; you’ll find yourself there all evening,” he says.

Reader David claims he never leaves the house without his USB key. “On it, I have a program called PStart ([www.pegtop.net/start](http://www.pegtop.net/start)) to provide a simple task tray menu,” he says. “I also install lots of portable utility programs and use PStart to launch them, as required. From my USB key, I can clean a PC, remove viruses and such like wherever I may be – it has been a godsend.” Dell’s John Cordiner carries a USB flash drive with an antivirus programme such as Avast or AVG (both of which have free versions), as well as file-recovery software Recuva and anti-malware tool Spybot.

Real World Computing columnist Simon Jones advises copying





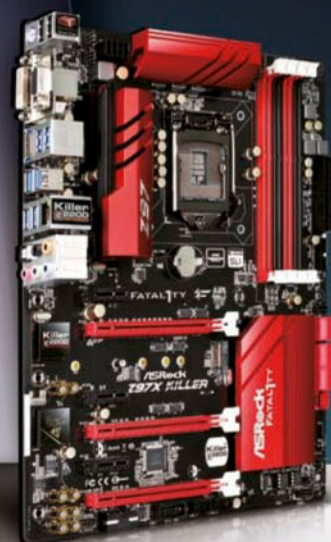
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# TECH SUPPORT HORROR STORIES

Everyone has them: tech support horror stories you can't believe are true. One reader told us the mythical "Press any key? Which is the any key?" genuinely happened to him.

Another reader used to work on an IT help desk when PCs were just hitting high-street shelves. "Using the mouse was the most difficult concept – one rang to complain their pointer moved slowly," he says. "It turned out they had the mouse upside down and were moving the ball with their finger. Another had been using it on the floor and was operating it with their foot – I kid you not. We also had the obligatory reference to the CD drive as a 'cup holder'."

David Wright shared a printer maintenance classic. The machine stopped working, and he suggested it was the purge unit that was faulty – a common error with the printers in use at his employer. The maintenance man, however, suggested it was "air in the line". To solve this, he "disconnected the tube and started sucking on it," says David. "I shook my head, since I knew exactly what was coming. He sucked again. And again. And then he spat a mouthful of ink all over the personnel manager's desk." He was never allowed back in the building, not least after

it turned out the purge unit was indeed the source of the problem.

Back in the early days of Leigh Wood's IT Administrator career, he reached up to turn off a test server, but accidentally pressed the Power button for the main file server. "However, since I hadn't let go of the button, it was still up," says the now director of Node IT Solutions. "So, as long as I didn't move my finger, the company stayed up and running; if I let go, all hell would be let loose. I had no mobile phone [and I] was in a sealed server room stuck to a rack of servers." Trapped like a soldier on a landmine, he managed to call his colleagues from a landline – after they recovered from laughing and took a few photos, they eventually replaced his finger on the button with a huge ball of Blu-Tack.

Leigh has had better luck on other support calls. While helping a government department upgrade to Windows XP, he fixed a printer for a lady in the office, to whom he has now been married for 12 years. "You never know what your next helpdesk call may lead to. We even named a table at our wedding HP LaserJet 4000 in honour of how we met."

suffering from either a catastrophic internal failure... or something far simpler, Darien advises using an old support trick: ask the user to unplug the cable and blow into the end before plugging it back in. "The blowing isn't really necessary; the point is to get them to replug the cable in case of a loose connection, or indeed to prompt them to notice that it wasn't plugged in in the first place," he says.

However, be careful they don't blow too hard. Reader David tells a support horror story (see Tech support horror stories, left) in which a customer did just that. "After waiting patiently on the phone for ten minutes and hearing nothing, a colleague finally picked up the phone and told me they'd have to ring me back," he says. "When they did, it turned out she'd been holding the metal connector as she plugged it in and had electrocuted herself. She was fine after a bit, though."

Reader Carlos says it might be easier to carry out all the servicing at home, where you have your tools and equipment to hand. "I had a spare hard drive that would have solved anything on the spot," he says. Another reader, Rob, agrees, saying he prefers to work from home in order to do "all my cursing in the comfort of my well-equipped lair".

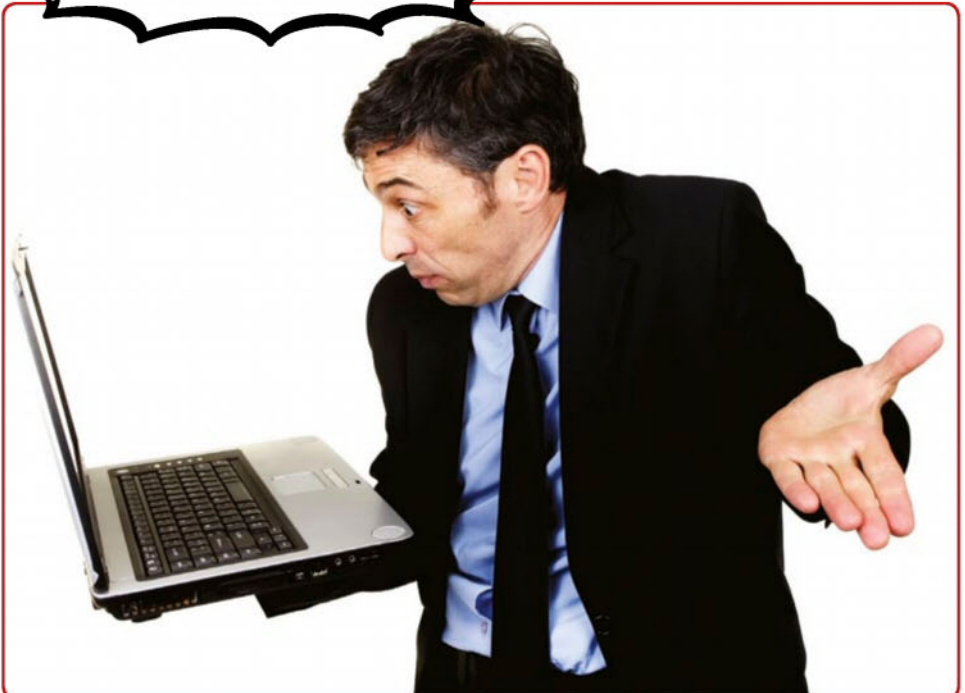
any software you acquire, from applications to hardware drivers, to an "Installation packs" folder on your network or an external drive, with relevant product keys saved in a text file. "You should also teach all your 'customers' to do the same thing," he says. "Three years down the line, when you need to reinstall something quickly, you'll know exactly where to find it and won't have to spend hours searching for the missing disc. They always go walkies when you need them most."

Darien notes that Windows 8 has a handy "Refresh your PC" feature to bring Windows back to a working state without touching personal data. However, if you're running an online download of Windows 8.1 you won't have an installation disc. A quick Google search will reveal how to make one, and how to make a custom refresh image to restore the OS to a working state with drivers and apps in place.

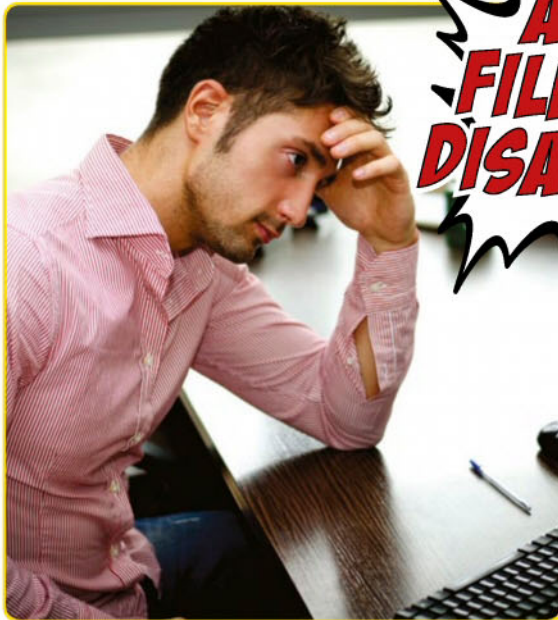
## GETTING TO (UNPAID) WORK

After the initial suggestion of turning the machine off and on again, the real work begins. If hardware isn't turning on or responding and appears to be

**PRESS ANY KEY!**







**ALL MY FILES HAVE DISAPPEARED**

### COMMUNICATION IS KEY

The weak point in tech is often the user, and this is no different with support. It's easier to keep calm when faced with difficult users when you're being paid to put up with them, but it's frustrating when you're doing it for free – and it's your mum who's being a pain.

Before you even start work, set some boundaries. "People who come to friends and family members for free support have a tendency to save up small problems and then drop them on you all at once when a big problem arises," notes Darien. "Depending on how you play this, you might want to make a point of asking them to fill in an informal 'support request form' so you know which tools and skills to bring, or you might even sneakily agree to drop in for half an hour on your way somewhere."

Reader David advises asking what changed between when the

device was working and when the problem cropped up. "It may be that the answer is, 'Time passed', but it may be, 'I plugged in a different mouse'."

Don't rely on someone without tech skills to be able to describe the problem accurately. "Before you start trying to troubleshoot anything, get your supportee to demonstrate the problem," he adds. "It's amazing how often it turns out that they've neglected to mention an informative error message popping up."

Reader Rob says to avoid asking if they've set up something correctly – they'll say yes regardless. Instead, walk them through it step by step.

Indeed, don't assume your "customer" is telling the truth, adds reader David. While diagnosing a problem over the phone, he asked a client to unplug and reconnect a cable. She said it didn't help, but when she went to lunch and another person took over the call, he asked them to try again. It turned out the first person hadn't bothered to unplug the cable, since it was in an awkward position; when that solution was attempted, it worked. "Rather than say she couldn't do what I'd asked her to, she said something to keep me satisfied and, unwittingly, prolonged the problem," he says. Avoid awkward situations by giving people fair warning that you'll see everything they've done on their computer. "This can help keep relatives off your back," adds

### REMOTE CONTROL

While some basic problems are easily solved over the phone – "turn it off and on again" – or by sending a few links of instructions to follow, you'll need to turn to remote desktop tools if things are more complicated (see p27 for our in-depth look at the options and how to use them).

However, remote-login tools can be a mixed blessing, says editor-in-chief Tim, since they make support too easy. "At one point, it felt like I was logging onto a friend's laptop every week to sort out some minor problem," he says. Reader Alan Wood adds that using remote desktop tools can be confusing to less tech-savvy users, meaning you'll need to spend time teaching them how it works before you can get started.

If you'd rather not use remote-access software, for whatever reason, ask your supportee to send a screenshot of the error by pressing PrtScn, switching into their email account and hitting Ctrl+V.

Cloud backup tools can also help. "If you can, inculcate in your supportees the habit of saving everything to one place. If they can fit everything into Dropbox, that's ideal, because if they manage to lose a file you have 30 days to recover it (and can do so remotely with their password)," Darien adds. "Even if they manage to break Windows entirely, you can simply wipe it and pull their files back down from the cloud."

**IT WORKED FINE UNTIL YOU STARTED CHANGING THINGS...**







# NEPTON SERIES

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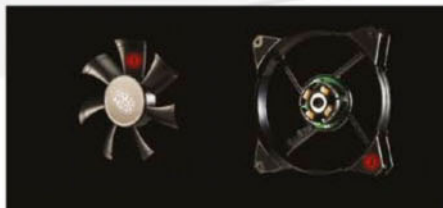
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If you want the best in AIO coolers; look no further than the Nepton 280L. - TweakTown

Overall I'm very impressed with Cooler Master's new and refreshingly cool AIO, the Cooler Master Nepton 280L. The whole package from unboxing, installing through to the testing of the cooler has been a great experience from start to finish. - pcGameware

With everything tallied, Cooler Master has created a surprisingly flexible cooler...the Nepton 280L is one of the best CPU cooling options available. It may have taken Cooler Master a few tries, but they now have a flagship model which can once again compete with the best the industry has to offer. - Hardwarecanucks

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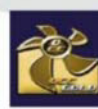
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Real World Computing columnist Steve Cassidy.

### FOLLOW-UP

If you've fixed one problem, expect to be called back for future issues, says columnist Mark Newton. "Be ready for the subsequent call for help when another totally unrelated problem occurs," he says. "Despite your best explanations that the two issues can't be related, expect the 'it never did this before' plea."

To help avoid this, deputy editor Darien Graham-Smith advises sitting down with your supportee and the fixed machine to make sure everything works as before. "This way, you're there to give guidance if anything now works differently to the way they expect, and, more to the point, it makes it more difficult for them to say, 'This was working before you started changing things'."

Show your supportee how to fix the problem themselves to avoid being called back again for the same issue, advises Dell's John Cordiner. "It's always preferable to demonstrate how you fixed issues, rather than simply fixing it yourself and telling your mum or dad afterwards," he says. "It might save you some time later."

### KEEP IT PROFESSIONAL

Be wary of being tapped for free tech support services for a friend's small business. Tech consultant

Leigh Wood warns that such attempts to "save some money" aren't wise in the long run. A client of his ended his contract to switch to a new support company - which turned out to be "a friend who knows computers". A day after the contract ended, their Exchange server went down. "We've stepped in now and are getting things up and running for them, and as a result the customer has extended our contract," he says. "The 'friend' sounded very relieved, and he admitted that this was all too complicated for him. So, the lesson here is this: the reason everything is working is because your IT support company is doing its job."

Stephen Green of IT services firm TSG warns on the "crossover between home and business use". "Typically, freeware doesn't come with business-grade support and isn't supported by the major vendors, so it could cause problems," he points out. "It's also important to check that it's legal for use in a business context."

"It's always going to be difficult to say no to people who ask for help, but make sure you're not doing someone a favour that turns out not to be one," he adds.

### WHAT'S WORK WORTH?

Your tech skills have been acquired through years of work, and your time isn't worthless; make sure your supportees know this. If it will cost more in petrol to drive round to

mum's to fix her laptop than to call in paid-for tech support, it makes little overall sense.

In addition, putting a mental figure on your time can help inform a longer-term solution. "You can put in weeks of fiddling to not quite fix some infected disaster zone that cost the buyer \$2,000 but can be replaced for \$250 in the current market," notes columnist Steve Cassidy.

However, just because you value your work at a certain hourly rate doesn't mean you should expect to earn anything for your efforts, said reader Nick. "My dentist gave me a cheap bottle of wine for rebuilding his laptop. He charged me the full rate for my next visit."

And even though you're a *PC & Tech Authority* reader, you're not immune to needing help yourself sometimes. Columnist Mark Newton has advice many will appreciate: make sure to stock your support's favourite type of coffee when they come round to help out. A few biscuits wouldn't hurt, either.

## THREE COMMON PROBLEMS

Toshiba's tech experts share their three most common support problems - and how to fix them

### PCs running slowly or not booting into the OS

"A slow-running device can be the result of a number of issues. For instance, it can sometimes be attributed to having multiple antivirus software packages running simultaneously. These can conflict with each other, causing the device to run more slowly than it should."

### Corruption of the boot sector

"This stops the OS booting and also stops you rescuing the data via a USB caddy. To resolve this, we find it best to boot from an original Windows OS installation disc, then run a repair that scans and attempts to recover the boot sector. If this doesn't work, there are partition-management software packages available on the web that may help."

### Devices running ransomware

"This is when users believe their device has an antivirus package installed, but in fact it's a fake or a scam that asks for payment to fix any issues. Microsoft has a useful page with some guidance on this at <http://tinyurl.com/kfbtpcq>."

# REMOTE ACCESS

## DARIEN GRAHAM-SMITH OUTLINES THE OPTIONS AVAILABLE FOR TROUBLESHOOTING FROM HOME

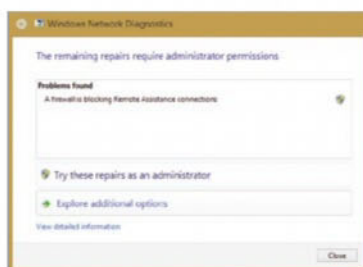
**W**e all know the scenario. You're sitting happily at home watching TV – or perhaps at your desk in the middle of the day – when suddenly the call comes in: "Something's gone wrong with my computer." You can try to diagnose the problem over the phone, but this can be agonising, especially if the person seeking your support isn't particularly technical.

So, what can you do? Your first instinct might be to hop in your car, head over to your (hopefully grateful) friend or family member's house and take a look for yourself – and sometimes that's true.

Before you set off, however, it's worth checking whether you can resolve the problem by using remote-access software. This approach won't be much help if the PC won't switch on, or if it's been disconnected from the internet. It also won't help you diagnose hardware problems, such as a dodgy monitor cable or a dying battery in the mouse. In many cases, though, the ability to give a PC a once-over from afar, and to make any necessary configuration changes, can save you an awful lot of time and travel.

### WINDOWS REMOTE ASSISTANCE

The good news is that there's a remote-access tool built into Windows. The Remote Assistance application lets you connect to another user's computer over a network and view and control their desktop without the need to install anything. (Don't confuse this tool with the Remote Desktop Connection application: this opens a new user session



Windows features a built-in remote-access tool, but your supportee may find it too difficult to configure

on the remote PC that is displayed only on your screen, making it rather less useful for collaborative troubleshooting.)

Unfortunately, home networks aren't normally set up to accommodate this type of connection request by default. In order for you to connect to a remote PC over the internet, your supportee's router must be configured to forward incoming connections on port 3389 to the PC in question, and it may also be necessary to configure any local security software to permit the connection.

All of this may be daunting for a family member to configure if you haven't set it up in advance. You'll also need to know the external IP address of their router, which again they may have difficulty finding and passing on.

For simplicity, therefore, it's common to use third-party software that uses a central server to broker connections between computers. Since every PC opens its own outbound connection to this server, routers and firewalls don't get in the way – and if a remote PC is online you can connect to it by simply clicking on its name, rather than having to worry about its network address.

### TEAMVIEWER

There are dozens of remote-access tools available, but the majority are paid-for. That's because remote-desktop access is useful not only for ad hoc personal assistance, but also for professional support and administration.

One such system is TeamViewer ([www.teamviewer.com](http://www.teamviewer.com)). As the name suggests, this is primarily designed as a business tool, and it supports online meeting features as well as straightforward desktop access. Pricing for the basic package starts at \$699, rising to \$2809 for a fully featured corporate licence.

Generously, though, the publisher also makes the service available free of charge for private, non-commercial use. In some ways, it's overkill – you don't really need its online meeting features, management interface and so forth – but you can certainly benefit from its business-class uptime, rock-solid connections and premium features such as remote audio, remote printing and file transfer.

It also works on OS X and Linux PCs, and apps for Android, iOS and Windows 8 let you view and control a connected computer from a phone or tablet, so you can check up on a remote PC even when you're out and about.

Once you've installed TeamViewer on the PC you want to control, you can configure it to start with Windows automatically, so it should always be available. In addition, there's a TeamViewer Host client that runs as a Windows service, so you can connect even if no-one's logged in to the PC. If you haven't had a chance to preinstall the software, you can direct your family member to download it from the TeamViewer website in a few clicks; they can then give you access by simply reading out a randomly generated ID and access code.

### CHROME REMOTE DESKTOP

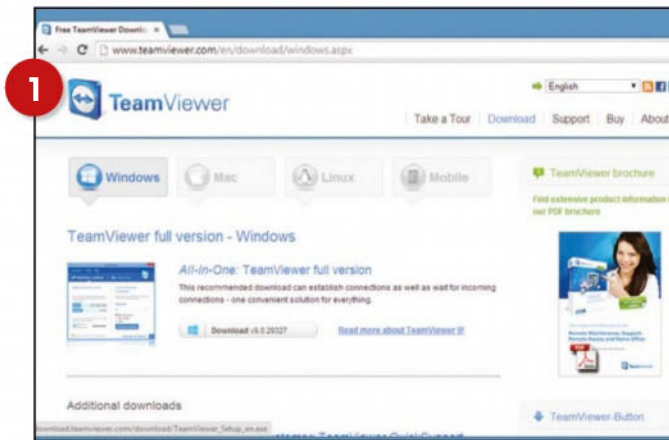
If you're looking for something lighter, Chrome Remote Desktop might be the system for you. It's developed and published by Google and is completely free – the only prerequisite is that



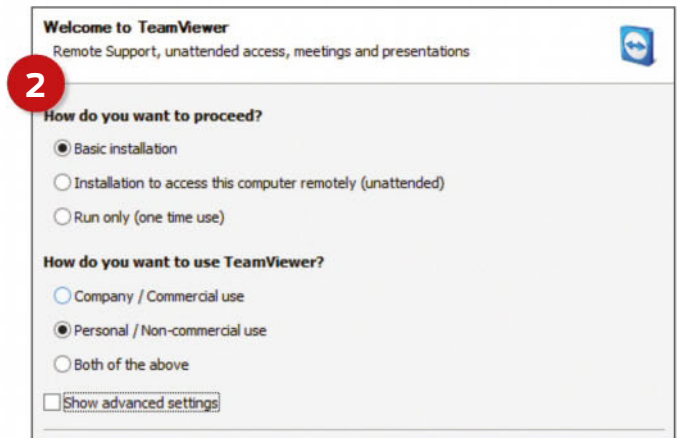
Chrome Remote Desktop is a free app that runs in Google's web browser and can be accessed via Hangouts



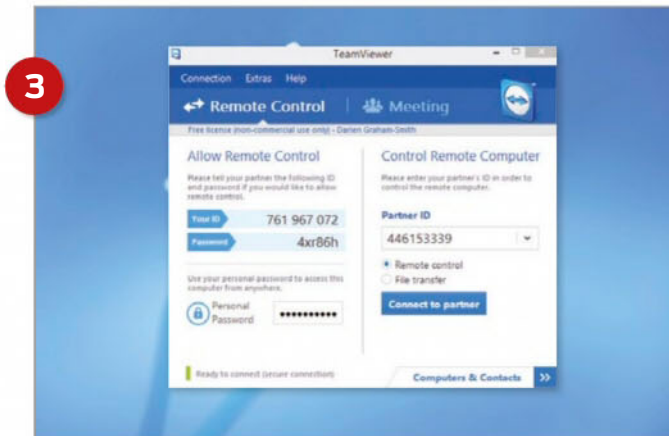
## ▼ WALKTHROUGH Configuring Team



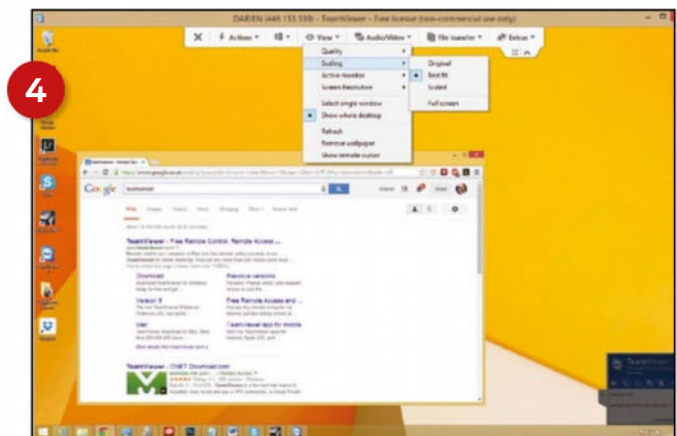
▲ The TeamViewer website offers several installation packages to suit different platforms and usages, including Mac, Windows and Linux options, as well as mobile apps that can be used to connect to a remote host while you're on the go. The full Windows download is only around 6MB in size and provides all the features you might need..



▲ Don't worry about advanced settings unless you want to set up remote printing. Do remember, however, that TeamViewer is only free for personal, non-commercial use. If you want to use it to help you work from home, or to offer remote support for money, you'll need to pay for a licence – or pick a different remote-access tool..



▲ Once the software is installed and running, the window above will open. To connect to a remote PC, you need the remote operator to supply you with their nine-digit ID and password as shown here. Once you connect, you can store the remote computer's details so that you can reconnect with a single click next time..



▲ The View tab on the remote desktop includes a menu bar that you can use to adjust parameters such as window scaling and audio options. The floating window at the bottom right lets you open a chat session with the person sitting at the computer, capture a screenshot of what you're doing and more. It's also where you end the session, by clicking X..

you have to use the Chrome browser. Although the back-end server installs as a regular application for Windows or OS X, the viewing client installs as a browser extension; when you connect to a remote view on the remote system, it opens up in a browser tab.

Once the extension is installed on more than one computer, you can open a remote-assistance view – or a new remote desktop session – by simply opening the Chrome Remote Desktop app in your browser and entering the PIN you set previously. Since it's based in the browser, you can use any system that runs Chrome, including Linux PCs, Chromebooks and Android devices. You can also kick off a remote-assistance session from within a Hangouts session – making it a hassle-free option for those who

stay in touch via Google services.

Chrome Remote Desktop is a simpler tool than TeamViewer, but it supports remote audio if both client and server are running Windows. In addition, it allows clipboard sharing, so you can copy from one PC and paste into another. We have one caveat about Chrome Remote Desktop: in our tests, we were unable to connect to a remote PC from behind a company firewall, while TeamViewer hooked us up effortlessly.

### ONLINEVNC

In some cases, when the call for help comes, it may not be possible to install the requisite client software for remote troubleshooting – for example, you might be using a corporate PC that has been locked down to prevent you

from installing applications.

However, even in a situation such as this, it's possible to gain access to a remote PC. One solution is OnlineVNC ([www.onlinevnc.com](http://www.onlinevnc.com)), a browser-based system that uses Adobe Flash to display the remote desktop.

A word of warning, however: remember that, if you're using a public PC, it's possible that someone might be running spy software to monitor and record what you're doing.

If some unscrupulous type were to get hold of the credentials needed to gain direct remote access to your friend or family member's PC, they could cause all sorts of trouble.

With that in mind, consider changing passwords after connecting from an untrusted client just to be absolutely sure of security.

# HYPERS DRIVES

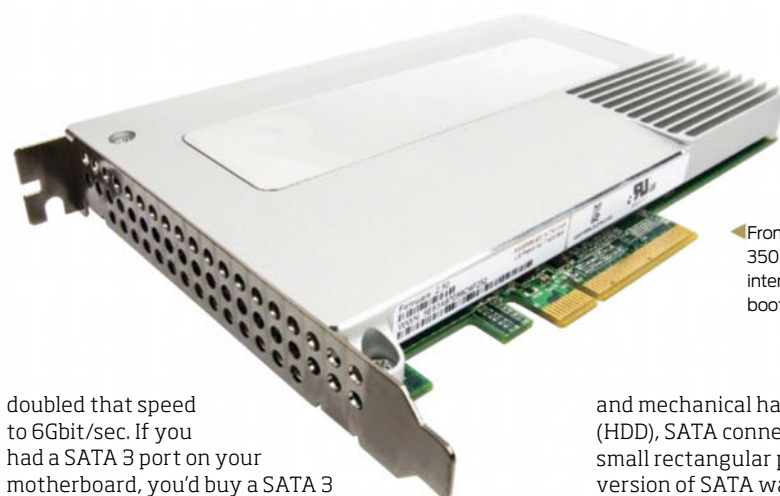
IF YOU THOUGHT SSDS WERE INCREDIBLE, JUST TAKE A LOOK AT THE NEW STORAGE TECHNOLOGY THAT LEAVES THEM IN THE DUST.

**W**ith the arrival of Intel's Series 9 chipset just recently, an exponential boost in SSD speed came online with M.2, and other new storage technologies like SATA Express and PCIe are all doubling or tripling already incredible SSD speed.

These speedy new technologies are coming on-stream right now, and it's probable that the next PC you buy, or upgrade you undertake, will need to factor in this important consideration. Read on, as we guide you through the main points, pros and cons of each of the new storage technologies.

Until recently, the choice for internal PC storage devices was relatively simple, and limited to one of two options. There was the size and value of a mechanical drive, being the most affordable form of storage, battle-tested over several decades. Their age is showing though, as they're woefully underpowered compared to the latest generation of storage devices, being SSDs, or Solid-State Drives. If you need the ultimate in speed, SSDs deliver a huge boost in performance, especially when dealing with extremely small files such as those required by Windows, where they're hundreds of times faster than mechanical drives.

No matter which drive you purchased, mechanical and SSD products used the same connection to your motherboard. The SATA connection, or Serial ATA interface, comes in two flavours; SATA 2 delivered a theoretical maximum speed of 3Gbit/sec, while SATA 3



From OCZ, the Revodrive 350 is a PCIe device and is intended to be used as a boot drive.

doubled that speed to 6Gbit/sec. If you had a SATA 3 port on your motherboard, you'd buy a SATA 3 drive, and vice versa, making it very difficult to choose the wrong type of device.

However, with the introduction of Intel's Z97 chipset, storage choices are about to get a whole lot more interesting. Motherboard and drive manufacturers are rolling out several new types of drive connections, in the form of M.2 and SATA Express, to keep up with SSDs that are soaring to even faster speeds. Drives once limited to commercial computers are also making their way into the home, in the form of PCI Express drives. To help make sense of the wide range of new drives and their connection options, we've explained every type currently available, allowing you to choose the right storage option for your PC and your wallet.

## SATA (SERIAL ATA)

Currently the most common form of storage connection found on SSD

and mechanical hard disk drives (HDD), SATA connections look like small rectangular plugs. The first version of SATA was released in 2003, and ran at a maximum theoretical speed of 1.5Gbit/sec. It was quickly superseded by SATA 2.0, which used the same socket shape, but doubled the speed to 3Gbit/sec. In 2008, SATA 3.0 was released, and once again it retained the same socket, ensuring backwards compatibility amongst all SATA devices. However, SATA 3.0 runs at a theoretical maximum performance

Two Revodrive 350s configured as RAID 0 and with extra cooling.





## “PCIE DRIVES ELITE PRICE TAG HELD THEM BACK FROM BECOMING TRULY MAINSTREAM”



▲ Standard SSDs can also be used with a PCIe adaptor.

of 6Gbit/sec, fast enough to provide full bandwidth for today's mainstream SSDs, with speeds maxing out at around 515MB/sec. Running a SATA 3.0 SSD on a SATA 2.0 port halves the performance of the drive, so always buy an SSD to match the speed of the SATA port on the motherboard.

Just to confuse matters, the naming schemes of these drives has changed slightly since they've become so popular - many refer to SATA 2.0 3Gbit/sec devices simply as SATA 3 Gbps devices, while SATA 3.0 6Gbit/sec devices are often referred to as SATA 6 Gbps. With cutting-edge SSDs delivering performance even faster than the SATA 3.0 standard, it was time for new connection types, hence the following newcomers to mainstream storage.

### PCI EXPRESS

PCI Express (PCIe) drives aren't new, with the first hitting the server racks around 2008. However, they were initially designed for commercial use, where their high speed made their even higher pricing justifiable. OCZ was one of the first companies to offer PCIe drives to consumers in its RevoDrive range of performance PCIe drives in 2010, but their elite price tag held them back from becoming truly mainstream. Recently we've started to see PCIe drive prices drop to the point where they're becoming an option for regular users, at around \$400 for basic models.

All PCI Express drives plug into the motherboard's PCI Express bus, which powers the PCIe slots used for graphics cards, sound cards, network cards and other add-in cards. However, there are several varieties of PCIe slots. Firstly, these

slots are broken into version, with both version 2.0 and 3.0 on offer. PCIe 2.0 is rated to handle 5GT/sec, where GT stands for Gigatransfers. PCIe uses Gigatransfers rather than Gigabits as a measurement as there is an overhead incurred when transferring every bit over a PCIe bus, making Gigabits an inaccurate way to measure PCIe performance. PCIe version 2.0 actually loses 20% of its theoretical maximum performance due to this overhead, resulting in a real world performance of 4Gbit/sec, or 500MB/sec, per lane (more about lanes in a second). PCIe version 3.0 then increased the bandwidth to 8GT/sec, but it also dramatically lowered the overhead necessary to send each bit, down from 20% in version 2, to just 1.54% in version 3. As a result, PCI 3.0 can effectively send 8Gbit/sec, or 985MB/sec per lane, basically double the speed of PCIe 2.0's lanes.

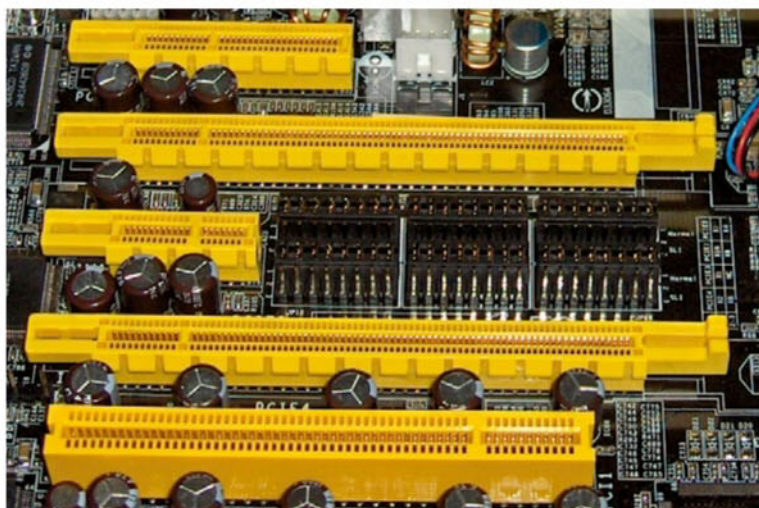
So then, what's all this about lanes? Well, regardless of the version, each PCIe slot or connection

is broken down into the number of lanes that feeds it, which can be anything from one lane (x1) up to 16 lanes (x16). A motherboard only has a limited number of PCIe lanes, with Intel's newest Z97 motherboards having sixteen lanes of PCIe 3 and eight lanes of PCIe 2 (some manufacturers might add more, but few will). Currently most PCIe drives use PCIe 2.0 with two or four lanes, which is written as PCIe 2.0 x2 or PCIe 2.0 x4. ASUS' affordable RAIDR PCIe drive is a PCIe 2.0 x2 drive, and costs \$469 for 240GB of 1GB/sec storage, while OCZ's new RevoDrive 3.0 X2 offers 960GB of PCIe 2.0 x4 storage at 2GB/sec, for a rather hefty \$1600.

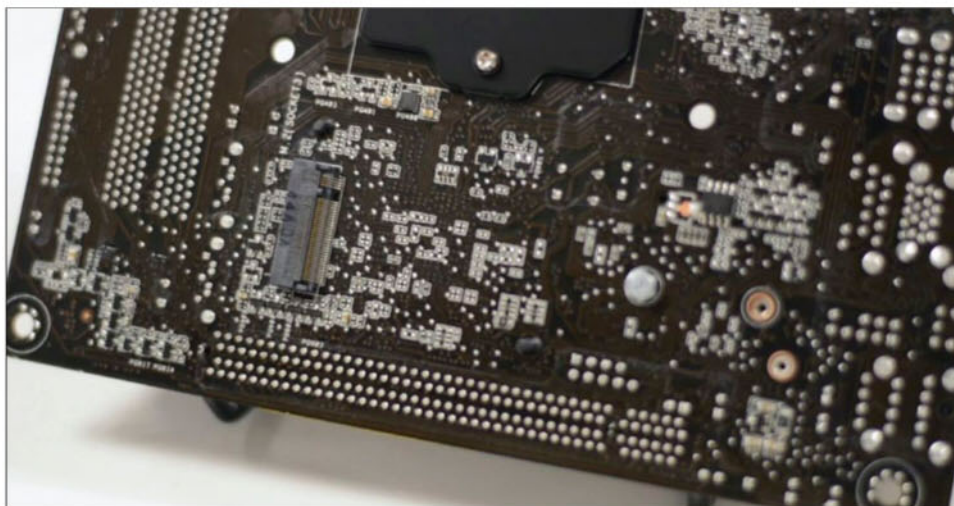
PCIe drives have some of the fastest connection speeds, especially when using multiple lanes of PCIe version 3, but there's a catch. A motherboard only has a limited number of PCIe lanes, with Intel's newest Z97 motherboards having sixteen lanes of PCIe 3.0 and eight lanes of PCIe 2.0 (some manufacturers might add more, but few will). If you happen to be using twin graphics cards on most Z97 motherboards, all 16 lanes of PCIe 3.0 will be in use, leaving no room for a PCIe 3 x2 drive. So plan ahead if going with a PCIe drive.

### M.2

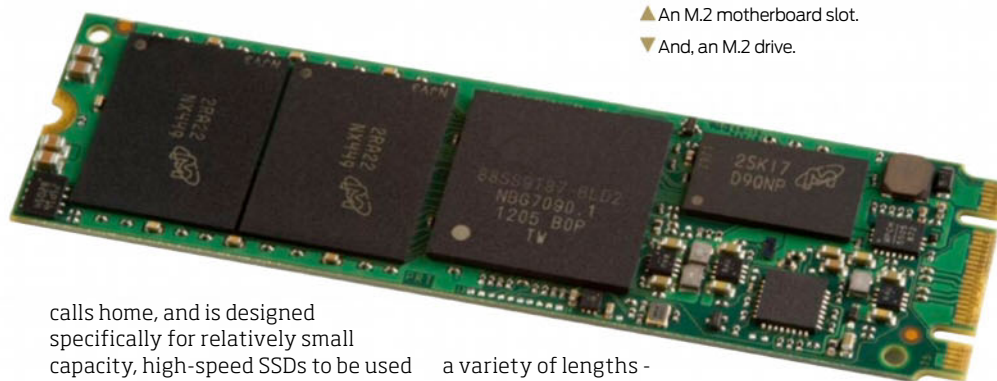
The new M.2 socket is one of the defining features found on the latest Z97-powered motherboards, and it's an evolution of the mSATA port found on laptops and miniature PCs of the past. This special slot usually lives right next to the main PCIe x16 slot that the graphics card



► Motherboards typically have more PCIe lanes than physical slots.



▲ An M.2 motherboard slot.  
▼ And, an M.2 drive.



calls home, and is designed specifically for relatively small capacity, high-speed SSDs to be used primarily as the OS boot drive. It's a multifunctional little slot though, as it can also be used to host Wi-Fi/Bluetooth modules, Near Field Communications cards and more. It's designed to house drives that are much smaller than the other connection types, as all consumer M.2 drives come in a single width of 22mm. However, they can have

a variety of lengths - 30, 42, 60, 80 and 110 mm - so you'll need to dig through your motherboard's manual to find the various sizes supported by your motherboard. You can visually identify the lengths on the board, as there will be several screw holes next to the slot, each equating to a different M.2 SSD length.

Make sure your new M.2

**“ITS REAL WORLD SPEED IS MUCH LOWER THAN THE THEORETICAL MAXIMUM”**

drive doesn't exceed those measurements, and you'll be good to go.... almost. To keep shoppers on their toes, the M.2 port connects to the motherboard's PCI Express lanes and, as we saw earlier with the PCIe drives, these come in either version 2.0 or 3.0, and various numbers of lanes. Most of today's M.2 devices use two PCIe 2.0 lanes, offering a theoretical maximum speed of 1GB/sec. However, ASRock has recently demonstrated M.2 devices attached to four PCI 3.0 lanes, which it calls an Ultra M.2 slot, and which equates to a theoretical maximum of 4GB/sec. There are very few drives in existence with the M.2 PCIe 3 x4 connection type, though the Samsung SP941 is one of them. It's currently retailing for around \$700 for a 512GB version but its real world speed is much lower than the theoretical maximum, with benchmarks showing speeds of around 1.2GB/sec. It seems that the Ultra M.2 port has plenty of space for faster SSDs.

### SATA EXPRESS

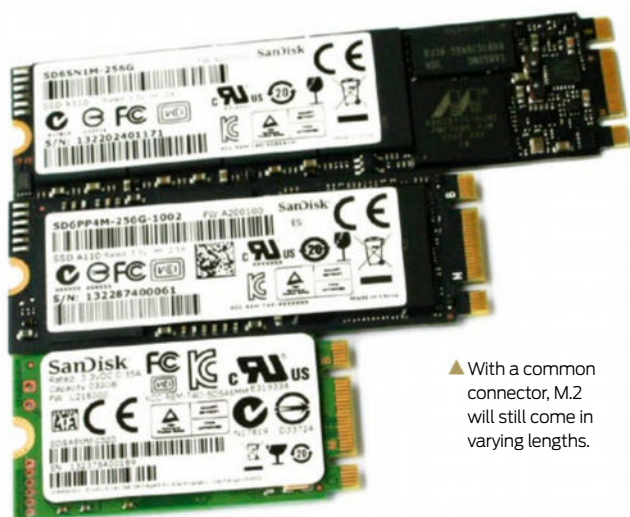
Last but not least is the latest version of the SATA standard, SATA Express (SATAe), which also

### SPEEDS - THEORETICAL VERSUS REAL

Unfortunately the rarity of some of these devices meant we were unable to benchmark products including all of these new connection types. However, based on existing tests we can say that most don't hit their theoretical maximum, and as speeds get higher, the bigger the difference between theoretical and real. For example, there are SATA 3.0 drives delivering sequential read speeds of around 550MB/sec, just shy of its maximum theoretical speed of 600MB/sec. At the high end, products like the Samsung SP941 use a PCIe 2.0 x4 connection, which should deliver around 2000MB/sec, but real world testing shows it tapping out at around 1050MB/sec. It's going to take several years before the 4000MB/sec of PCIe 3.0 x4 is even close to being fully utilised in the home.

Theoretical Maximum Sequential Read Speed	
SATA 1.0 1.5Gbit/sec	150MB/sec
SATA 2.0 3Gbit/sec	300MB/sec
SATA 3.0 6Gbit/sec	600MB/sec
PCIe 2.0 x2	1000MB/sec
PCIe 2.0 x4	2000MB/sec
PCIe 3.0 x2	2000MB/sec
PCIe 3.0 x4	4000MB/sec
SATAe PCIe 2.0 x2	1000MB/sec
SATAe PCIe 2.0 x4	2000MB/sec
SATAe PCIe 3.0 x4	4000MB/sec
M.2 PCIe Gen 2 x2	1000MB/sec
M.2 PCIe Gen2 x4	2000MB/sec
M.2 PCIe Gen3 x4 (Ultra M.2)	4000MB/sec





▲ With a common connector, M.2 will still come in varying lengths.

happens to be one of the rarest drive types. During a recent roundup of Z97 motherboards, we only found a couple of samples included SATAe, with the majority favouring M.2 instead. The SATAe connection looks like twin SATA plugs alongside an additional smaller plug, and the unique SATA Express connection fills all three at once.

The good news is that the use of twin SATA plugs makes this connection type backwards

compatible with existing SATA devices, such as your old SATA 3.0 SSD or SATA 2.0 hard drive. The SATAe connection increases speed by being connected to the PCIe bus in your motherboard, and on Intel's H97 and Z97 chipsets is powered by twin PCIe 2.0 lanes. However, like M.2 and PCIe drives, SATA Express connections can be paired with PCIe 3.0 lanes, and in higher number – it just depends on the motherboard having the correct slot (such as a PCIe 3.0 x4 slot), along with the drive having the same interface to go with it.

## TRENDS AND SPECULATION

As you can see, all of the new drive interfaces leverage the existing PCI Express bus to deliver extra speed. Thanks to the two different versions of PCI Express currently in widespread use – 2.0 and 3.0 – as well as the various lane configuration options they can configured in, choosing the right drive for the right port can be quite confusing. Not only do you have to worry that you've selected the correct physical connection, be it PCIe, M.2 or SATAe, but you also

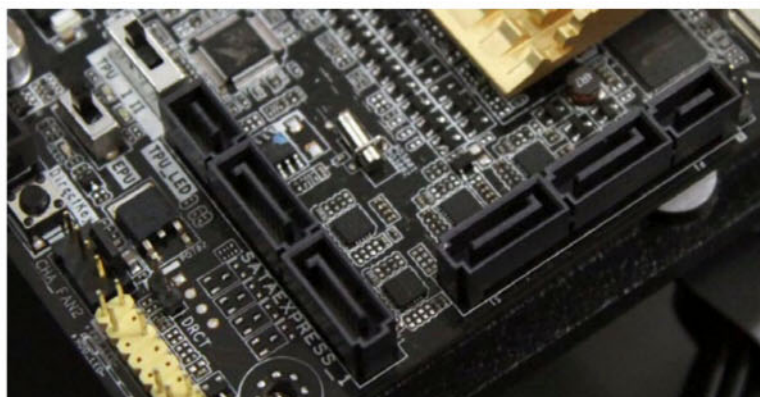
have to consider the type of PCIe configuration behind it.

The good news is that SATA 3.0 is now the standard for mainstream SSDs; figuring out which connection will win the high-speed war of cutting-edge storage devices isn't so clear. PCIe has the numbers behind it, as every motherboard on the market has at least one or two PCIe slots, while M.2 is following in a distant second place, showing up on nearly every one of the new Z97 and H97 motherboards. Sadly SATAe looks like it's not even in the running, with only a handful of products currently featuring this technology. The good news is that no matter which one of these ports wins, the top theoretical speed of 4GB/sec means our SSDs have a lot of room to improve before the connection is the bottleneck.

## Bennett Ring



▲ Standard motherboard SATA ports.  
▼ SATA Express ports.



## MEANWHILE IN SSDLAND...

While it really is exciting to see some innovation in flash storage, the traditional SSDs we've come to love are forging ahead with incremental improvements. SanDisk recently launched a new flagship drive. The Extreme Pro (pictured above) leverages the company's own NAND manufacturing expertise, and also adds in an improved controller to deliver faster read and write speeds. We tested the new Extreme Pro against the previous SanDisk Extreme II, using ASSSD. The older drive delivered a still respectable 482MB/s read speed – compared to the new Extreme Pro which managed 526MB/s in our test system. Write speed also saw a similar jump, with 416MB/s for the Extreme II against 472MB/s for the newer Extreme Pro.

The Extreme Pro is available in 240GB (RRP \$279), 480GB (RRP \$499) and 960GB (RRP \$799) capacities. Crucial has also just released a new premium performance SSD. The M550 replaces the M500 in its line-up. Tested performance was 523MB/s read and 482MB/s write for this drive. It's available in 128GB (\$109), 512GB (\$399) and 1TB (\$599) capacities. The almost identical performance of each of these drives is typical of the evolution of SSD performance, particularly at the high end. At the budget end of the market there is a great deal of choice, whether you opt for a superseded model, or an SSD designed and marketed as a more affordable device. Crucial has its new M100 to meet this need, though we have not yet had the opportunity to benchmark this drive. Most manufacturers will have budget drives available.

# IN THE LABS

YOU WON'T FIND  
BETTER REVIEWS  
ANYWHERE  
IN AUSTRALIA!

## Better, faster, stronger.

**BEN MANSILL** IS ALWAYS IN AN UPGRADE STATE OF MIND.

**W**e exist within an area of technology that tends to edge ahead in incremental steps. Sometimes the gains are slight, and were likely on most people's radar well before arrival. Other times we're surprised to see unexpected innovation in the most mundane quarters.

It's a bit like that with monitors. I'd bet that this part of your PC kit is one that's low on the upgrade priority list, but it shouldn't be. Prices drop, screen sizes go up, that's the obvious bounty, but as you'll discover in our Monitor Labs, this month, colour accuracy is another area often overlooked, but has been pushing towards better and better quality all the time. Of course, not everyone values perfect colour reproduction, but for many professionals it's bread and butter material. Thankfully, we have the equipment plus years of experience to be able to deliver to you testing that highlights the benefits of one

monitor over another.

We've also included monitors that represent average use at a home or office, but at a great price. Face it - we all stare at our screens for ungodly hours - perhaps even researching other components for upgrade, so take a close look at our roundup and perhaps you'll decide it's time to treat your eyes to some new tech.

Another area that's symptomatic of the old step-by-step evolution is the motherboard. A new chipset is always big news here at *PC & Tech Authority*, but we've been lukewarm on the Series 9 so far. As I've said before, there are not many reasons why you would want to upgrade to one of the new Z976 or H97 boards if you're happy with your current build, being:

\* You like the sound of the new SSD storage technology (which we've explained on page 28).

And... that's about it. If your old motherboard doesn't support SATA 3 and

you are keen to get on the SSD train, then older cheaper 8-series boards are fine. Ditto for USB 3. If you need a board with a better slot arrangement then, equally, the chipset series is largely irrelevant - although if you are running very specific multi-card solutions and slot multipliers are now a big factor, it may turn out that a Series-9 offers the best compromise.

No - the real reason why Series-9 is so exciting is that manufacturers have used it as a catalyst to roll out many other interesting features - which are generally not requiring Series 9 to operate.

So! Start reading our Z97 roundup on page 50 and maybe something will inspire you to move up. Heck, motherboards fade with age and can suddenly die at the most inconvenient time, and I think that about five years is as long as you would ever want to go before upgrading, and the new crop are actually dare I say it... sexy enough to want one.



GIGABYTE GB-BX15G-760  
BRIX GAMING 36



NETGEAR  
NIGHTHAWK X6 42



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### WHAT OUR A-LIST MEANS

Our A-List award is reserved for the best products in each category we review. With a winner and an alternative pick in each, that's 92 products you know are first class.



### WHAT OUR AWARDS MEAN

*PC & Tech Authority's* comprehensive Real World testing sorts out the best products from the pack. Any product recommended by *PC & Tech Authority* is well above average for features, value for money and performance.



### WHAT OUR RATINGS MEAN



OUTSTANDING  
VERY GOOD  
GOOD  
ORDINARY  
POOR  
VERY POOR



# HOW WE TEST



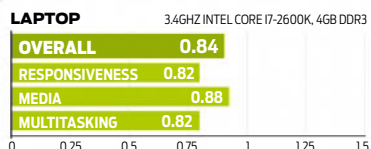
OUR BENCHMARKING TESTS ARE THE BEST IN THE BUSINESS. READ ON TO FIND HOW THEY WORK...

## 2D TESTS

We test desktop PCs, netbooks and laptops with our own, custom-built, 2011 Real World Benchmarks.

We split the results into three categories: Responsiveness, Media and Multitasking, with the Overall score an average of the three sub-scores.

For instance, responsiveness replicates light browser and productivity workloads. The Media test involves running iTunes for audio conversion, Photoshop CSS to crunch large images and Sony Vegas 10 to edit home video. This then gets run simultaneously alongside Cinebench 11 in order to get a handle on the multitasking ability of the system.



## 3D TESTS

We use pre-recorded demos in Crysis and DIRT 3 to test gaming performance where relevant. We have three standard test settings, depending on the power of the graphics card: Low, Medium and High.

To test gaming performance, we use our own recorded Crysis benchmark. We use the Low, Medium and High quality settings in 1366 x 768, 1600 x 900 and 1920 x 1080 screen modes respectively. Very high-end systems can also be tested using the ultra-intensive Very High settings, with all detail switched on, and varying levels of anti-aliasing enabled.



## LAPTOP BATTERY LIFE

We subject laptops to two battery tests. In the light-use test, we optimise the system settings for the greatest power efficiency. We then disconnect the mains and run a script scrolling a selection of web pages until the system shuts down, giving you a realistic idea of the surfing time each laptop offers.

For the heavy-use test, we engage Windows' High Performance power profile, set the display brightness to maximum, and allow the taxing Cinebench 3D renderer to push the processor load to the limit. This gives a worst-case figure, revealing how long you can expect the battery to last under the most demanding conditions.



## GROUP TEST MONITORS 58

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# ASUS TRANSFORMER PAD TF103C

A TOP-NOTCH HYBRID THAT SUCCESSFULLY BLENDS LAPTOP AND ANDROID TABLET AT AN AMAZING PRICE

**PRICE** \$429  
**SUPPLIER** [www.asus.com.au](http://www.asus.com.au)

Asus has been producing its Transformer Android hybrids for years, but the TF103C breaks new ground for the company. While previous efforts have been pitched at the premium end of the market – to compete with the likes of Apple's iPad Air and the Sony Xperia Z2 Tablet – this latest effort is targeted firmly at the lower end, where the Nexus 7 holds sway.

The Transformer Pad is a full-sized 10.1in slate that turns into a compact laptop with the addition of a keyboard dock; and it costs a mere \$429. This makes it a bit of a bargain.

Despite the low price, the TF103C doesn't feel cheaply made. It's solid, with a rubbery plastic coating on the rear giving it a firm feel in the hand, and solid power and volume buttons on the top and left edges lending it a sense of dependability.

The keyboard dock – an essential purchase, we think – is endowed with similar qualities. It's made from tough plastic, and both the keyboard and touchpad work without fuss. In particular, the keyboard is a triumph, with a sensible layout and keys that have plenty of travel.

What you don't get is the lightest or slimmest tablet around – it weighs 556g and measures 10mm thick, while the dock takes that up to 1.1kg and 23mm – but you should still be able to carry it around in a bag easily enough. There are benefits to lugging the keyboard around, too, since it adds a full-sized USB socket to the tablet's microSDXC slot. Unlike the firm's other Transformer Pad devices, however, there's no second battery in the base.

To keep such a tight lid on the price, there have to be compromises, and the screen is the first victim here. The TF103C comes not with a 1080p screen, but a 1,280 x 800 one, a resolution we thought we'd waved goodbye to on all but the very cheapest tablets. Inevitably, images look more pixellated than on the Sony Xperia Z2 Tablet, say, and text doesn't

have that print-on-paper sharpness we've come to expect from the best tablets.

Images do, however, look bright and bold. The display reaches a maximum brightness of 407cd/m<sup>2</sup> and a contrast ratio of 1,018:1, both of which are excellent figures, and the glass also benefits from a fingerprint-resistant coating. We found it still picked up the odd greasy dab, but the coating means such dirt is easily wiped clear.

It's tougher to overlook the poor-quality cameras. Both the 2-megapixel snapper at the rear and the front-facing 1.2-megapixel webcam are dreadful. Photographs lack detail, and videos – captured at 720p – are noisy, even in the brightest light.

Asus has gone all Intel with its latest clutch of budget Android tablets, and this hybrid is no different. At the helm is one of the latest Bay Trail processors – a quad-core, 1.86GHz Intel Atom Z3745, accompanied by 1GB of RAM and 8GB or 16GB eMMC storage – and its performance is spritely. In the SunSpider JavaScript benchmark, a time of 610ms marks out the TF103C as one of the fastest tablets on the market, not far behind the more expensive iPad Air or Samsung Galaxy NotePRO 12.2.

Its results in Geekbench 3 are equally impressive, with scores of 757 and 2,334 in the single- and multi-core tests. With a frame rate of 28fps in the demanding GFXBench T-Rex HD gaming test, it's as quick as any tablet we've tested.



## KEY SPECS

Quad-core 1.86GHz Intel Atom Z3745 • 1GB RAM • 8GB/16GB eMMC storage • 10.1in 1,280 x 800 IPS display • dual-band 802.11n Wi-Fi • Bluetooth 4 • 3.5mm audio jack • microSDXC slot • 2MP/1.2MP rear/front cameras • Android 4.4 • 1yr RTB warranty • 256 x 10.2 x 177mm (WDH) • 556g (1.1kg with keyboard)

We have no complaints about performance in general use, either: the TF103C coped with everything from web browsing to word processing and gaming, barely breaking a sweat. It runs Android 4.4, so you have the latest software to play with, too.

Inevitably, Asus has tinkered with the user interface. The most noticeable change is a rejigging of the notifications menu along the lines of Samsung's Galaxy S5 smartphone, complete with pale-green pastel colours and circular shortcut buttons. Otherwise, the tweaks are confined to a selection of preloaded Asus apps.

Battery life is acceptable. Although there's no second battery in the keyboard base, the TF103C lasted 8hrs 21mins in our looping video test.

Until now, if we'd been asked to recommend a budget tablet, we'd have plumped for the Nexus 7 without a second thought, but the Asus Transformer Pad TF103C has given us another option. For fans of large-screened tablets who might want to do a touch of work on the move, its performance, display quality and usable keyboard make it a worthy alternative.

**Jonathan Bray**

**BATTERY: VIDEO PLAYBACK 8HRS 21MINS**



PERFORMANCE  
FEATURES&DESIGN  
VALUE FOR MONEY



**OVERALL**







▲ The PC is excellent, the screen, keyboard and mouse less so.



it uses passive 3D technology which, unlike its stereoscopic 3D competitors, covers the monitor in visible, horizontal lines at all times, especially in 2D mode. We're really not a fan of this display, even if it is the most affordable way to game in 3D. Worse, it clashes with the choice of GPU in this system.

Gigabyte's Radeon R9 290X is undeniably excellent value for high-performance gaming, but it's a poor choice for 3D. The problem is that AMD doesn't officially support 3D gaming, which is why 3D gamers use Nvidia hardware, in the form of Nvidia 3D Vision 2. It is possible to get the R9 290X to pump out a 3D image, but you'll need to purchase 3D middleware to do so, which is not included with this PC. It's also a great deal fiddlier to get it all running.

It's a shame that the inferior display was paired with such a quality, high-performance PC, as the choice of hardware within and build quality were both excellent. With the street price of the components coming to a total of \$2480, it's also very good value, with the company likely making the slimmest of margins on the package. A one year warranty on the build plus five years on components is also rather generous, especially as it's a Return to Base warranty.

Thankfully TI Computers has realised the error once we informed them of the 3D issue, and will now be offering this package with a non-3D monitor in the form of AOC i2757Fh 27-inch display. But we have to call it how we see it, which is why our score reflects the original configuration sent out to us for review; add another point if you choose to buy the updated package.

**Bennett Ring**

## TI DELUXE 4790X

AIMED SPECIFICALLY AT 3D GAMERS, THIS PC SADLY MISSES ITS MARK

**PRICE** \$2620

**SUPPLIER** [www.ticomputers.com.au](http://www.ticomputers.com.au)

**W**hile we're big advocates for taking the DIY road when setting off on a new PC journey, we understand that some people simply don't have the time or expertise necessary, which is why there's a thriving niche of smaller PC-builders in Australia. TI Computers is one such company, and its new TI Deluxe 4790X is aimed squarely at gamers – especially those who want to play in 3D.

Intel's shiny new i7 4790K CPU is at the heart of this machine, overclocked to 4.6GHz, a tiny increase over the 4.4GHz default top speed. Still, gaming CPUs don't get any faster than this, and it's cooled by the massive Noctua NH-D14 premium air cooler, which keeps temperatures under control while delivering whisper-quiet performance. Accompanying the speedy CPU are twin 8GB sticks of Kingston's HyperX DDR3-1600MHz memory, combining to deliver a total of 16GB of memory, the perfect amount for games.

Long-term storage is delivered in both solid-state and mechanical varieties. Samsung's popular 840 Evo SSD coughs up 250GB of high-speed storage for the OS and your favourite games, while a huge 2TB Seagate mechanical drive delivers plenty of

space for your video files and backups.

So far so good, but the first blip on the trouble radar is the choice of motherboard. The ASUS Z97-A is an all-rounder of a motherboard, and costs around \$30 less than the ASUS Maximus VII Ranger, a gaming-focused board. We'd have preferred the slight bump in price for the Ranger due to the superior onboard audio solution, as we noticed some slight distortion when testing the Z97-A's audio.

Everything is encased in CoolerMaster's affordable yet sleek CM693 case, while a CoolerMaster GX II Pro 750W PSU provides the juice to power the system. We should point out that the build quality is excellent, with all cables tucked neatly away behind the motherboard, helping to deliver better airflow through the case.

A very basic keyboard and mouse set from Logitech is included but, at \$17 for both, they'll probably be the first items to be replaced. The other external peripheral is where things head south for this package, in the form of the AOC D2757PH display. This 27-incher is very reasonably priced when bought separately, at just \$355. There's a reason such a big screen is so cheap though. Firstly, the maximum resolution is 1920 x 1080, which is a little too low for our liking at 27-inches, with the screen's pixel structure quite obvious, so as a 2D gaming monitor it leaves a lot to be desired. Secondly,

### KEY SPECS

Intel i7 4790K CPU OC 4.6G • Noctua NH-D14 Super CPU Cooler • ASUS Z97-A Motherboard • 16G DDR3 Kingston 1600MHz HyperX • 250G Samsung SSD + 2TB Seagate SATA3 HDD • 4G DDR5 • ATI 290X • Cooler Master CM693 Case • Cooler Master GXII Pro 750W PSU • Logitech USB keyboard mouse • AOC i2757Fh 27-inch monitor • Windows 8.1 64 bit • Pioneer Blu-ray Combo Drive • Intel integrated Gigabit Ethernet • Windows 8.1 64-bit • M.2 and SATAe connection

PERFORMANCE ★★★★★  
FEATURES&DESIGN ★★★★★  
VALUE FOR MONEY ★★★★★

OVERALL ★★★★★



# GIGABYTE GB-BXi5G-760 BRIX GAMING

## GIGABYTE STEAMS AHEAD OF THE COMPETITION

**PRICE** TBA  
**SUPPLIER** [www.gigabyte.com.au](http://www.gigabyte.com.au)

**W**henver one of the myriad systems based on Intel's Next Unit of Computing (NUC) concept comes into the labs we see so much potential. But we have also encountered frustrating roadblocks to the dream of tiny computing, be it the whiny fan noise experienced by most, or the stubborn insistence that early models had to use mSATA drives.

While there is still one major caveat, namely price, the BRIX gaming from Gigabyte is by far the most impressive NUC that we have seen. It packs not only a Core i5-4200H CPU clocked at 2.8GHz but it also sports an Nvidia GeForce GTX 760 mobile GPU. All you need to do is populate the SODIMM memory slots and add a drive.

Thankfully it has space for both an mSATA and a 2.5in hard drive, which gives a degree of flexibility needed for such a gaming box - if you really want to maximise performance and storage you could opt for an mSATA boot SSD and a bulk storage drive, for example.

The unit is slightly larger and much heavier than other models, and it

doesn't take long to work out why. Gigabyte has paid close attention to the design of the thermals in the BRIX gaming, working it into the green Nvidia logo-inspired design with black mesh panelling on the sides. This has enabled them to use two fans pushing air straight through the system, most importantly over the source of the unit's heat - a copper heatsink designed to ensure that the GPU runs at optimum levels.

All of this results in a fantastic little gaming box, capable of pumping out decent looking titles at 1080p. In our Standard Crysis benchmark the unit

▼ With the back plate off access to the SODIMMS is easy.



### KEY SPECS

i5-4200H CPU • Nvidia GeForce GTX 760 GPU with mini HDMI x2, mini DP Output, featuring triple displays • Supports 2.5" Hard Drives • 1 x mSATA SSD Slot • 2 x SO-DIMM DDR3L Slots (1333 / 1600 MHz) • 4 x USB 3.0

managed a very respectable 52fps at High detail, although this performance dropped to unplayable at Very High. Though that is the compromise you make by reducing size and moving to a mobile GPU. It still leaps and bounds ahead of what either Intel or AMD pump out from their integrated graphics units though.

It is worth also noting that this is a system where Nvidia's GeForce Experience software really shines, taking the tricky work out of deciding on the best settings for games. Most of the time it opted for 1920x1080 resolution with medium to high settings, which in recent games like Wolfenstein: The New Order and Wildstar looked quite spiffy indeed, competitive with what the Next Gen consoles are capable of.

Where the real potential of the BRIX series lies (and thankfully this is something that Gigabyte has clearly worked out, unlike some of its competitors) is in the upcoming category of Steam Machines. Thanks to its use of Intel CPU and NVIDIA GPU it is a prime candidate for SteamOS, though for those who want to use the software's ability to stream games from a desktop PC this is overkill, and the lower end models of BRIX will be much better suited to that.

Despite the fact that the BRIX gaming is by far the most accomplished NUC design that we have encountered, we do worry that it is hampered by its pricetag. At the time of writing we didn't have a local price, but it was selling in the States for around US\$950. While there is little that can be done by Gigabyte to reduce this and still retain the performance of the unit, you can build a pretty powerful Mini-ITX box for that, especially when you factor in the lack of memory and a drive in the standard BRIX Gaming package. That said, if you absolutely must have the best tiniest system on the market, this is it.

**John Gillooly**

3D SPEED		GOOD	PLAYABLE	UNPLAYABLE
HIGH SETTINGS	52FPS			
MEDIUM SETTINGS	102FPS			
LOW SETTINGS	156FPS			

PERFORMANCE  
FEATURES&DESIGN  
VALUE FOR MONEY



**OVERALL**







# WANT HIGHER PC PERFORMANCE?

THE OCZ ARC SSD SERIES WILL TAKE YOU THERE.



You've been hearing about what SSDs can do to jump start PC performance for a while now. But you haven't made the leap yet. Why, what is holding you back? Cost? Enter the all-new OCZ ARC solid state drive series. Known for its innovative enthusiast-grade SSDs, OCZ designed the ARC series to offer everyday users an excellent value while still leveraging the proven technology found in our flagship SSDs for a robust performance and reliability feature-set. [Crossover...no faith needed with this leap.](#)

Up to 490 MB/s • Up to 80,000 IOPS • OCZ Barefoot 3 M10 Controller • Toshiba 19nm Multi-Level Cell (MLC) NAND • Available in 120GB – 480GB



**“Devil’s Canyon isn’t aimed at the low-cost, low-power market; it’s for enthusiasts and can’t-get-enough workstation jockeys.”**

1.27 – a huge 13% improvement on the i7-4770K, representing the highest score we’ve seen from any desktop chip. The single-threaded Media section of the test was particularly strong: here the Core i7-4790K scored an impressive 1.35.

Incredibly, the i7-4790K had yet more to give, since, like all K-class processors, Devil’s Canyon chips come with unlocked Turbo multipliers. We configured our Core i7-4790K to clock itself up to 4.7GHz for single- and double-threaded tasks, and 4.6GHz for more demanding scenarios. At these speeds, it achieved an Overall score of 1.31 with a stock-standard, low-profile Intel cooler.

However, there’s a price to pay. Like the Core i7-4770K, the i7-4790K is expensive at around \$400 (street price), and unless you do a lot of heavy-duty, multithreaded computing, it’s of questionable value. Also, it’s worth noting that running at such speeds takes a lot of power. Flip over a Devil’s Canyon chip and you’ll see an extra crop of capacitors that regular Haswell processors lack. To keep these fed, the new chips have a thermal design power of 88W – slightly higher than their predecessors.

But so what? Devil’s Canyon isn’t aimed at the low-cost, low-power market; it’s for enthusiasts and can’t-get-enough workstation jockeys. For them, it delivers better performance than Intel’s previous flagship. If you’re looking for exceptional desktop performance, there’s only one reason to consider holding off: with Intel wringing such speed from its 22nm architecture, who knows what may be possible with its forthcoming 14nm parts later in the year?

**Darien Graham-Smith**

# INTEL CORE I7-4790K

THE NEW HASWELL FLAGSHIP IS THE FASTEST DESKTOP CPU WE’VE YET SEEN – AND THE PRICE IS SURPRISINGLY PALATABLE

**PRICE** \$405  
**SUPPLIER** [www.intel.com.au](http://www.intel.com.au)

Intel’s brisk production schedule should see the new 14nm Broadwell architecture arrive by Christmas, but that doesn’t mean Haswell is out of tricks. To tide us over until the next generation arrives, Intel has released a new spin on the Haswell design, codenamed Devil’s Canyon, that squeezes more performance from the hardware.

This has been achieved not through complex re-engineering, but by simply switching to a new thermal interface material – that is, the stuff inside the chip that conducts

heat away from the transistors and up to the heatsink. Thanks to the use of “next-generation” thermal material, the chips enjoy better heat dissipation than the original Haswell models, so they can run faster without overheating. This is very significant for the enthusiast market, as the last generation TIM was a notoriously poor performer, inhibiting overclocking potential severely.

What this means in practice for the rest of us depends on whether you go for a Core i5 or i7 processor. Intel has set the base clock of the Core i5-4690K at 3.5GHz, only 100MHz higher than that of its predecessor, the Core i5-4670K.

With the Core i7-4790K, however, the company has pulled out all the stops. Previously, the fastest Intel CPU on the market was the Core i7-4770K, which has a base speed of 3.5GHz; the i7-4790K takes the same design, but cranks it up to 4GHz. When it comes to single-core operations, Turbo Boost accelerates things further still, to an eyebrow-raising 4.4GHz.

It’s no surprise that the new chip tears through benchmarks. Tested in Windows 8, with 8GB of RAM and a Samsung 840 Evo SSD, the Core i7-4790K achieved an Overall score of

## KEY SPECS

4GHz (4.4GHz max turbo speed) • 88W TDP • four cores • 8MB Smart Cache • Intel HD Graphics 4600 • socket 1150 • 3yr RTB warranty



◀ All hail the new king of CPUs.

PERFORMANCE  
FEATURES&DESIGN  
VALUE FOR MONEY



OVERALL





# INTEL PENTIUM G3258 ANNIVERSARY EDITION

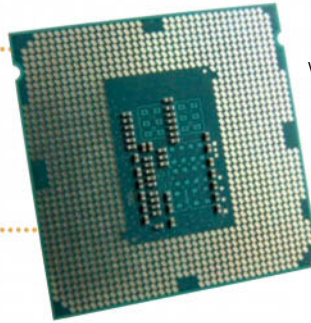
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**PRICE \$79**  
**SUPPLIER** [www.intel.com.au](http://www.intel.com.au)

**W**e still can't figure out whether this CPU is sheer marketing brilliance, or simply a happy coincidence in timing. Performance-hungry PC users should currently be peeved at Intel, with the 5th Gen Core CPU delayed from the original June release until the end of this year. However, rather than moaning about our 'ancient' CPUs, we're all running around like kids in a candy store, thanks to the bargain blazer that is this special Pentium. Did Intel release this to shut us up, or did it always plan on making a special product to celebrate the 20th anniversary of the Pentium brand? We don't know, and we don't really care, because there is one thing we do know - this \$80 chip is fiendishly fast.

Unlike other Pentiums, the G3258 has an unlocked multiplier. This means it's a breeze to overclock, and overclock it does. We haven't seen such huge speed boosts for years, with our review sample happily purring at 4.4GHz, up from a default speed of 3.2GHz. Others have managed to squeeze a whopping 4.8GHz out of their samples, a scorching 50% speed increase. The chip doesn't include Intel's Turbo mode, so it's stuck at 3.2GHz unless overclocked, but motherboards like the ASRock Z97 Anniversary make tweaking a truly painless process.

The high potential frequency of this CPU is remarkable, but there is a negative side; the CPU is comprised of just two cores. They can run legacy software remarkably well, as older software was designed with a single CPU core in mind. Ditto



with older games, which tend to be bottlenecked by the graphics card anyway. However, as soon as you partake in any activity that benefits from multiple cores, the G3258 falters. Whether it's running several demanding applications at once, or playing games with wide open worlds, overly clever AI or complex physics, the twin cores will prove to be two cores too few. Our gaming benchmarks were run at low resolution, ensuring the CPU was the bottleneck, hence the lower scores. Over the last couple of years, application support for four or more cores simultaneously, in both game and general software programming, has become widespread so the lack of extra cores will become more of an issue over time. But if all you care about is a spot of casual gaming, some light multimedia action or a basic desktop machine, this \$80 CPU will deliver a level of responsiveness usually reserved for the elite.

**Bennett Ring**



## KEY SPECS

Twin Cores • no HyperThreading; No Turbo • 3MB cache • Socket 1150 • twin channel DDR3-1333MHz supported

PERFORMANCE	★★★★★
FEATURES&DESIGN	★★★★★
VALUE FOR MONEY	★★★★★
<b>OVERALL</b>	★★★★★

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## ASROCK Z97 ANNIVERSARY

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**PRICE** \$119

**SUPPLIER** [www.asrock.com.tw](http://www.asrock.com.tw)

The Pentium G3258 Anniversary Edition is a gift from Intel to overclockers, delivering astonishing raw frequency performance provided you don't mind getting your hands a little dirty. ASRock has come up with a rather savvy marketing manoeuvre to capitalise on the excitement around the G3258, in the form of the ASRock Z97 Anniversary motherboard. Like the CPU it's named after, this budget board packs a powerful wallop, but several rather large corners had to be cut to lessen the blow to your wallet or purse.

The use of the Anniversary name suggests this motherboard has a nifty feature or component that somehow makes it the perfect home for Intel's new bargain blazer, but upon closer examination there isn't. It's just a just a damn good value, Z97-based motherboard. It's quite amazing to see how cheap this board is, as the Z97 is Intel's latest performance chipset. Designed to extract maximum performance out of the upcoming 5th Generation Core CPU (aka Broadwell), Z97 is usually found in more expensive, premium motherboards around the \$180 to \$250 price point, aimed at gamers or performance users. Backwards compatible with today's 4th Generation Core CPUs yet forwards compatible with the long overdue

Broadwell, it uses the Socket 1150 design, safe in the knowledge that it should still be compatible with at least the next two generations of Intel CPUs.

So how has ASRock managed to slash the price of a Z97 board so drastically? The answer is easy – there's precious little else on this motherboard other than Z97 chipset and its supporting components. Even the physical size of the PCB board has been cut back, as it's much thinner than average ATX-sized products. Considering how small it is, ASRock has managed to squeeze a healthy number of expansion slots onto the board, with a single PCI 3.0 x16 for a graphics card, alongside three PCIe 2.0 x1 slots and twin legacy PCI slots. They're rather cramped on this board, though, so expect a few to be shut out of action when their neighbouring slots are occupied.

Strangely absent is one of the key features of the Z97 chipset, an M.2 slot, the exotic new connection type designed for ultra-fast SSDs. For existing Z87-based motherboard owners, it's the only reason to upgrade right now, as the performance is otherwise identical between the new and the old.

We're a little surprised that ASRock cut this one defining feature from the board, but in reality most users are still perfectly happy with their SATA 3 SSDs, so it probably wouldn't have got much use anyway.

Onboard audio is comprised of the absolute basics, in the form of a Realtek ALC887 audio chip, without any of the EMF shielding or proprietary amplification found on more expensive offerings. The power circuitry is similarly simple, with a four-phase solution offering decent performance provided you keep it away from all forms of extreme voltage tweaking. Despite this simple power configuration, we managed a sterling 4.4GHz frequency out of the G3258 CPU, which runs at a default speed of 3.2GHz. Best of all, we achieved this soaring speed increase by using the board's preconfigured BIOS overclocking options. There was no messing around with voltages, no disabling esoterically named monitoring features or complex mathematics to figure out the right memory ratio. In BIOS, we selected an automatic overclock speed of 4.4GHz, and rebooted the PC to 100% stability. It doesn't get any easier.

The pre-tweaked BIOS settings will be reason enough for novices to pair this motherboard with Intel's new wonder chip, giving them all of the performance with none of the effort. The fact that it also delivers the brand new Z97 chipset, along with forwards compatibility, makes the price quite remarkable – we just wish they'd spent a few dollars more to include the M.2 connection. It might not have any fancy features that make this board specially sculpted for the Pentium Anniversary, but the unique combination of chipset, price and easy overclocking results in it being the perfect partner.

**Bennett Ring**

### KEY SPECS

6 x SATA3 • 4 x DDR3 DIMM Slots (up to 3100+ OC) • Gigabit Intel LAN • Six USB 3.0 • Six USB 2.0.



PERFORMANCE  
FEATURES&DESIGN  
VALUE FOR MONEY



OVERALL





# APPLE OS X 10.10 YOSEMITE PREVIEW

THOUGHTFUL IMPROVEMENTS AND NEW FEATURES MAKE OS X AND IOS WORK BETTER TOGETHER

**PRICE** FREE  
**SUPPLIER** [www.apple.com/au](http://www.apple.com/au)

The latest version of Apple's desktop OS officially drops this spring, and preview code has already been released to developers and beta testers. As usual, it brings a varied selection of features and updates, but what's noticeable is a directed effort to evolve the Mac into a closer partner to Apple's mobile devices. The intention is clear as soon as you boot up the new OS. The Finder and Dock are populated with flatter-looking icons, while subtle, soft window-translucency effects further echo the iOS look. Perhaps most symbolically, the system font has been switched from Lucida Grande – previously a keystone of Aqua – to the sober Helvetica of iOS.

Wisely, Apple hasn't tried to transplant iOS interface elements onto the desktop. The changes in Yosemite's Finder and native applications are mostly modest and practical: they include the ability to annotate emails in Mail; a new layout for Calendar; and a cleaner look for Safari, with a new tab overview and purportedly lower power consumption in multitab browsing. Full-screen mode is now accessed by clicking the green window-control button, while the wayward window-zoom function of old is demoted to an Option-click.

One notable update is the behaviour of Spotlight. Previously tucked away at the top right of the screen, the search field now appears as a large floating bar in the upper middle of the screen. As you start to type the name of an application or document, Spotlight's top suggestion appears alongside your typing, ready for you to open instantly by hitting Return. For searches where you know exactly what you're looking for, it's a cleaner experience than what went before.

Another big change is to the Notification Centre. Previously a dry list of events and messages, this has become a two-pane affair, with the addition of the new "Today" view. By default, this pane shows the date, calendar events, reminders and other timely information – very much in the iOS style – and can be customised with a selection of widgets. Bundled options include a calculator and a world clock; developers will also be able to create their own and distribute them via the App Store.

Where Yosemite really reaches out to mobile devices is in its new features. For a start, a technology called Handoff allows desktop applications to share user-state information with any nearby mobile device running iOS 8 (also set for general release this autumn). In practice this means you can start writing an email or a document on your MacBook, then switch to the iPad and pick up where you left off. It works



with a range of applications, including Safari, Pages and Maps, and a public API means cross-platform developers can use Handoff in their own creations.

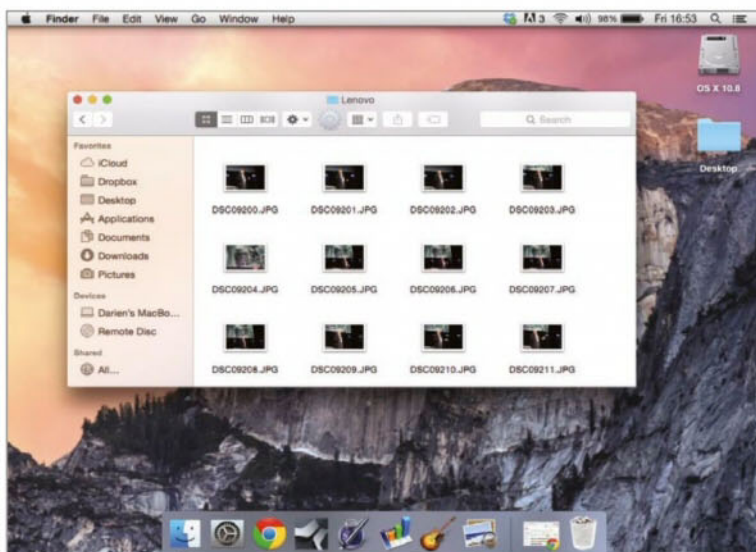
Communications features become more device-agnostic, too. Mavericks brought FaceTime to the desktop, and now in Yosemite it's possible to send and receive regular voice calls and text and picture messages from your Mac – so long as your iPhone is on the same local network.

The most significant development in this area is a feature called iCloud Drive, which lets you use your 5GB of iCloud storage (or more if you've paid for it) as a general-purpose Dropbox-type repository for your own files and folders. A client is promised for Windows, so that files can be easily synchronised across platforms, but what's really interesting is that it also works on iOS, providing an effortless way to move files back and forth between desktop and mobile clients.

In the past, some have suggested that Apple's long-term plan for confluence might be to evolve OS X into a variant of iOS. But Yosemite points in the opposite direction. In Apple's vision, desktop and mobile platforms build on their strengths – yet work together, so that you and your files, projects and communications can hop between them. We have to say, on this evidence, it looks like a more persuasive vision than Windows 8.

It isn't a reality yet, of course: more app support is needed at the very least. But for Mac users who've so far resisted the lure of iOS, Yosemite is already the best argument we've seen for switching to an all-Apple line-up; and for those who own an iPhone or iPad, it promises to be an irresistible release.

**Darien Graham-Smith**





# NETGEAR NIGHTHAWK X6 AC3200 TRI-BAND ROUTER

NETGEAR 'S NEWEST FLAGSHIP HERALDS  
TRI-BAND FOR DATA HUNGRY FAMILIES

**PRICE** \$349  
**SUPPLIER** [www.netgear.com.au](http://www.netgear.com.au)

It's easy to overlook a device that sits quietly in the corner doing all the networking heavy lifting in our increasingly connected world. That is, until a medium sized family with video, gaming, mobile phone, laptop, tablet and browsing needs comes along -- all fighting for a share of the data stream. Added together, the amount of data being carefully doled out to various devices is huge and it is this future that the Netgear Nighthawk X6 is designed to work in.

Being tri-band means the Nighthawk X6 gives essentially 3 Wi-Fi networks each with their own dedicated bandwidth to play around in. There is a relatively low speed 2.4GHz range, which is where older devices will sit, taking them away from the faster channels. The high speed 5GHz range has two separate channels, allowing a larger number of devices connected at once. The Nighthawk X6 AC3200 router can dynamically assign a high demand device to a channel with only low demand devices on it, or even out the data demand over 3 different channels. It also means that devices

which allow faster throughput such as modern 802.11ac smartphones, aren't being slowed by older devices with more limited capabilities.

Sleekly styled, the router has six antennas which can be laid flat across the top, or set upright for better range. The range itself is excellent, with an upstairs/downstairs (around 15m with up to two walls and a floor) and even upstairs/outside (up to 25m with up to three walls and a floor) presenting little difficulty. Speed drop was reasonably low (around 40%) at the outer points and it held signal remarkably well.

Connections are fairly standard, but very easily accessible, with 4 wired Ethernet ports, 1 WAN port and 2 USB ports -- one USB 3.0 and one USB 2.0 -- which allows for connection of both a printer and a media storage device turning the router into a media hub quickly and simply. The 1GHz dual core processor with three offload processors means that the router, even under full load, should have enough capacity to manage with cycles to spare.

Setting up the router is refreshingly simple. Once attached to the modem, it automatically checks for a network already in place. If it finds one, it asks whether to put the router into

access point mode rather than using the routing features. Once told to use router mode, the admin panel is displayed. The usual settings are all here such as VPN support, separate guest networks, SPI and NAT in a nicely intuitive and simple Netgear layout.

The option of setting either the same SSID or different SSIDs for the three different channels is here as well. For those who want more control over which devices are assigned to which channel, the ability to set either one, two or three SSIDs means that you can physically assign a device to a channel rather than letting the router choose. Should you have the same SSID set across all three (or any combination), the router is allowed free reign to decide where to put different devices. This also allows you to set a guest SSID on the slower channel keeping the faster connections for yourself and without messing around with guest networks feature.

The test Nighthawk came configured with three different SSIDs out of the box, and once changed across to a single SSID happily placed a laptop (using wireless G) onto the lower speed channel and a HTC M8 and iPad Air onto the same high speed channel, leaving one completely free. Throughput over these channels was excellent, even when multiple devices were streaming simultaneously. When adding more devices it kept loading up the second high speed channel, leaving the first free which was unexpected and somewhat disappointing. Transfer speed remained high even after the addition of a reasonable number of devices, however it started to slow before the router decided to put devices onto the free channel.

While there is no doubt that the Nighthawk X6 is an excellent solution for keeping our increasing numbers of devices connected to the net efficiently, those who already have a good router may be dissuaded by the price, however for those who are suffering the pain of device dropouts and 'too much data in too few pipes' could do a great deal worse than Netgear's latest offering.

**Nichole Tillotson**



## KEY SPECS

1GHz dual core processor with 3 offload processors · six high performance antennas · one 2.4GHz band and two 5GHz Wi-Fi bands

▼ Excellent connectivity options include USB 3 + USB 2 ports.



PERFORMANCE  
FEATURES&DESIGN  
VALUE FOR MONEY

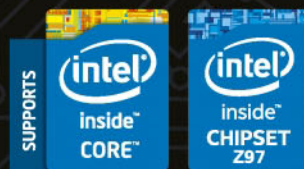


OVERALL





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## LG G3

LG RUSTLES UP A CLASSY, TOP-RUNG SMARTPHONE, BUT THE PIXEL-HEAVY SCREEN TAKES ITS TOLL ON BATTERY LIFE

**PRICE** \$700  
**SUPPLIER** [www.lg.com.au](http://www.lg.com.au)

**L**G's flagship smartphone, the G3, has finally landed. With a huge, 5.5in Quad HD display and a host of upgrades over its predecessor, the G2, the G3 is gunning for its top-flight Android rivals.

The big news is the display. LG has opted for a 5.5in, 1,440 x 2,560 IPS panel – the highest resolution we've seen on a smartphone. It delivers unearthly levels of detail – snap a picture with the rear-facing 13-megapixel camera and it's possible to see almost every speck of detail without the need to zoom in.

Tested with our X-Rite colorimeter, the G3's display is technically capable, too. Brightness peaks at 457cd/m<sup>2</sup>, and colour accuracy is largely on target. Only the modest contrast ratio of 788:1 disappoints; the G3 fails to dredge up as much detail in darker images as its rivals. Disappointingly, once the phone warms up, the display brightness is automatically reduced to prevent overheating. This reduces the screen brightness from 457cd/m<sup>2</sup> to 310cd/m<sup>2</sup>, which is far less legible in sunny conditions. After a few minutes more, it dims further, to 269cd/m<sup>2</sup>, although

the indicated brightness percentage level doesn't change. Clearly, LG is using aggressive power-saving measures to cope with the demands of the pixel-packed screen.

The G3 gets all the essentials spot on, though. The plastic rear mimics brushed metal, and it doesn't feel cheap: the smooth, curved body is great to hold. At 149g, it's reasonably light, too. There's 16GB of onboard storage, plus a microSD slot hidden behind the removable battery, and the phone's punchy 1W speaker is loud enough for both music and hands-free phone calls.

Android 4.4.2 has received a tasteful LG makeover and a heap of new features. Knock Code makes a reappearance, allowing you to unlock the phone with a sequence of finger taps, and the G3 can be "knocked" into life by double-tapping the display, rather than reaching for the power button. The familiar interface has been tweaked to employ simple, pastel-coloured shades and rounded icons, and garnished with a sprinkling of apps and widgets.

Like Samsung's recent handsets, the G3's Dual Window feature allows a selection of apps to be run simultaneously side by side. The QSlide

feature allows certain apps to be run as resizable floating windows, too: it's possible to have two split-screen apps in the background and a third QSlide app floating on top, for instance.

There's one area where LG has made a serious misstep. Despite the phone's pixel-dense screen, an image-sharpening filter is applied to all onscreen content. Everything – including text, icons, web pages and snaps taken by the camera – is fringed with halos. Annoyingly, this feature can't be disabled. The pixel-dense display causes other problems, too. Despite being powered by the same 2.5GHz Qualcomm Snapdragon 801 CPU as the Samsung Galaxy S5 and sporting 3GB of RAM, the G3's benchmark scores aren't quite on par with those of its flagship rivals.

Our usual suite of benchmarks saw the G3 finish the SunSpider test in 692ms, ahead of the Sony Xperia Z2 – 920ms – but well off the 391ms pace of the Galaxy S5. Oddly, the G3's Geekbench 3 results were around 19% behind those of its key rivals, with a single-core score of 829 and a multi-core score of 2,205.

Behind the gorgeous metal-effect rear lies a 3,000mAh battery. In GFXBench's battery test, this lasted 2hrs 58mins, putting the G3 only 11 minutes behind the Xperia Z2.

The G3's camera is a high point. The 13-megapixel sensor has a laser autofocus system for taking quick-draw snaps – crisp shots are captured almost instantaneously. It's not infallible, of course – there were still plenty of photos featuring a blurry subject framed by a pin-sharp background – but the G3 is capable of taking cracking snaps. The 30fps 4K video recording is impressive, too, with near-photographic levels of detail and smooth motion.

On paper, the G3 looks like it's capable of landing some knockout blows on its premium smartphone rivals. In reality, however, the pixel-packed screen is of no practical benefit, and LG has had to compromise brightness and battery life as a result. The LG G3 remains a good handset, but, with rivals delivering a more balanced performance for similar money, this isn't the Android giant-killer we've been waiting for.

**Sasha Muller**

### KEY SPECS

2.5GHz Qualcomm Snapdragon 801 CPU • Adreno 330 GPU • 3GB RAM • 16GB storage • 5.5in 1,440 x 2,560 display • 4G • Bluetooth 4 • NFC • 802.11ac Wi-Fi • microSD • 13MP/2.1MP rear/front cameras • 4K video • 3,000mAh battery • 1yr RTB warranty • 146 x 8.9 x 75mm (WDH) • 149g

PERFORMANCE  
FEATURES&DESIGN  
VALUE FOR MONEY



**OVERALL**





# NOKIA LUMIA 630

A PERFECTLY PASSABLE BUDGET HANDSET, BUT A POOR DISPLAY ROBS IT OF GREATNESS

**PRICE** \$200  
**SUPPLIER** [www.nokia.com.au](http://www.nokia.com.au)

**N**okia has form in producing high-quality, low-cost smartphones, and the Nokia Lumia 630 has the added bonus of being the first we've seen to come with Windows Phone 8.1 on board.

We were impressed with Windows 8.1 when we tried out the Developer Preview on a Lumia 1020, and it works just as well on this smaller handset. In particular, the new pull-down Action Center is a boon, with its toggles and settings menu shortcuts, while the Swype-style "shape writing" keyboard works beautifully.

At first glance, the phone itself isn't especially interesting. Like many budget smartphones, it looks and feels ordinary, with a simple, flat glass front and a removable, matte-plastic rear cover, which is available in a variety of bright colours. It doesn't even have the iconic Windows Phone Home, Back and Search keys stencilled beneath the screen: on the 630, the buttons have been moved onto a bar at the bottom of the display itself.

In terms of build quality, it isn't a patch on Nokia's flagship models, but it looks reasonably smart with its angled edges and rounded corners. It's also light, weighing only 134g, and is more pocketable than the 5in phones we've seen recently.

On the rear, the 630 has a 5-megapixel camera but no flash, and there's no front-facing snapper at all. Unusually for a Nokia handset, there's no dedicated camera shutter button; to take a photograph, you have to first unlock the phone then launch the camera app, which can take as long as ten seconds if you secure your phone with a code. Other shortcomings include a lack of 4G (the Lumia 635 has 4G but is more expensive), no dual-band Wi-Fi support, and no NFC. On the plus side, the phone's 1,830mAh battery

is replaceable, there's 8GB of internal storage – generous for a budget phone – and you also get a microSDXC slot, which accepts cards up to 128GB.

The 630's 4.5in display is an IPS panel, and measured with our colorimeter it reached a reasonably bright 323cd/m<sup>2</sup> at maximum brightness, while the contrast ratio of 788:1 prevents onscreen images looking washed out. It's tough, too: the layer of Gorilla Glass 3 should shrug off scratches.

Take it outside, however, and it quickly becomes clear that this is a second-class screen. The first problem is that it picks up fingerprints far too easily, and the greasy smears create a glare that makes it difficult to read the screen in bright conditions.

Dim the display and another problem rears its head: the top edge of the screen is terribly patchy, which can be distracting when using the phone in dark conditions. Also, there's a lot of smear and motion blur evident when you scroll around quickly.

The resolution of 480 x 854 is the least of the Lumia 630's worries, but graphics and text do look noticeably more coarse than on a 720p display of the same size.

Qualcomm's 1.2GHz quad-core Snapdragon 400 system on a chip (SoC) is a common sight at this price level, and as usual its performance fails to set the pulse racing. The 630 achieved an uninspiring time of 1,529ms in SunSpider, which is well below average for a modern smartphone.

The Snapdragon 400 had enough juice to run Windows Phone 8.1 smoothly, though, with only the occasional hitch – usually evident during app installation. And you won't find many games that will overtax the 630's Adreno 305 GPU, since the screen resolution is so low.

The battery life is fine, too. In general use, we found the Lumia 630 would get us through a day with capacity to spare. In our tests, with the screen set to medium



▲ We love Windows Phone 8.1, but the Nokia's display is below par

brightness, our video consumed 10.4% per hour, and audio streaming over 3G at up to 5.2% per hour. This puts it on level pegging with the Motorola Moto E and ahead of the Moto G.

The 630's 5-megapixel camera is merely average – it doesn't have a high resolution, and the 1/4in sensor is on the small side – but in good light conditions images are clean and exhibit more natural colours than most budget rivals. It's much the same story when it comes to video. In good light, the 630's 720p footage is lacking in detail, and there's no stabilisation to sort out shaky hands, but colours are well balanced and there's none of the horrible exposure stepping we saw with the Moto E. Footage is noisy in low light, but not unusably smeary or juddery.

All-round call quality is superb. Both the earpiece speaker and mic produce clear audio, and the rear-firing, single external speaker can reach surprisingly high volumes, although it does have a harsh, nasal quality to it.

The Nokia Lumia 630 is a pretty good smartphone. There's ample performance, battery life is good, and the camera is tolerable. All the same, the patchy, dim, low-resolution screen disappoints, and is reason enough to consider the 630's budget rivals first.

**Jonathan Bray**

## KEY SPECS

Quad-core 1.2GHz Qualcomm Snapdragon 400 SoC • Adreno 305 GPU • 512MB RAM • 8GB storage • 4.5in 480 x 854 display • 3G • Bluetooth 4 • 802.11n Wi-Fi • microSDXC slot • 5MP rear camera • 720p video • 1,830mAh battery • 1yr RTB warranty • Windows Phone 8.1 • 67 x 10.4 x 130mm (WDH) • 134g

PERFORMANCE  
FEATURES&DESIGN  
VALUE FOR MONEY



OVERALL



# APPS ROUND-UP

**JENNETH ORANTIA** WITH THE WISE WORD ON THE ESSENTIAL APPS, TOOLS AND UTILITIES WE THINK YOU NEED.

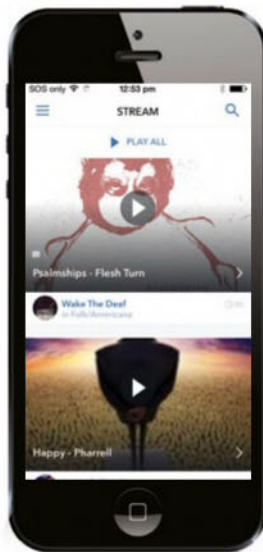
## ► WHYD

**T**ired of switching between multiple apps and services just to listen to music? Whyd is equal parts music discovery service and social network, and works by aggregating music from various online services. Once you create an account, it automatically sets you up to follow users with similar music tastes.

From there, it works more or less like every other social network. You have your own profile, which you can customise with your photo and background image, followers and people you follow, and a 'stream' that shows all of the updates in a timeline. You can comment on and like posts, only in this case, there's no option to post freeform updates – the only items that appear in the stream are tracks that you and people in your network have posted.

So long as you're following people with similar music tastes, Whyd does well as a music discovery service. Once you start playing a track in the stream, you can then easily skip forward and backward through tracks from the Now Playing screen.

Finding a track to add to your profile is easily accomplished using the search bar. Matching results are organised into tracks, playlists and users, and you can



add a track – either on its own or as part of a playlist – by tapping on the plus button. If you're a little embarrassed about your fondness for Katy Perry, however, there's no way to hide particular tracks or playlists from your public Whyd network.

A neat feature of Whyd is that it lets you play YouTube tracks in the background (that is, while the YouTube app isn't active on your iPhone screen), which means you can listen to music hosted on YouTube while you're using other apps like Runkeeper or Facebook.

The downside to Whyd is that it doesn't support that many services – yet. For now, it works with YouTube, Soundcloud, Vimeo, Bandcamp, Deezer, Daily Motion and embedded MP3 files, but the developers say Spotify support is on the cards.

As always, these new social network services need to reach a critical mass in order to make it – or break it. So far it appears that Whyd is going for gold.

**PRICE** FREE **DEVELOPER** WHYD  
**PLATFORM** IPHONE

EASE OF USE

FEATURES

VALUE FOR MONEY



**OVERALL**



## ► YAHOO AVIATE LAUNCHER

**Y**ahoo's newest app is an Android launcher with a difference. Unlike most apps of its class that focus mainly on giving your smartphone a prettier homescreen and apps interface, Aviate Launcher presents you with a homescreen that displays a different set of apps and information at different times of the day.

Aviate Launcher's interface is simple. There are three tabs: one with the context-sensitive homescreen, another with your most-used apps and quick access to your favourite contacts, and the third containing the apps launcher.

The homescreen changes throughout the day, so in the morning, it shows how long it will take to drive to work and your schedule for the day. While you're at work, it displays productivity apps, a link to navigate home, and buttons to send an email and create a new event. As soon as you plug headphones in, it displays all of your multimedia apps and provides handy playback controls. Each of these homescreens can also be customised with apps and widgets.

The apps launcher automatically groups your apps



into categories such as 'social', 'productivity', and 'entertainment' to make them easier to find. These groups (or 'collections', as they're known in the app) are fully customisable, so you can add new apps, remove existing ones, and create new collections. You can also find apps organised by alphabet or using the search function.

The middle tab is the least exciting, showing a customisable photo and frequently used apps. However, you can also get to your favourite and recently used contacts by swiping up from the bottom of the screen.

Aviate Launcher stands out for being easy to set up and having a clean interface. We just wish there were more customisation options. As it is, you're limited to adding a picture to the middle tab, choosing from one of two colour themes and downloading an icon pack.

**PRICE** FREE **DEVELOPER** YAHOO  
**PLATFORM** ANDROID

EASE OF USE

FEATURES

VALUE FOR MONEY



**OVERALL**





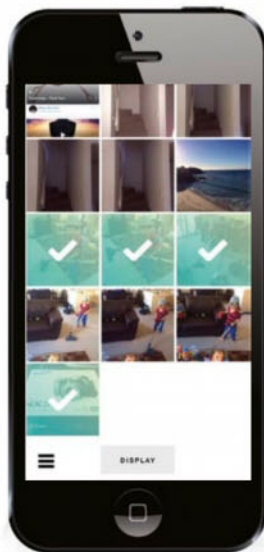
## ► OVERSWIPE

**PRICE:** FREE

**DEVELOPER:** NHALEY & HUGHES

**PLATFORM:** IPHONE

Everyone's got at least one of those relatives, friends or workmates. You know, the ones who scroll forwards or backwards in your photo library when you were only showing them a single picture. Overswipe nips this photography faux pas in the bud by letting you choose the photos that people can see. Before you hand your phone over, simply select the photos you want visible in Overswipe, and you don't have to worry about your mum or Auntie Sheila coming across images they weren't meant to see. The free version is limited to showing five images. Upgrading to the Pro version for \$1.29 removes this restriction, and also adds a passcode to prevent nosy friends from going back to the main gallery view. Of course, we also think this feature should just be part of the OS itself...



**OVERALL**



## ► VIDEOSTREAM FOR GOOGLE CHROMECAST

**PRICE:** FREE **DEVELOPER:** TEAM VIDEOSTREAM

**PLATFORM:** CHROME

The Google Chromecast offers a cheap and easy way to get content that's on your smartphone, tablet or laptop playing through your TV. However, you need to have Chromecast-enabled apps (such as YouTube and Chrome) to take advantage of this functionality. The Videostream for Google Chromecast extension gets around this limitation, enabling you to play any videos stored on your computer through the Chrome web browser. To play a video, simply open Videostream in Chrome and navigate to the movie you want to play. All video formats are supported, including MKV and FLV. Upgrading to the premium version (\$1.49 a month, \$14.99 a year or \$34.99 for a lifetime license), adds playlist support and remote control from an Android app.



**OVERALL**



## ► GOOGLE SLIDES

**PRICE:** FREE

**DEVELOPER:** GOOGLE

**PLATFORM:** ANDROID

Need to create or edit presentations from your Android device? Many road warriors do. Google now offers its 'Slides' cloud-based service as a free standalone app. You can use it to open existing PowerPoint files, in which case it preserves all of the original formatting and fonts, and you can make minor changes to the layout and text. Or, you can create new presentations from scratch. However, Google Slides doesn't offer much in the way of design options. There are no templates to choose from, and while there are different slide types, you're limited to simply changing the font, paragraph alignment and line spacing in each slide.



**OVERALL**



## ► PHOTOSHOP EXPRESS

**PRICE:** FREE

**DEVELOPER:** ADOBE

**PLATFORM:** WINDOWS PHONE

Windows Phone has scored a major coup with the introduction of Adobe Photoshop Express to the platform. Sure, it's been four years since it first debuted on iOS, but who's counting? Photoshop Express offers plenty of easy fixes and adjustments for photos you snap on your Windows phone, including the basics like cropping and removing red eye, one-touch filters such as 'superpunch' and 'cinematic', and slider controls for adjusting settings like exposure and contrast. The aim with Adobe Photoshop Express is to make advanced image editing as simple as possible, reducing the confusion and the chances of making a mistake, and on that basis it scores top marks. The base app is free, but you can buy additional packs to add more filters and special noise reduction functions.



**OVERALL**



# LABS BRIEFS

## ► NZXT GRID+

**PRICE** \$US29

**WEBSITE** [www.nzxt.com](http://www.nzxt.com)

**F**an controllers are not everyone's cup of tea. If you're not boasting a seriously hot system that needs extra fans and careful monitoring of temperatures. However, if that's something you do require, NZXT's Grid+ system is a solid option.



The Grid+ is a small black box that can sit in the palm of your hand. It's light enough, in fact, that's it's meant to be velcroed to the inside of a case, usually behind the motherboard plate. It can up to six 3-pin fans, and installation is simple - plug the fans into it, then plug the Grid+ into the motherboard and the PSU.

You will require NZXT's CAM monitoring software, which is a simple download. With it you can now monitor each fan, set performance presets, and even keep track of other system notifications. It's a very elegant system, and even capable of monitoring your machine remotely via a mobile app. If that level of control is your thing, the Grid+ does what it says on the tin.

**David Hollingworth**

**OVERALL**



## ► LEICA T

**PRICE** \$2090 (BODY ONLY)

**WEBSITE** [www.leica-camera.com](http://www.leica-camera.com)

**T**he Leica T doesn't really offer any more features than a similarly-priced Nikon or Canon, it has no special tricks, but, it is utterly lovely to hold, operate and be creative with. Machined from a single block of aluminium, it's a minimalist stunner. The 3.7in screen is crystal clear and refreshes fluidly, and upon it is an app-like menu that's better than almost every other camera's.



Shooting with the stock model is via Liveview on-screen, and that works well, plus there's an optional \$700 Visoflex viewfinder which has an exceptionally sharp screen within and near-perfect colour accuracy. Shooting with the Leica T yielded wonderful images, I was inspired to even shoot unremarkable scenes just to see what came out! All this we expect from a Leica, and the only drawbacks are a limited number of lenses at this stage and autofocus that's slower than we like. You can achieve similar results from a camera half the price, but a Leica is about premium quality engineering, as well as apparently premium pricing just because they can get away with it.

**Tim Frawley**

**OVERALL**



## ► STEELSERIES H WIRELESS GAMING HEADSET

**PRICE** \$329

**WEBSITE** [www.steelseries.com](http://www.steelseries.com)

**A**dding a microphone to any old headphones do not maketh them game cans. I think, and Steelseries apparently agrees, in that a separate control box for mixing voice and game audio is essential. This is the key big thing here, with these. Several configurations are possible, including running game audio in via optical from your sound card or Xbox, and plugging the mic into the box or headphones directly while maintaining balance control. The box has a lovely display, too. It also functions as a charger for one battery - there's two in the package, so you'll never be caught out powerless.

As for the cans themselves, they're bassy, mostly, with midrange absent and a tweaky treble. That's great for games but not so much for music. The only downside is the comfort - there isn't much of that. The cushions are lacking in padding, are too small so they'll clamp over most ears, and prolonged sessions will have you adjusting them often. For the high price, though, the box, its many connectivity options and the wireless get the tick from me.

**Ben Mansill**



**OVERALL**



## ► RAPOO KX MECHANICAL KEYBOARD

**PRICE** \$139

**WEBSITE** [www.rapoo.cn](http://www.rapoo.cn)

**W**hat a truly strange little keyboard.

We normally appreciate Rapoo's skill with wireless keyboards, but its first foray into mechanical switches is more than a little baffling.

It has the brushed metallic and white look of an Apple product, but is meant for Windows machines; it's wireless, and might seem good for a media center, but has no track pad.

However, all that could be forgiven if the the keyboard was actually good to type on, but the non-Cherry mechanical switches are decidedly mushy under the fingers, and the keys themselves are very flat and close together, making mis-keys inevitable.

And you get to pay a premium price! Sadly, it's not a price we're willing to pay.

**David Hollingworth**



**OVERALL**





## ▶ SEAGATE BUSINESS STORAGE 4-BAY NAS

**PRICE** \$549

**WEBSITE** [www.seagate.com](http://www.seagate.com)

Not everyone needs a high-end, business-grade NAS at home. These days, there are a lot of so-called 'personal cloud' storage devices that are perfect for most home needs.

But some homes, and some users, need a little bit more. Seagate's 4-Bay Business Storage unit is pretty much the last word in seriously connected storage; out of the box it even feels sturdy and reliable!

The four bays mean you can install up to 16TB of drive space, which may sound like a lot, but anyone working with professional imaging will think that's a sensible amount of space. The drives are easy to install and remove, and the NAS even features a spare 2.5in hot-swappable bay for moving data around, as well as two USB3 ports. Seagate's included PC back-up software, and it works with Apple's Time Machine as well.

If you need your data remotely, you can even access it via mobile apps, which makes it a great way to share large images, and with hardware encryption built in, those files will always be secure. Built to last, and very versatile, this is a great choice for professional storage.

**David Hollingworth**



**OVERALL**



## ▶ SECURALIVE ANTI VIRUS

**PRICE** \$24.95 PA (1-3 USERS); \$34.95 PA (5 USERS)

**WEBSITE** [www.securalive.com](http://www.securalive.com)

Aussie PC gear shop PC Range has been around for a couple of decades, and has been branching out into offering custom products and services, the latest being SecuraLive Antivirus. To launch the product PC Range are generously offering a free copy for everyone who subscribes to this magazine, or renews their subscription this month, and we've been giving it a test run in the meantime.

It's the most affordable AV product we have seen for quite some time, yet it still offers real-time protection, including active protection against malicious web sites.

During a scan the impact on CPU and memory was insignificant, and this would be a good AV choice for older PCs in particular due to its small footprint. It's also free of the bothersome pop-ups that so many AV products seem to love, and we hate.

Or step up to the Internet Security product, which offers everything the AV software does, adding in protection of emails, ad blocking and malicious website filtering, among other extras.

**Ben Mansill**



**OVERALL**



## ▶ NIKON DF

**PRICE** \$2,999 (BODY + 50MM LENS)

**WEBSITE** [www.nikon.com](http://www.nikon.com)

Like the Leica T on this page, we can't help but feel that the Nikon DF's relatively high cost is, in part at least, covering the styling and premium feel. The retro design is unique and a bold move from Nikon, and having pretty much every control mapped to a physical dial or button is luxurious – though the front dial isn't comfortable to use, and overall the mix of materials give it a disappointingly cheap feel. That's more than made up for with the excellent shooting characteristics. It handles any lighting with aplomb and the viewfinder's 100% coverage is well appreciated.

Autofocus is good in bright to medium light, but I felt performance dropped a bit in low light though. A single SD slot for a camera this price is a bit disappointing, but it's not a deal-breaker. Battery life is exceptional, it still had plenty of charge even after 1000 shots, where most cameras would run dry at half that number.

In the end it feels like the high cost is due to the retro look/appeal more than performance, but you won't be disappointed with its imaging prowess.

**Tim Frawley**



**OVERALL**



## ▶ STEELSERIES RIVAL OPTICAL MOUSE

**PRICE** \$65

**WEBSITE** [www.steelseries.com](http://www.steelseries.com)

We recently reviewed the wireless version of the Rival mouse, and at the time were particularly impressed with the actual wireless implementation, but as far as the pure ergonomics and function of the mouse itself goes, this is the pure version.

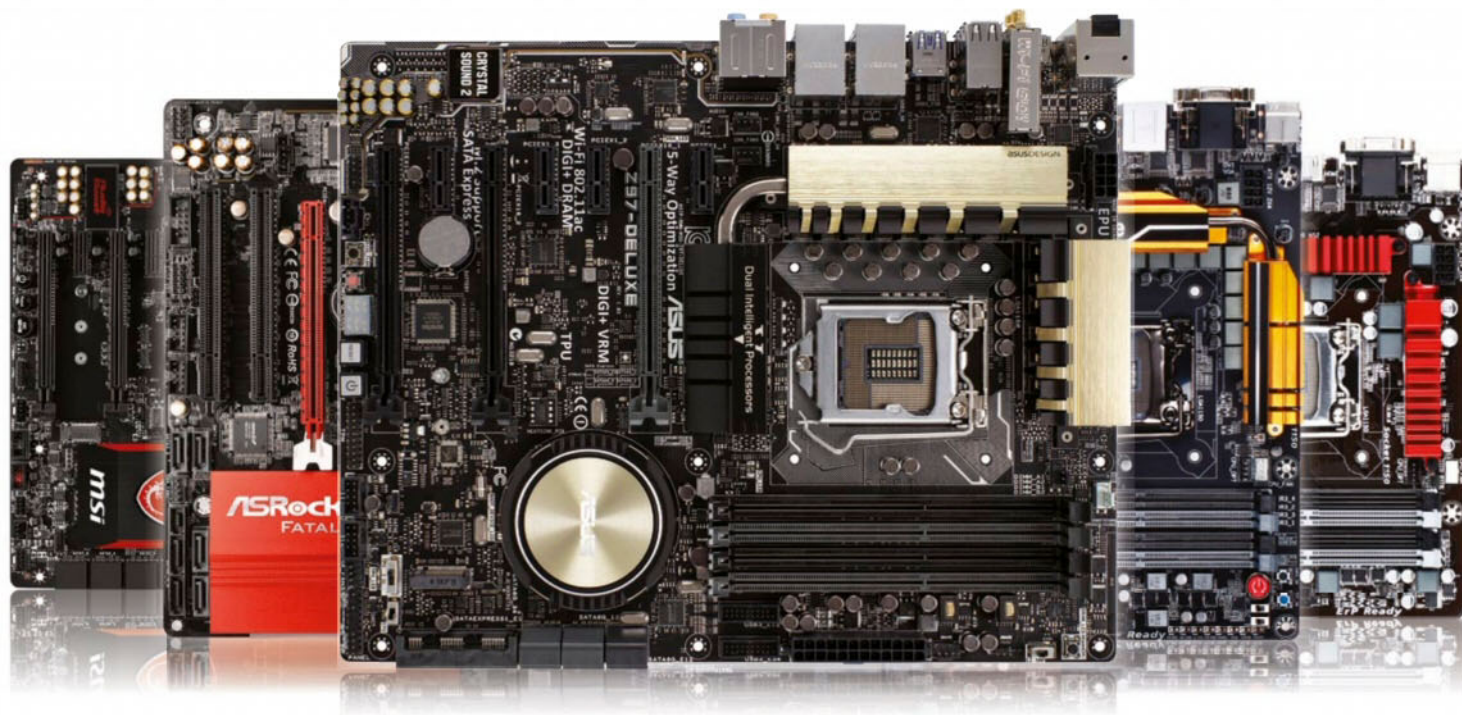
It's very good value indeed for around \$65, if one considers the quality of materials and build, it's very apparent there has been no corner cutting here. While other rodents have been veering towards ostentatious design, inlaid bits of metal or an over-abundance of buttons, the Rival is delightfully simple. With just two side buttons and the usual DPI adjustment (up to 6500) on top, it's elegant and purely functional. I've been using it as my main mouse for a couple of months here at work and I just can't see myself switching anytime soon. For gaming, as long as you don't mind the scarcity of buttons it's fine, being particularly lightweight you can do mouse-lift turns effortlessly in FPS games.

**Ben Mansill**



**OVERALL**





## GROUP TEST

# Next-gen motherboards

IN PREPARATION FOR THE RELEASE OF BROADWELL AND ITS HASWELL REFRESH, INTEL HAS LAUNCHED TWO NEW 9-SERIES CHIPSETS BASED ON THE LGA1150 SOCKET. HERE, WE LOOK AT A SELECTION TO HELP YOU GEAR UP FOR THE FUTURE.

**A**n Intel Haswell CPU coupled with a Z87 motherboard has been a common sight in the builds of gamers and enthusiasts since their launch last year. Unfortunately, however, even though Haswell's upgrade, Broadwell, will use the same LGA1150 socket, it's presently rumoured that it will be incompatible with motherboards based on 8-series chipsets and, worryingly, Intel hasn't sought to deny these claims.

The launch of two new 9-series

chipsets, Z97 and H97, many months before Broadwell's release (some rumours now even point to post-2014) took us a little by surprise, but if you're planning a build around a current LGA1150 CPU, a motherboard based on one of the new chipsets will certainly be your best option in terms of future-proofing.

Of course, motherboard ranges are now notoriously extensive and confusing, with tiny differences often separating one board from another as manufacturers seek to

target different users and price points. For this reason, we've rounded up five boards from all of the big four motherboard manufacturers to help find the best one for you. With its support for multiplier overclocking, and a more extensive feature set, we've chosen to focus on the Z97 chipset, although we'll also be examining what H97 has to offer.

**By Matthew Lambert and Mike Jennings.**



# How we test

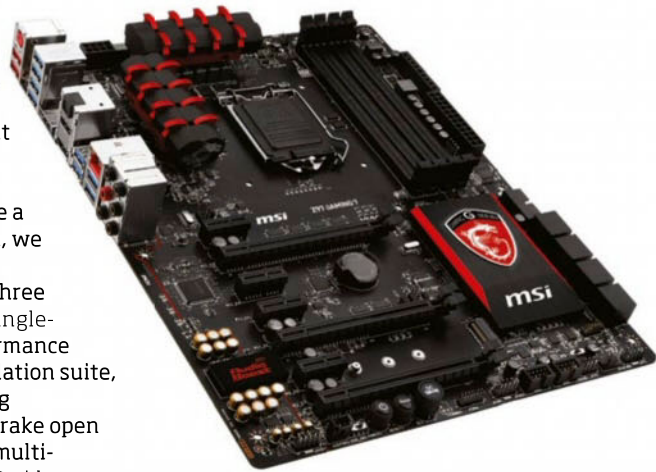
**S**ince there are, as yet, no new top-end LGA1150 CPUs, we tested each of the motherboards in this Labs using an Intel Core i7-4770K. Alongside this CPU is 16GB (2 x 8GB) of Corsair Vengeance Pro 1,600MHz DDR3 memory, an OCZ Vector 150 240GB SSD and an Nvidia GeForce GTX 780 3GB. The CPU is cooled using a Corsair H80i liquid cooler, and the system is powered by an Antec High Current Pro 850W PSU. All tests are performed with an up-to-date version of Windows 7 64-bit.

We first test each motherboard at its stock settings, resetting the EFI system to its defaults and setting the memory speed before booting into Windows. We then attempt to overclock the board to its highest possible CPU frequency. Due to Haswell's thermal density limitations, our test CPU tops out at 4.8GHz, where its temperature approaches the thermal

throttling point. Thus, without de-lidding the CPU or using extreme cooling, this is the realistic limit of this chip. Once a stable CPU frequency is found, we then repeat our tests.

The benchmark suite runs three separate tests, taxing a PC's single-threaded image editing performance using the Gimp image manipulation suite, multi-threaded video encoding performance using the Handbrake open source video transcoder, and multi-tasking performance using HD video playback, in addition to file compression and decompression. Each test produces an individual point score, with the overall score being an average of the three.

To test in-game performance, we use the built-in CPU benchmark in Shogun 2: Total War, capturing the minimum and average frame rate over 60 seconds of



Samurai battle using FRAPS. We also test performance in The Elder Scrolls: Skyrim, with a 60-second manual play-through in the area outside Whiterun at 1,920 x 1,080 with Ultra detail settings and 0x AA.

Neither tests are GPU-limited, so the onus is on the motherboard and CPU to perform well.

Finally, we test the SATA 6Gbps speeds of both the chipset and any third-party controllers using ATTO Disk Benchmark.



## THE 9-SERIES CHIPSETS

The two 9-series chipsets that Intel is first introducing are Z97 and H97 (a top-end X99 chipset is due to come later), with the differences between them being the same as the previous generation's Z87 and H87 chipsets – only Z97 officially supports CPU ratio overclocking and multi-GPU setups.

The biggest change is CPU support, as both chipsets are ready for the unlocked Haswell Refresh (Devil's Canyon) and Broadwell CPUs. Intel has yet to confirm whether these future CPUs will also be compatible with current 8-series chipsets.

In terms of PCI-E 3 support, the higher-end chipset, Z97, again supports a single 16x slot running with 16 lanes, a pair of 16x slots with eight lanes each or a trio of 16x slots with eight, four and four lanes.

On H97, however, you're limited to a single 16x PCI-E 3 slot running with 16 lanes, hence the lack of proper multi-GPU support. Both chipsets also allow manufacturers to add additional PCI-E 2 slots, with room for a total maximum bandwidth of eight lanes. Once again, the



▲ In addition to SATA 6gbps ports, Z97 also now supports SATA Express, enabling you to use up to two lanes of PCI-E 2

number of available default SATA 6Gbps ports is also six. Manufacturers often add extra controllers to bolster the number of SATA ports, but they're usually not as quick as the Intel controller, which is why we test ports from all the available controllers on a motherboard.

Additionally, manufacturers can implement a combined total of 14 USB ports, with up to six of them being USB 3.

The 9-series chipsets, coupled with

the IRST 13 driver (Intel Rapid Storage Technology), also add native support for storage over PCI-E and, as a result, both SATA Express and M.2 (the equivalent of mSATA) connectors are commonplace on Z97 boards. The support only extends to two PCI-E 2 lanes, for a maximum bandwidth of 10Gb/sec.

This bandwidth comes from various sources, depending on the board; on some boards, using SATA Express disables other SATA ports, while on others it makes 1x PCI-E 2 lanes inactive. RAID isn't supported on these devices either, although they can be configured as boot drives. Currently, only the AHCI interface is supported by them as well, but support for the newer, SSD-optimised NVMe interface is due to be added in the new 13.1 drivers.

Finally, another new addition is Device Protection Technology with Boot Guard, which apparently prevents the execution of unauthorised boot block level malware. This feature, however, will require a Haswell Refresh CPU or later.

# ASUS Z97-DELUXE

FOR THOSE WHO WANT IT ALL

**PRICE** \$485

**SUPPLIER** [www.asus.com.au](http://www.asus.com.au)

The Asus Z97-Deluxe (NFC & WLC) is undoubtedly one expensive package. That isn't just because it contains one of Asus' flagship Z97 boards, however, as this bundle has all the bells and whistles thrown in with it too. Accompanying the Z97-Deluxe are three key accessories: the NFC Express 2, Wireless Charger and ThunderboltEX II/ Dual expansion card.

The Z97-Deluxe is crammed full of components, controllers, ports and headers, but nearly everything is still conveniently placed around the board edges – a commendable feat.

There are two fan headers just in front of the rear audio ports, but even these shouldn't be difficult to wire up, and the angled SATA ports are also useful. As you'd expect, the motherboard also includes on-board power, reset and clear-CMOS buttons, as well as a POST code readout.

Meanwhile, the UEFI system is simple to use, and has heaps of overclocking features and options that are sure to keep even the most avid tweekers satisfied. It also includes an EZ Tuning Wizard, which includes support for RAID – this is particularly handy, as setting up RAID can be a confusing and tiresome process, even for enthusiasts. As with the Maximus VII Hero, USB BIOS Flashback is supported, although the board lacks some RoG-exclusive features, such as KeyBot, for one.

Along with the RoG motherboard, the Z97-Deluxe has the most fan headers on test, and all six are the 4-pin variety. With Fan Xpert 3 able to alter the speed of both PWM and DC fans, only those with a serious cooling setup are likely to be left wanting when it comes to fan control.

As for audiovisual outputs, the Z97-Deluxe is one of only two boards to offer DisplayPort, and it forgoes both VGA and DVI outputs entirely. Meanwhile, the 8-channel, Realtek ALC1150-based audio design is powered by Crystal Sound 2; like the RoG SupremeFX system, this utilises track and signal separation, EMI shielding and high-quality capacitors.

The two 16x PCI-E 3 slots support two-way SLI configurations, while

the additional 16x slot (4x PCI-E 2) slot brings support for three-way CrossFire setups, but 4x operation isn't supported by SLI technology, so two cards is the limit here. Asus could have used a PLX chip, but even then multi-GPU arrangements would still be limited by the bandwidth that the CPU and chipset can handle. Comparatively, Intel's current LGA201 setups have more lanes, and are much more appropriate if you want to go beyond two cards in SLI.

Thanks to additional ASMedia controllers, the Z97-Deluxe sports a whopping ten USB 3 ports (six on the rear I/O and four offered via headers), as well as eight USB 2 ports (split evenly between the I/O panel and headers).

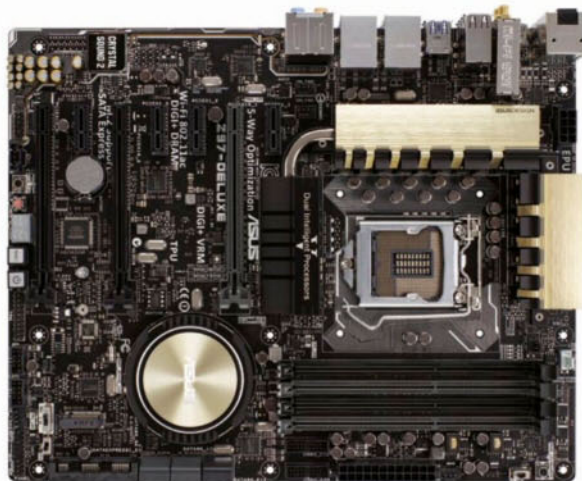
There's also an on-board Thunderbolt header for the Asus ThunderboltEX II/Dual expansion card. When slotted into the board's 16x PCI-E 2 slot and connected to the header, the card provides access to two Thunderbolt 2 connections, with each one able to daisy-chain up to six devices and three monitors.

When it comes to storage, there are again more options than any other board on test. Ten SATA 6Gbps ports line the edge of the board, with the additional four provided by ASMedia. Four of these ports also form SATA Express connections. There's a single M.2 connection too, which has its bandwidth controlled by the on-board Z97 PCH.

Alongside dual gigabit LAN connections, Wi-Fi and Bluetooth are both included onboard, easily giving the Z97-Deluxe the best networking options on test. Also included in the bundle is the new Asus NFC Express 2, a USB-connected device that gives near field communication devices an easy way to connect to your PC and perform tasks such as file transfers, Windows log-on, video streaming and remote desktop control.

The final accessory is the creatively named Wireless Charger. Using the Qi interface standard, this can be used to induce electrical power transfer to compatible devices, which you simply rest on top of it.

Unfortunately, all these features and the expensive price tag don't make the Asus Z97-Deluxe any quicker than the competition. In fact, the



motherboard came second to last when it came to stock performance in our Media Benchmarks, although the difference between all the boards is low here. However, Z97 SATA performance is top-notch – the Z97-Deluxe has the joint highest read speed of 544MB/sec and a write speed of 519MB/sec, just 3MB/sec behind the fastest. The ASMedia ports are on a par with the other two boards that use them and quicker on write speeds than the Marvell-controlled ports of Gigabyte's Z97X-UD5H.

Finally, when it came to overclocking, the Z97-Deluxe kept our Core i7-4770K stable at 4.8GHz with a vcore of 1.3V. Most other boards required less voltage, but the bulky heatsinks prevented overheating.

## CONCLUSION

There's plenty of cutting-edge technology crammed into this package. It's for those who want it all, and if you truly need all the bells and whistles that a modern LGA1150 system can provide, this is pretty much it. The Z97-Deluxe won't win any value-for-money awards, but people who want Thunderbolt 2, NFC, Qi charging, SATA Express and/or M.2 are likely to be big spenders on technology anyway. For everyone else, though, you can get a great motherboard for significantly less money elsewhere. ML

PERFORMANCE	★★★★★
FEATURES&DESIGN	★★★★★
VALUE FOR MONEY	★★★☆☆

**OVERALL** ★★★★★☆

## VERDICT

Undoubtedly a ludicrously expensive motherboard package, but one that will leave hardcore technology enthusiasts drooling.





# ASROCK FATALITY Z97 KILLER

A RAPID BOARD THAT PRIZES PERFORMANCE ABOVE HIGH-END FEATURES

**PRICE** \$225  
**SUPPLIER** [www.asrock.com](http://www.asrock.com)

As its name suggests, ASRock's Fatal1ty Z97 Killer emerges from ASRock's tie-up with pro gamer Fatal1ty, so it features a suitably loud design that will stand out inside cases with windows: huge red heatsinks, a dramatic black PCB and both red and black slots.

Its feature set will also sate many gamers. Two-card SLI and CrossFire is supported, it has Killer Gigabit Ethernet, and two 16x PCI-E slots, one of which is PCI-E 3. However, if both slots are used for graphics cards, one will run at its full speed, while the other lags behind with just four lanes.

Meanwhile, its six fan headers is the equal of this month's best boards, and it supports 32GB of memory – the same as every other board on test. One of its six SATA 6Gbps ports can also be sacrificed to help another use the faster SATA Express standard – a feature missing on three boards in this test, and it has a Thunderbolt header on-board too.

The EFI system is good too, not least because the board offers a great Dual Bios system and Internet Flash features, which are absent from the majority of boards on test. What's more, its base clock range of

90-300MHz is beaten only by the two Asus boards, and its CPU multiplier range of 8-120x is the broadest on test; however, to be fair, you're unlikely to ever need a 120x multiplier anyway. Only MSI's Gaming 7 allows more voltage through the CPU than this ASRock board too.

**“The Z97 Killer might be a mixed bag when it comes to features.”**

Interestingly, the Z97 Killer is also a little smaller than most of its rivals, measuring just 218mm wide. However, while the slim profile means it will be easier to fit this board into a case, it also means the layout feels cramped. The VRM heatsink and quartet of DIMM slots are close to the CPU socket, so chunky coolers could be problematic, and the 8-pin CPU power plug is right up against the VRM heatsink too.

The six SATA connectors aren't perpendicular either, the bottom PCI slot is right up against the headers at the bottom of the board and the CMOS battery will be blocked by large graphics cards, which is irritating, considering there's no clear-CMOS button on the backplate.

There's no room for an LCD POST display, voltage read points, and on-board power and reset buttons either, the former of which can end up being very handy for troubleshooting. Meanwhile, its count of four USB 3 ports is fine, but other high-end boards now include six. It also doesn't support SLI, so it's CrossFire or nothing for dual graphics.

The Z97 Killer might be a mixed bag when it comes to features, but its performance scores were undeniable. Its overall Media Benchmarks result of 2,477 is the fastest on test, and it was in the top three in every Shogun and Skyrim test.

As with many other boards on test, we saturated the SATA bus when it came to read speeds – the Killer's 544MB/sec result topped the table with four other boards, and its 519MB/sec write speed was only 3MB/sec behind the fastest rivals.

We also managed to overclocked our Core i7-4770K processor to 4.8GHz with a 1.27V vcore on the Killer, which was the lowest voltage required to reach that speed on test, along with three of the board's rivals. That's impressive, but the Killer couldn't maintain its benchmark speed when overclocked – its application performance slipped to mid-table and a handful of boards were faster in some gaming tests.

Power consumption didn't prove to be this board's strong point either – at stock and overclocked speeds, it was consistently mid-table or worse.

## CONCLUSION

At this price, the Killer comes into competition with feature-rich boards such as the Gigabyte Z97X-SLI, and here it loses out; it doesn't have as many slots, or the SLI support, that its rival offers. Instead, the ASRock offers pure performance, either topping or nearing the top of our benchmark tables in both applications and games, but only by small margins. In this price range, the Gigabyte Z97X-SLI gives you better value for money.

PERFORMANCE	★★★★★
FEATURES&DESIGN	★★★★☆
VALUE FOR MONEY	★★★★★
<b>OVERALL</b>	★★★★★

## VERDICT

Great performance, and some nifty BIOS features, but the similarly priced Gigabyte Z97X-SLI offers a superior feature set.

# MSI GAMING 7

## A REASONABLE PRICE AND A HUGE FEATURE SET

**PRICE** \$265

**SUPPLIER** [www.au.msi.com](http://www.au.msi.com)

Most motherboards arrive in boxes plastered with names derived from internal codes, chipset numbers and other obscure nomenclature, but there's no mistaking MSI's intentions with its latest board – it's unashamedly designed for gamers.

That much is obvious from its looks as well as its name. The black PCB, expansion slots and memory slots all look moody and imposing, and the heatsinks are just as slick; two matt, black metal units surround the CPU socket with red wings. They're designed to riff off the MSI Gaming Series emblem that's stamped on top of the chipset cooler above a light-up MSI logo.

The 244mm-wide PCB is dotted with features aimed at gamers and other high-performance enthusiasts. The bottom of the board has power, reset and buttons for MSI's OC Genie overclocking system, and the right-hand corner has a small switch for flipping between the MSI's two BIOS chips too.

Meanwhile, the top right-hand corner houses nine voltage check points, and halfway along the same edge there's an LCD POST display.

Underneath the processor socket is a row of status lights that indicate issues with the processor and expansion slots. What's more, if you want to monitor your hardware, especially when overclocking, this board is stacked with enough features to squeeze ahead of the Gigabyte Z79X-UD5H.

All of these features make for a busy board, but this good-looking black PCB still maintains a reasonable layout. We only have two complaints: the chunky, good-looking heatsinks aren't far enough away from the CPU socket, so installing large coolers could be problematic, and there are only five fan headers.

The Gaming 7 is just as impressive when more mundane features are considered too. The six Intel-powered SATA 6Gbps connectors are bolstered by two ASMedia-controlled ports, and they're perpendicular to the board on the right-hand edge, next to a perpendicular USB 3 header – a clever, rare addition. This board doesn't have

SATA Express, but it does have an M.2 connector squeezed beneath the two bottom PCI-E slots – its usual spot beneath the CPU socket is occupied by status lights.

Meanwhile, the three 16x PCI-E slots run at a minimum speed of 8x, 4x and 4x if three GPUs are deployed using CrossFire, and it supports two-way SLI too. There are four 1x PCI-E slots as well, which is the same amount as the Asus Z97-Deluxe, and the most of any board here on test, but there's no room for PCI.

There's a whopping count of eight USB 3 connectors, and only two USB 2 ports – overall, that's the most USB action on any board in this Labs. One of those USB ports can also be used with the Gaming 7's USB Audio Power feature, which promises 5V of power, and is designed to be used with USB headsets and DACs.

That isn't the only feature that's designed to boost this board's audio credentials. MSI's Audio Boost 2 chip has isolated audio circuitry that's used to amplify sound, and there's a Sound Blaster-branded app that can be used to tweak settings. However, as always with PC audio, you'll need really good audio equipment to tell the difference – most people will be fine with the Realtek kit included elsewhere.

There's no sign of DVI or D-SUB either – display connections on offer include two HDMI connectors and a DisplayPort socket. Elsewhere, there's six audio jacks, an optical S/PDIF output, one PS/2 socket and Killer Gigabit Ethernet.

This board has high-end looks and promises high-end performance, but most of its benchmark results were consistently and disappointingly average. Its overall Media Benchmarks result of 2,460 came fifth out of the boards on test. The situation didn't improve when we overclocked it either. We got our test CPU to run at 4.8GHz with a 1.27V vcore, which is fine, but the MSI's revised Media Benchmarks result of 2,845 didn't stand out.

The MSI's overclocked gaming benchmarks didn't return a completely clean bill of health either. The board kept up in three of the four tests, but its minimum Skyrim result of 105fps was 9fps behind the two fastest boards.



Its storage speed was reasonable, though, with a 544MB/sec sequential read pace able to match the fastest boards in the Labs, and a 520MB/sec write pace 2MB/sec slower than the fastest boards.

And, for a gaming board, the Gaming 7 was power-frugal throughout. At stock speeds, its idle and load power draws of 53W and 124W respectively were a long way behind this month's greediest PCBs, and it was similarly power-efficient when overclocked too.

### CONCLUSION

The MSI Gaming 7 is a brash board with a forward-thinking, broad feature set, and it balances the mundane with the exciting well; it ticks most of the standard boxes, while including plenty of enthusiast features, high-end networking and an impressive array of storage connectors.

However, its great feature set was slightly hampered by middling benchmark results. Its Media Benchmarks performance was consistently towards the bottom of our tables. This isn't a major issue when you're talking about such small margins, though.

With carefully engineered and sometimes surprising enthusiast features and reasonable overclocking ability, the MSI Gaming 7 is a recommended Z97 motherboard.

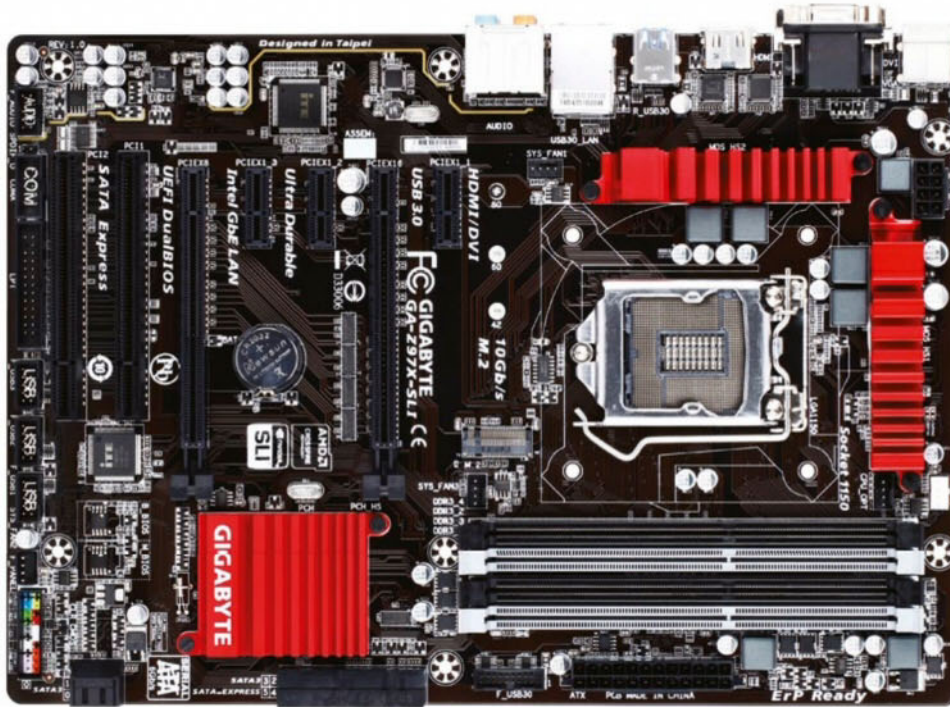
PERFORMANCE ★★★★★  
FEATURES&DESIGN ★★★★★  
VALUE FOR MONEY ★★★★★

OVERALL ★★★★★

### VERDICT

Loads of enthusiast features and great looks for a very reasonable price, making this a Z97 motherboard of choice.





# GIGABYTE Z97X-SLI

REASONABLE PERFORMANCE AND A DECENT UPGRADE PATH

**PRICE** \$199  
**SUPPLIER** [www.gigabyte.com.au](http://www.gigabyte.com.au)

**T**his Z97X-SLI's name might suggest it's packed with features to help handle multiple graphics cards, but it actually only supports two cards using SLI and CrossFire, and it doesn't have any additional PCI-E power connectors either. As such, it officially lags behind the boards in this test that support trios of AMD cards, but actually, the lack of extra lanes means we wouldn't recommend building more than a two-card setup with Z97 anyway.

What's more, the Gigabyte's circa \$200 price makes it significantly cheaper than the other gaming boards on test and, despite there being three 16x PCI-E slots, Gigabyte has still found room for three 1x PCI-E slots and a pair of PCI slots, giving it one of the most versatile slot selections we've seen in some time.

This Z97X-SLI is adept when it comes to storage too. It features six SATA connectors that are perpendicular to the PCB, and they all support the faster SATA 6Gbps standard. One of these can be sacrificed to leave a single SATA Express 10Gb/sec connection, alongside four standard SATA connectors, and there's an M.2 port between the top PCI-E slot and

the CPU socket too. This a feature only found on two other boards in this Labs, and it supports the emerging small drives that run at 10Gb/sec – faster than mSATA.

The board has a great, no-nonsense

**“A great range of slots, which are important if you ever want to upgrade”**

layout too. It's quite narrow, but the lack of chunky heatsinks means there's plenty of space around the CPU socket for chunky coolers, and the rest of the board is sensibly designed too, with the power connectors right on the edges of the board.

It isn't all good news though. There are only five fan headers – one behind most other boards on test, and only two of those connectors are four-pin models with PWM. It also only has four USB 3 ports. On the plus side, the EFI system is great, with an attractive, intuitive interface. You work in the middle of it, while current status indicators, such as temperatures and clock frequencies, are displayed around the edges.

In terms of performance, the Z97X-SLI's overall Media Benchmarks result of 2,468 is right in the middle of this

Labs' contenders, and it was at the top of the table in our Gimp image editing test. It also coped well with our gaming tests, remaining respectably mid-table.

However, it has one slight issue, and that's overclocking headroom. This was the only board on test that couldn't get our Core i7-4770K to 4.8GHz, despite having a 1.27V vcore pumped through the chip, it stalled at 4.7GHz. That slightly lower result meant that benchmark results took a hit: the Gigabyte's overclocked overall Media Benchmarks result of 2,803 was the slowest on test. Ultimately, though, in real world use this is insignificant and shouldn't be taken as a reason to overlook this otherwise excellent motherboard.

However, the Z97X-SLI's impressive roster of storage features was underpinned by strong SATA performance, with a table-topping read score and a write result only 3MB/sec behind this month's best board. And, while the Gigabyte isn't a record-breaking performer, it has modest power requirements – its 51W idle and 122W load power draws are the lowest in the Labs, and its overclocked power draw was similarly frugal, although this isn't surprising given the lower clock frequency.

## CONCLUSION

The Z97X-SLI didn't wow us during any of our benchmark tests, and it might not be able to match the overclocking peak of other boards on test, but you're very unlikely to be running your CPU flat-out at 4.8GHz regularly anyway. More importantly, it has a wider feature set than the ASRock Fatal1ty Z97 Killer, while being no more expensive, including better dual-graphics options and a great range of slots, which are important if you ever want to upgrade. It's a close-run contest between the Z97X-SLI and the Fatal1ty Z97 Killer, but the Gigabyte's better upgrade path give it a longer shelf life, making it our circa-\$200 Z97 motherboard of choice.

PERFORMANCE	★★★★★
FEATURES&DESIGN	★★★★★
VALUE FOR MONEY	★★★★★
<b>OVERALL</b>	★★★★★

## VERDICT

Can't quite match the overclocking peak of other boards on test, but it offers a fantastic feature set for the money.

# GIGABYTE Z97X-UD5H

AN EXCELLENT BALANCE OF FEATURES, PRICE AND PERFORMANCE

**PRICE** \$269

**SUPPLIER** [www.gigabyte.com.au](http://www.gigabyte.com.au)

The Z97X-UD5H costs over \$50 more than the more modest Z97X-SLI, so it's no surprise that it makes a louder first impression, thanks to its metallic, gold-coloured heatsinks and bright red power button. It's brimming with features too. It's one of only three boards in the Labs to support three-card CrossFire, and its power button is paired with a reset switch in the top-right corner of the PCB. Also clustered in this part of the board is a clear-CMOS button and a line of voltage read points too. Only MSI's Gaming 7 also has the latter feature in this test.

Meanwhile, the middle of the right-hand edge has a two-character LCD POST display. Interestingly, the bottom of the same edge also houses an extra four-pin ATX power connector (ATX4P) for providing extra power for multiple graphics cards, if you need it.

The three PCI-E slots run at 8x, 4x and 4x if they're all used, and they're separated by two 1x PCI-E slots and two PCI slots. With other boards offering one or two 16x PCI-E slots or

abandoning PCI altogether, the Z97X-UD5H's slot is one of the most versatile on test.

Like the cheaper Gigabyte Z97X-SLI, and unlike the MSI Gaming 7, the UD5H can also use the faster SATA Express standard, and it has an M.2 connector too. Unlike its budget brethren, the UD5H has eight SATA 6Gbps connectors as well; six are controlled by the Intel Z97 chipset, and two more – identified by grey plastic, rather than black –

**“We also managed to overclock the CPU to 4.8GHz using a 1.29V vcore”**

are handled by a Marvell 88SE9172 controller.

Move to the backplate and you'll find not only a Killer Gigabit Ethernet port, but also a second Intel Ethernet port – a small bonus over the MSI Gaming 7 – and the rest of the I/O is decent too, including six USB 3 ports and just two USB 2 ports, one PS/2 plug, five audio jacks and an optical S/PDIF output.

It's a packed board, but the UD5H doesn't suffer from a cramped layout.

The chipset heatsink is impressively low-profile, and the VRM coolers at the top of the board aren't much larger either. Meanwhile, the EFI system is attractive and easy to use.

When running at stock speeds, the Z97X-UD5H's overall score of 2,473 was good enough for a place in this month's top three. We also managed to overclock the CPU to 4.8GHz using a 1.29V vcore – a little high – and the UD5H's revised overall result of 2,932 was the best on test.

The UD5H's gaming performance was inconsistent though. Interestingly, we also had trouble starting it with a GeForce GTX 680 installed – so beware if you plan to use one in this board, or check first to see if a driver update addresses any potential issues. In Shogun 2, the Z97X-UD5H 30fps minimum was fine, and its 37fps average was this month's best result, but in Skyrim its 86fps minimum and 151fps average were at least 10fps behind its best rivals.

That situation didn't improve when overclocked either. In Shogun, the UD5H kept up with other boards, but its 100fps Skyrim minimum was 14fps slower than the best boards. The UD5H impressed in storage tests, though, and while its power draw results were mid-table, it was still a way off the more power-hungry boards.

## CONCLUSION

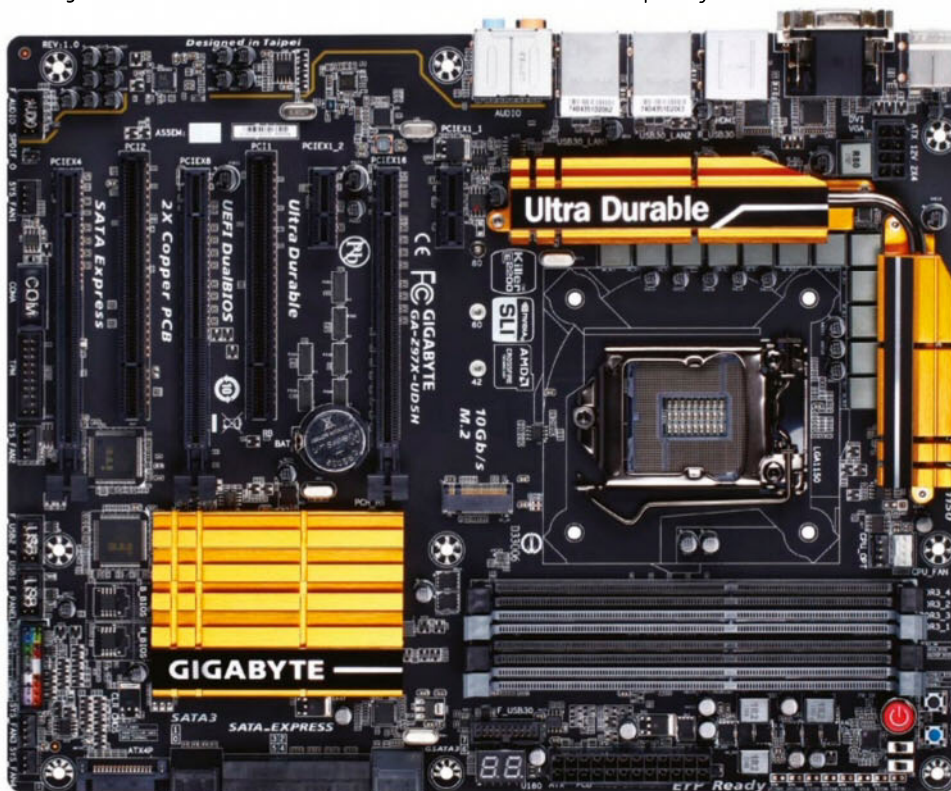
The Z97X-UD5H has a broad selection of high-end features and ticks the right boxes elsewhere, with plenty of slots and connectors and a good I/O selection. It's reasonable value for money too, having a similar price to the MSI Gaming 7 while offering a second Ethernet port, SATA Express and a similar roster of high-end features. Its performance is a little inconsistent, but the MSI suffered from the same issue. It's a close-run competition between these two boards, but the nearly identical price for these two boards negate any advantage. This is also a great board if dual network ports are a priority.

PERFORMANCE	★★★★★
FEATURES&DESIGN	★★★★★
VALUE FOR MONEY	★★★★★

**OVERALL** ★★★★★

## VERDICT

A great feature set and decent performance for a very reasonable price add up to make this a compelling choice.





# *Lethal Speed.* **Deadly Precision.**



NVIDIA G-SYNC SYNCHRONIZES THE MONITOR AND GRAPHICS CARD FOR A FASTER, SMOOTHER, TEAR-FREE DISPLAY THAT REDEFINES GAMING WITH QUICKER REACTIONS AND LESS EYE STRAIN.

**G2460PG 24"**

**nVIDIA**  
**G-SYNC™**

**1ms**  
GtG

**144**  
Hz



# Premium monitors

THIS MONTH'S LABS PITS A SELECTION OF MID-RANGE MONITORS AGAINST THE FINEST THAT MONEY CAN BUY. WHETHER YOU'RE AFTER BIG-SCREEN 4K THRILLS OR THE ULTIMATE IN COLOUR ACCURACY, THE SIX MODELS HERE PROMISE TO DELIVER A PIXEL-PERFECT QUALITY AND PERFORMANCE.

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# Buyer's guide

**A** top-notch monitor is one of the best upgrades money can buy – make the right choice and you can push your PC to new heights. Whether you want a pixel-packed screen for effortless multitasking, a display worthy of professional photo and design work or a 4K entertainment setup, there's a perfect monitor for every application in this month's group test.

Taking the plunge can be a daunting prospect, however, since there's a vast amount of choice out there. With top-flight 24in models costing four times as much as capable, mid-range 27in models, and colour-accurate displays available at a considerably higher price than more humble counterparts, it's essential to spend time working out what you want – or, indeed, need – from your monitor.

## SPENDING SENSIBLY

Remember, while it may be tempting to splash your cash on the most expensive monitor you can afford, not everyone needs perfection. Sometimes good is sufficient, and, if you don't mind sacrificing supreme image quality, you can now buy a big-screen, high-resolution monitor for a relatively sensible sum.

This month's group is split roughly into two groups – consumer and professional-class monitors. These days, around \$400 is enough to buy you a good-quality 27in monitor with a WQHD, 2,560 x 1,440 resolution. Generally, these are equipped with decent IPS or PLS panels (PLS is Samsung's take on IPS technology, and are capable of serving up images with good colour reproduction and wide viewing angles. Be wary of spending less, however, as budget big-screened models often cut costs with Full HD resolutions and less impressive TN panel technology.

A recent development is the arrival of the affordable 4K monitor – we hadn't expected to see these so soon. There are two models priced at \$800 or less in this month's line-up, with several more coming from rival manufacturers, that sport 28in, 3,840 x 2,160 pixel panels.

There are upsides and downsides to this number of pixels, however. The good news is that such a high resolution gives amazing clarity to

images and onscreen text, as well as a huge amount of desktop real estate to play with. Quality is surprisingly decent, too; since this new breed of budget 4K monitors use the latest in 10-bit TN panels, the technology in question is a far cry from the calibre of 6-bit TN panels found in bargain-basement models. With the arrival of 4K, TN has come of age: both colour reproduction and viewing angles are now more competitive – to the extent that several *PC & Tech Authority* team members mistook such models for far pricier IPS monitors.

The main drawback of a 4K monitor is that you'll almost certainly need to run Windows 8.1 in order to take advantage of its scaling capabilities, since it's necessary to crank up the text and scaling settings to 200% to keep text and applications at a workable size. Older applications will look rough and pixellated when they're blown up to usable proportions, but that's still better than

tiny icons and fiddly menus you can't comfortably use.

The final side effect of such a sizeable resolution is gaming performance – powering a single 4K screen is equivalent to driving four Full HD displays simultaneously. Unless you have a pair of the fastest graphics cards currently available, you'll need to dial down the detail settings in games or reduce the resolution for more demanding titles.

## THE PERFECT IMAGE

There are monitors in this eight-strong group that can provide the highest level of image quality – monitors that are good enough to grace the desk of any professional design house or play a part in creating the next *Toy Story*.

Of course, this class of monitor doesn't come cheap – and there are good reasons why. These models have to employ the very finest LCD panels, backlights and quality controls to ensure that images look just so.



As a rough guideline, you can expect to pay at least \$1500 for a professional, 24in 1,920 x 1,200 monitor, more than \$2000 for a 24in 4K monitor and the best part of \$4000 for a money-is-no-object 27in or 30in display.

At the top end, it's not enough for a monitor to provide reasonably accurate

high-end monitors are compared to standard consumer models.

What's more, these high-end monitors are often equipped with features and specifications most users won't need. At the top end, Eizo's ColorEdge range sports integrated colour calibrators that automatically

## "You can now buy a big-screen, high-resolution monitor for a sensible sum"

colours and slightly uneven backlighting; it must be near-perfect across every square inch of the panel. This is essential in order that onscreen images or videos can be tweaked and adjusted without worrying that the final results – regardless of whether the end product is a digital file or a physical print – will come out too light, too dark or with a weird tinge to the colours. All of the monitors in this test are top-flight, with much more colour-accurate and evenly lit – these

maintain the perfect image and colour quality day in, day out. Of course, any monitor can be calibrated with third-party colorimeters (such as the X-Rite i1Display Pro we use), but not all are equal. Some allow for the monitor's internal colour look-up tables (LUTs) to be directly optimised via the calibration process, while lesser models only allow for the graphics card's LUTs – which work at a lower precision – to be adjusted, giving inferior gradations of colour.

More commonly, though, you'll see models described as being "wide-gamut" monitors; this refers to the spectrum, or gamut, of colours they can reproduce.

This is useful for artists and photographers who want to be able to see a more intense, varied palette of onscreen colours, and it also more accurately mimics the range of hues that can be reproduced in print.

You'll often see manufacturers specify that a monitor covers a certain percentage of the Adobe RGB colour space – the best here claim as much as 99% Adobe RGB coverage, and we verify these claims in our tests (see How we test, right).

### FEATURES

The final thing to look out for is each monitor's range of features. Most monitors costing more than \$400 supply adjustable stands offering height adjustment and portrait modes, but some pack in more video connections. HDMI, DisplayPort and DVI are the usual suspects, but we've started to see MHL-compatible HDMI connections appear, too: these make it possible to connect compatible smartphones and tablets via micro-USB. Some models have features more normally found on TVs, such as picture-in-picture or picture-by-picture, and high-end monitors often include built-in colorimeters or support for hardware calibration.

### HOW WE TEST

In this month's Labs, we've taken the opportunity to improve the breadth of *PC & Tech Authority's* range of display tests and upgrade our testing hardware. We've replaced our trusty X-Rite i1Display 2 colorimeter with its more accurate successor, the i1Display Pro, and started using the open-source display calibration and profiling software, dispCALGUI.

### IMAGE QUALITY

X-Rite and dispCALGUI allow us to measure a display's maximum brightness in cd/m2, contrast ratio, colour temperature and gamma, plus each panel's colour gamut as a percentage of the sRGB and, where applicable, Adobe RGB colour spaces. Backlight uniformity is tested by measuring brightness and colour across 15 points on the panel. Our gaming and video-playback tests, meanwhile, allow us to check each monitor for any ghosting or response-time issues.

We also test each monitor's colour accuracy. This process measures how close the displayed colours are to their intended shade. The difference between the intended and actual colour is measured in the unit of colour difference, Delta E (dE); the higher the figure, the poorer the match. We provide both average and maximum figures measured across 26 colours. The smallest colour difference that the human eye can discern is 1dE, so a display with an average dE of less than 1 is considered perfect.

### FEATURES & DESIGN

The Features & Design score is derived from a range of objective and subjective measurements.

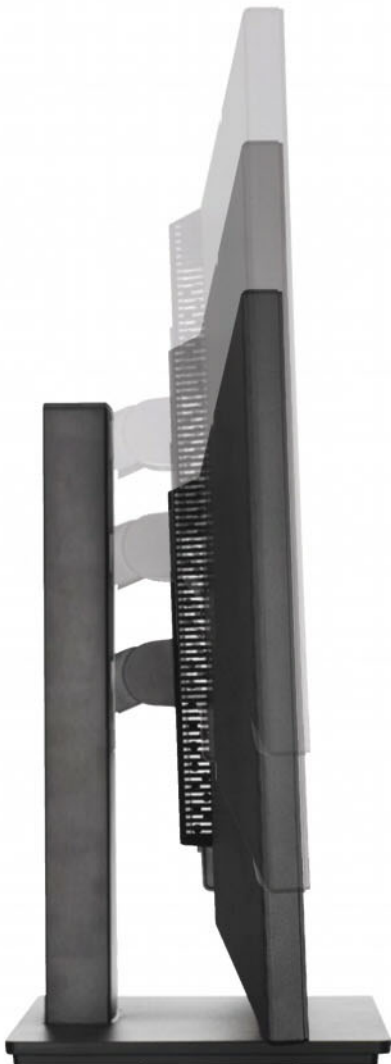
In particular, we take note of the quality and adjustability of the stand, the array of connectivity, the features and usability of the onscreen display and any extras supplied with high-end models, such as built-in colorimeters or display hoods.

Points are given for the length and type of warranty, as well.

### VALUE FOR MONEY AND OVERALL

The Value for Money score is based on a weighted average of the Performance and Features & Design scores. We then factor in how much each monitor costs for a bang-per-buck result.

The Overall rating is an average of the Performance, Features & Design and Value for Money scores; due to rounding, it may be higher or lower than you'd expect.





# Results

**T**ake a look at the graphs below, and the differences between the mid-range consumer monitors and the high-end professional models couldn't be more obvious. The high-end monitors reproduce a vastly wider palette of colours, and crucially do so far more accurately.

The only area in which some of the consumer monitors better their professional counterparts is with slightly improved contrast ratios, and that's of no practical benefit.

What's really noticeable, however, is the leap in colour accuracy. Not only are the professional monitors capable of displaying perfect colours, their LCD panels are backed by higher-quality LED backlights that produce very little variation in brightness across the screen. Look at the backlight uniformity tables on each review, and the consumer models lag behind - viewed with a critical eye, it's easy to see the patches where the panel isn't evenly lit.

## VIEW FROM THE LABS

After almost two decades of working with CRTs, LCDs and projectors, you can rest assured that we can spot a duffer from 20 paces.

This is a talent we've acquired as a result of seeing hundreds of monitors over the years. Way back when, before anyone had access to affordable colour-measuring tools to help evaluate a monitor's performance, we had to do it all by eye. It was a case of viewing test images and familiar photographs and playing through the same movie scenes to sort the good from the bad.

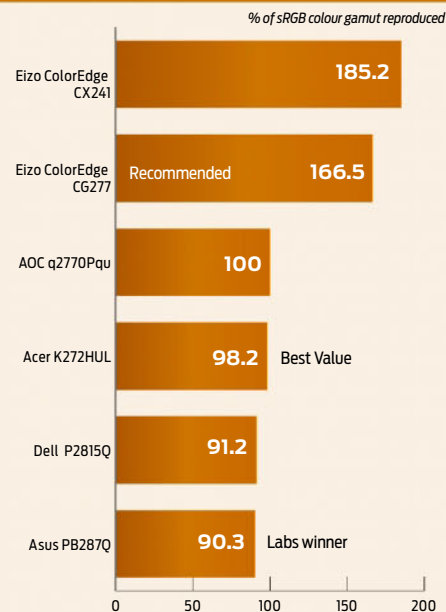
We wouldn't relish such a challenge today, though: PC monitors have come a long way. We recently discovered a pile of early LCD monitors hidden in a corner of the *PC & Tech Authority* labs, and it's no wonder they failed to defeat the bulky CRT monitors on our desks at the time. Moving a mouse cursor left a trail behind as the pixels struggled to keep up, and colours looked pallid compared to the rich hue of a CRT tube. There was no need for fancy testing hardware - the difference was night and day.

Now, CRTs are long-forgotten, and LCD technology has advanced to the point where good image quality is all but taken for granted. Although we can still tell a lot by simply looking at a monitor, hardware measurement - using a colorimeter - is essential to precisely pinpoint the differences in image quality.

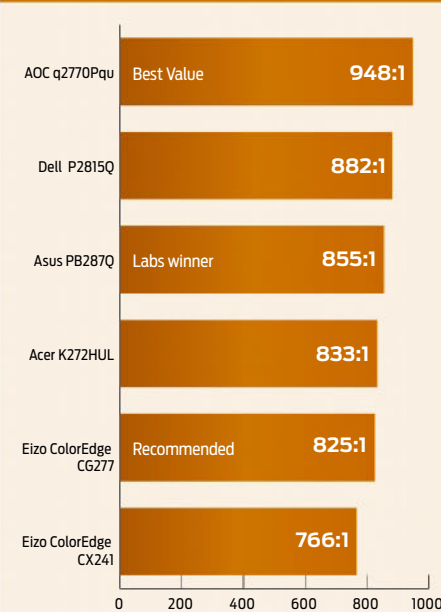
And what do these test results tell us? That, if you look closely enough, the difference between mid- and high-end displays is still pretty big.

So, which monitor should you buy? It's simple: if you're passionate about your photography, videography or design work, then a high-end monitor is an investment you simply won't regret. Everyone else should save their dollars - the only obvious difference will be the balance of your bank account.

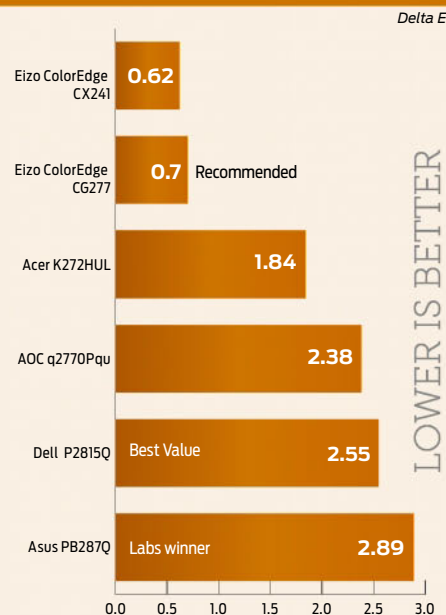
### COLOUR GAMUT



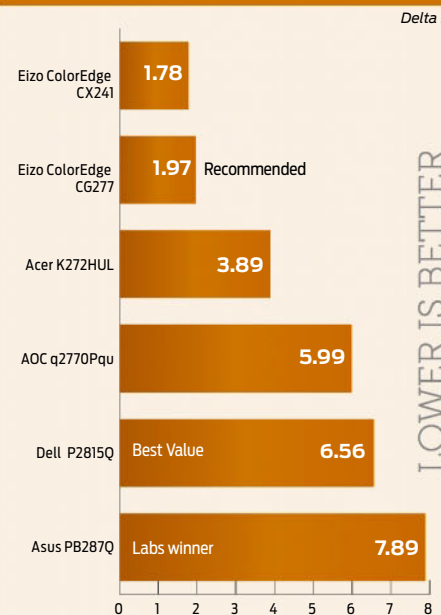
### CONTRAST RATIO



### sRGB COLOUR ACCURACY - AVERAGE DEVIATION



### sRGB COLOUR ACCURACY - MAXIMUM DEVIATION



# Need to know: screen technology

NOT ALL MONITORS ARE CREATED EQUAL. **DARIEN GRAHAM-SMITH** EXPLAINS THE VARIOUS TECHNOLOGIES THAT UNDERPIN MODERN COMPUTER DISPLAYS

**T**here are several factors to consider when choosing a screen. Size and resolution are important starting points, then come questions of brightness, contrast, colour accuracy and colour gamut. Whether a monitor performs well or poorly in these areas is at least partly down to the manufacturing technology used.

## A CLOSE-UP LOOK

Before we get into the specifics of the technologies on offer, let's start by looking at how a monitor produces an image. In all modern flat-screen displays, the display is nominally made up of a matrix of square pixels, each of which can at any time be coloured black, white, green, brown or any other colour.

Look through a magnifying glass, however, and you'll see that a pixel isn't really a solid square of colour. Rather, each pixel is made up of tiny red, green and blue elements - known as subpixels - set so closely together that, when all of them are fully illuminated, the eye sees the colours merge into white. The breadth of a monitor's colour gamut is thus a reflection of its ability to vary the intensity of these subpixels. The actual arrangement of

subpixels can vary. In a desktop monitor or laptop display, each square pixel is commonly divided into equal vertical stripes of red, green and blue, much like a tricolour flag. Some mobile devices use techniques such as angled subpixels to help maintain visibility from a wide angle; others seek to improve clarity and sharpness by using smaller green elements or a PenTile layout in which a blue central subpixel is surrounded by smaller red and green subpixels (drawing on the fact that the human eye is most sensitive to green light and least sensitive to blue). A few screen types feature dedicated white subpixels alongside the coloured ones to give brighter, cleaner whites. The truth is, for a display that will be viewed from at least a foot away, the precise layout is of little importance.

## TN VS IPS

When it comes to the business of lighting up individual subpixels, the majority of desktop and laptop screens use either twisted nematic (TN) or in-plane switching (IPS) technology. Both work in roughly the same way, employing a backlight with a matrix of liquid crystal subpixels in front, each of which can be controlled electronically to

block the light or allow it to shine through. As such, both types of display can therefore accurately be referred to as LCD monitors. Similarly, since both use thin-film-transistor technology to control the state of individual pixels, both can correctly be referred to as TFT displays.

**“TN technology is a good way to get a lot of screen for a reasonable price”**

Of the two technologies, TN is the cheaper. Fundamentally, it's the same technology as that used in old-school digital watches and the like. In the pixel's default state, the molecules in the liquid crystal layer are set up in a helical arrangement that rotates the polarity of the light by 90 degrees as it shines through. This enables the light to pass through a polarising filter at the front of the assembly, thus illuminating the subpixel. Applying a small charge to the liquid crystal causes the molecules to temporarily realign so that the light is no longer twisted; therefore, this means it's blocked by the filter and the subpixel remains dark.



▲ The light from an IPS display (right) has less directionality than a TN display (left), so colours remain far more consistent when the screen is viewed from an angle



TN technology is a good way to get a lot of screen for a reasonable price, and most of the new generation of affordable 4K screens use TN panels. However, the technology has one inherent limitation: due to the polarity and directionality of the light, you may only see the red, green and blue subpixels in the right balance if you're directly in front of the display. Move to the side or look down at the screen from a standing position and a TN display may appear dim and discoloured. We've also heard it suggested that TN screens are more susceptible to backlight bleed than other displays, but we suspect this is simply a side effect of the fact that TN screens are often manufactured to an extremely tight budget.

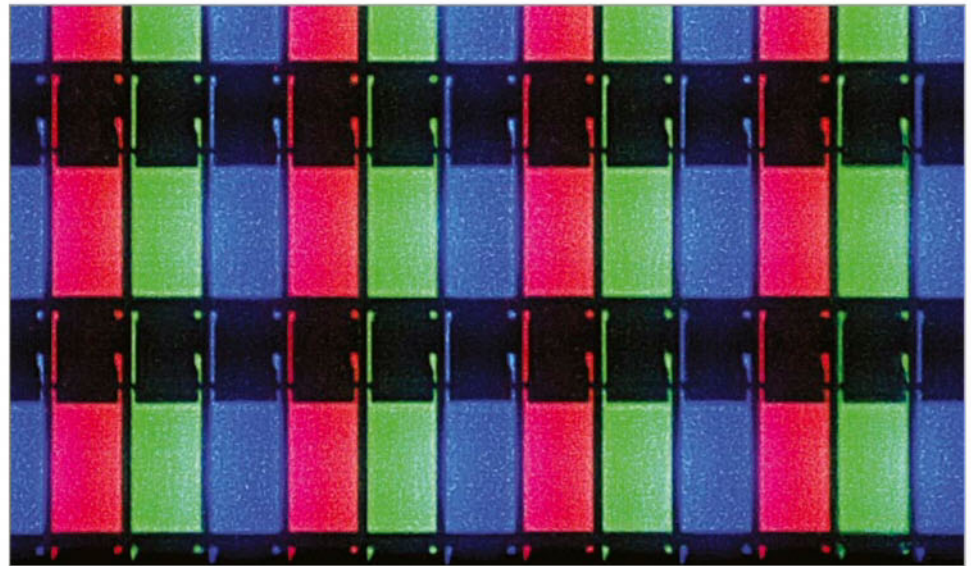
### IN-PLANE SWITCHING AND VERTICAL ALIGNMENT

If you can afford to pay a little more, in-plane switching (IPS) is a superior technology. It works similarly to TN, but instead of twisting the light the crystals simply rotate when a charge is applied in a way that blocks the light from getting through. Therefore, the light from an IPS screen has less directionality than a TN display, and colours remain consistent when the screen is viewed from a wider range of angles.

A variation on the IPS approach is known as vertical alignment (VA); here, the crystals are aligned perpendicular to the display, allowing almost all of the light to pass by them. With the application of an electric charge, the crystals tilt to reduce the amount of light that gets through.

IPS technology was created in 1996 and has been improved through several generations, so you might see screens described as "Enhanced IPS" or something similar.

Don't worry about the precise form of IPS a screen uses; successive improvements to the technology have focused on improving the contrast ratio or colour fidelity, so once you know a monitor uses some form of IPS you can get the measure of it by looking at its numerical specifications.



### CCFL VS LED BACKLIGHTING

Until a few years ago, it was common to use an array of white cold-cathode fluorescent lamps (CCFLs), similar to fluorescent strip lights, to provide the backlighting for both TN and IPS panels. However, as CCFLs age, their white light gradually tends to turn slightly yellow – bad news for photographers, designers and anyone who relies on decent colour accuracy. You can set up a colour profile to compensate for this, but that clean, out-of-the-box bright white won't ever return.

### “LED backlights don't age as quickly as CCFLs or discolour in the same way”

Modern monitors are more likely to use an array of LEDs as backlighting. These keep their brightness for longer and draw less power. The downside is that the light from a typical “white” LED is in reality skewed towards the blue end of the spectrum, so W-LED monitors can struggle to represent the full range of warm reds and yellows, not to mention flesh tones. More high-end screens use a mixture of light from blue and green coated with a red phosphor; these GB-R LED backlights produce a richer and more balanced spread of colours.

LED backlights don't age as quickly as CCFLs or discolour in the same way, but they're more likely to show the effects of ageing at different rates. After a few years, an LED monitor could start to develop uneven backlighting. In the case of a GB-R LED backlight, the colour

▲ Each pixel on a TFT display is made up of a repeating pattern of red, green and blue subpixels

balance may begin to shift and need recalibrating as the colours dim at different rates.

### AMOLED

LEDs aren't only for backlights – they're also the basis of another popular screen technology, AMOLED (active-matrix organic light-emitting diode). For convenience, it's often referred to as OLED, but strictly speaking this is a broader term that includes other types of display.

Instead of shining a backlight through a series of filters, AMOLED displays use a grid of tiny chemical diodes that illuminate individually when a charge is applied. This means AMOLED displays can easily produce better contrast than LCD screens: in a traditional LCD screen, black pixels aren't truly black, since a small amount of light always penetrates from the backlight through the liquid crystal layer; with an AMOLED screen, black pixels are entirely unlit.

The absence of a backlight means AMOLED displays can be thinner and lighter than LCD. They also consume less power in everyday use. These advantages make the technology a natural fit for mobile devices, and it's commonly used in smartphones. However, owing to the unpredictable ageing characteristics of LEDs, AMOLED displays can suffer from shifting colour balance. Indeed, last year, Apple CEO Tim Cook rejected OLED displays for the company's devices for this reason. “If you ever buy anything online and really want to know what the colour is,” he warned at a conference, “you should think twice before you depend on the colour from an OLED display.”

This may be one reason why

AMOLED technology is still largely restricted to devices that will be replaced after a few years' use. Another is OLED's susceptibility to "burn-in": subpixels that are frequently illuminated will, over time, lose brightness more quickly than those that are rarely used. The result is that something onscreen frequently, such as a clock or a taskbar, can become permanently "burnt" into the display, appearing as a negative shadow when the screen is supposedly evenly lit (see right).

AMOLED screens are also much more expensive to produce than LCD panels. Televisions based on the technology typically sell for upwards of \$4,000, and there's no mainstream market for computer displays, so you're looking at specialist prices - Sony's 24.5in BVM-E250A AMOLED monitor sells for more than \$3,000.

## GLOSSY VS MATTE SCREENS

One non-technical question to consider when choosing a monitor is how glossy you want the screen to be. Some are much shinier than others, and there are advantages in both directions. When a screen appears matte, it's because the outer surface is deliberately unsmooth; this

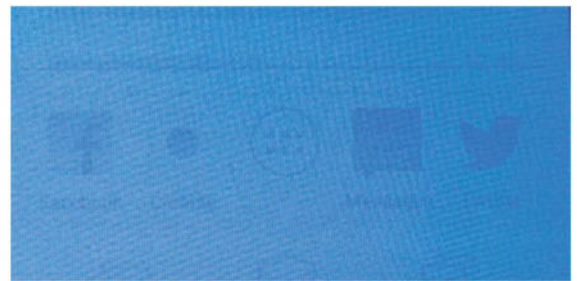
has the effect of diffusing external reflections, so a matte screen can be a godsend if you're working in bright sunlight or near a window.

Glossier screens tend to emphasise reflections, which can lead to annoying glare if you work in an environment with strong lighting. A glossy finish also tends to make any smudges or fingerprints stand out.

The trade-off is that a more matte panel diffuses not only reflections but also outgoing light, lending the image a slightly soft aspect.

On a glossier screen, less diffusion takes place, so the image appears sharper. Glossy displays may also be coated with an anti-glare finish to reduce distracting reflections; this means dark areas aren't illuminated by ambient light as much as they would be with a matte screen, so the contrast of the screen appears to be greater.

Choosing a screen type is a matter of personal choice as much as it is influenced by your environment and/or lighting conditions. As a rule of thumb, a matte screen makes sense for regular office work, or for a laptop that you intend to use while out and about; for games and movies, the vibrant colour and punchy contrast of a glossy screen may be more important - especially if the



▲ OLED displays can suffer from screenburn

room lights will be darker.

## REFRESH RATE AND RESPONSE TIME

Back in the CRT days, the refresh rate of a display was an important metric. It was generally agreed that, on a 15in monitor, the screen should be refreshed at least 60 times a second to avoid any uncomfortable perception of flicker. Bigger screens called for higher refresh rates, thanks to the eye's tendency to perceive flicker more at the edges of the field of vision than in the middle.

Today, this measure is mostly academic. Unlike a CRT, an LCD doesn't go dark between frames, so a 60Hz refresh rate - supported by almost every monitor on the market - appears perfectly smooth with no flickering. Manufacturers have occasionally produced monitors with a lower refresh rate, such as the 30Hz Dell P2815Q: this is absolutely fine for desktop use, but it means games and cursor motion won't be as fluid as they might be on a faster screen. At the other end of the scale, you may see monitors advertised as supporting 120Hz operation; this is intended to support active-shutter 3D glasses that automatically separate what you're seeing into two 60Hz video streams (one for each eye). If you're not planning to invest in such hardware, you have no need for this sort of refresh rate.

It's a similar story with response time. This indicates how long it takes for a pixel in the display to change from one colour to another and back again. Traditionally, this has measured full black to full white and back again, although some manufacturers measure using shades of grey to improve their reported speed.

If a display's response time is too slow, games and movies can look smeary, since frames blur together. However, typical response times these days are between 2ms and 5ms, which is fast enough to make any blurring imperceptible. Things become distracting only with response times of 10ms and above.

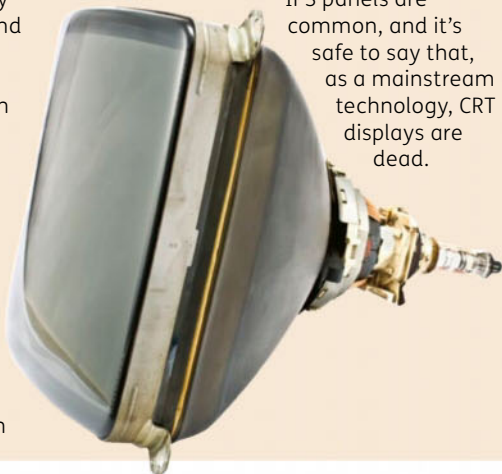
## CRT

If you're of a certain age, you'll remember that for decades computer displays used cathode-ray tube (CRT) technology, the same as that found in TVs. Such monitors are now rare, but a few professionals, particularly those working in the visual arts, still use them. High-end models provide excellent colour vibrance and accuracy, since the image is produced by using an electron gun to directly stimulate red, green and blue phosphors, giving an appearance more similar to AMOLED than LCD. They also have excellent viewing angles and almost instantaneous response times, and can support multiple resolutions cleanly by recalibrating the electron gun.

However, since the display requires a thick glass tube, such

a screen will always be heavier and more bulky than a flat-screen display of the same size. CRTs also can't produce the sort of sharpness we're now used to from LCD panels. It's understandable some have been reluctant to part with their trusty CRTs, since replacing such a monitor with a flat-screen display has until recently been terribly expensive. Today, though, colour-accurate

IPS panels are common, and it's safe to say that, as a mainstream technology, CRT displays are dead.





# CORE V71

*not just a pretty case...*



*...it has the features to back it up too*

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		BEST VALUE	LABS WINNER	
	Acer K272HUL	AOC Q2770PQU	Asus PB287Q	
OVERALL	★★★★★	★★★★★	★★★★★	
Image Quality	★★★★★	★★★★★	★★★★★	
Features & Design	★★★★★	★★★★★	★★★★★	
Value for Money	★★★★★	★★★★★	★★★★★	
PURCHASE INFORMATION				
Price	\$550	\$575	\$800	
Manufacturer	www.acer.com.au	www.aocmonitorap.com	www.asus.com.au	
SERVICE & SUPPORT				
Warranty	1yr RTB warranty (pixel warranty ISO 13406-2 class II)	3yr RTB warranty (pixel warranty ISO 9241-307 class 1)	5yr C&R warranty (7-day full-pixel failure warranty)	
DISPLAY				
Size & finish	27in	27in	28in	
Resolution (refresh rate)	2,560 x 1,440 (60Hz)	2,560 x 1,440 (60Hz)	3,840 x 2,160 (60Hz)	
Panel type	AHVA	Super-PLS	TN	
Backlight type	W-LED	W-LED	W-LED	
PORTS & CONNECTIONS				
Video connections	DisplayPort; DisplayPort out; DVI; 2 x HDMI; VGA	DisplayPort; DVI; HDMI; VGA	DisplayPort; HDMI; HDMI (MHL)	
Other connections	3.5mm audio in	2 x USB 3; 2 x USB 2	3.5mm audio in; 3.5mm audio out	
OTHER FEATURES				
Adjustable stand (height)	Tilt only	✓ (130mm)	✓ (150mm)	
VESA mount	✓ (100 x 100mm)	✓ (100 x 100mm)	✓ (100 x 100mm)	
Portrait mode	✗	✓	✓	
Speakers	2 x 2W	2 x 2W	2 x 2W	
Cables supplied	DisplayPort; DVI; power	DisplayPort; DVI; power; VGA	DisplayPort; HDMI; power	
SIZE & WEIGHT				
Dimensions (WDH, including feet)	642 x 248 x 468mm	642 x 245 x 428mm	660 x 220 x 414mm	
Weight	5.4kg	8kg	7.9kg	





		RECOMMENDED	
	Dell P2815Q	Eizo ColorEdge CG277	Eizo ColorEdge CX241
	★★★★☆	★★★★★	★★★★☆
	★★★★☆	★★★★★	★★★★★
	★★★★☆	★★★★★	★★★★☆
	★★★★☆	★★★★☆	★★★★☆
	\$799	\$3299	\$2200
	<a href="http://www.dell.com.au">www.dell.com.au</a>	<a href="http://www.eizo.com">www.eizo.com</a>	<a href="http://www.eizo.com">www.eizo.com</a>
	3yr C&R warranty (3yr bright-pixel replacement guarantee)	5yr C&R warranty (1yr full-pixel failure warranty)	5yr C&R warranty (1yr full-pixel failure warranty)
	28in	27in	24.1in
	3,840 x 2,160 (30Hz)	2,560 x 1,440 (60Hz)	1,920 x 1,200 (60Hz)
	TN	IPS	IPS
	W-LED	GB-R LED	GB-R LED
	DisplayPort; DisplayPort out (MST); mini-DisplayPort; HDMI (MHL);	DisplayPort; DVI; HDMI	DisplayPort; DVI; HDMI
	4 x USB 3	2 x USB 2; 2 x USB 2 (host)	2 x USB 2; 2 x USB 2 (host)
	✓ (115mm)	✓ (151.5mm)	✓ (128mm)
	✓ (100 x 100mm)	✓ (100 x 100mm)	✓ (100 x 100mm)
	✓	✓	✓
	✗	✗	✗
	mini-DisplayPort to DisplayPort; power; USB	DVI-D; mini-DisplayPort to DisplayPort; power; USB	DVI-D; mini-DisplayPort to DisplayPort; power; USB
	661 x 204 x 435mm	646 x 282 x 425mm	575 x 246 x 417mm
	7.3kg	12.8kg	9kg

# ASUS PB287Q

ASUS DELIVERS A GIANT-SIZED 4K MONITOR WITH GOOD IMAGE QUALITY AND A FISTFUL OF FEATURES FOR A BARGAIN PRICE.

**PRICE** \$800  
**SUPPLIER** [www.asus.com.au](http://www.asus.com.au)

**A**sus was among the first manufacturers to jump on the 4K monitor bandwagon, and back in October 2013 it led the charge with the Asus PQ321QE. At that price, we weren't entirely convinced, but the encounter left us hankering for an affordable version. The Asus PB287Q is exactly that – a 28in 4K monitor for only \$800. Could our Ultra HD dreams have come true?

It's fair to say we weren't expecting much from this "budget" 4K monitor, but the PB287Q makes quite an entrance. Viewed alongside a 27in, 2,560 x 1,440 (WQHD) monitor, the increase in clarity is dramatic. Where the individual pixels on the WQHD panel become visible at around 20cm, you have to almost press your nose to the PB287Q's semi-gloss panel to see them. In practice, and from normal viewing distances, the PB287Q's 157ppi pixel density and rich, saturated colour are enough to make images and photographs look almost as solid and pin-sharp as fine-quality print.

## IMAGE QUALITY

The PB287Q still turned in a good all-round performance in our barrage of screen tests. The panel covers 90.3% of the sRGB colour gamut; the white LED backlighting serves up more than enough brightness for any office or domestic conditions, peaking at 288cd/m<sup>2</sup>; and a contrast ratio of 855:1 is respectable by any standards. Only the colour temperature is significantly off-beam, with the PB287Q's 6,982K result well wide of the 6,500K ideal.

Colour fidelity isn't the match of the best monitors we've reviewed, but isn't unusably bad, and we suspect many people will struggle to pinpoint the panel's weak spots. We measured an average Delta E deviation of 2.89, principally due to a peak Delta E spike of 7.89 in the darker blue hues. According to our tests, the PB287Q is fairly accurate across the rest of the colour spectrum. Indeed, by far the most obvious deficiency is the panel's reproduction of darker tones, which results in a loss of detail in darker photographs or movie scenes.

If colour accuracy is crucial to you, there are two choices: spend more on a professional monitor, or shell out on a colorimeter such as the X-Rite i1Display Pro and calibrate the display properly.

While viewing angles are better than any TN panel we've tested before, the PB287Q still isn't up to IPS standards. Colours darken and shift in tone only slightly when viewed from the sides, but vertical viewing angles remain limited. Tilt the screen back and onscreen images swiftly darken; tilt it too far forward, and the reverse happens, images lightening and highlights becoming blown out.

Backlighting is another area where weaknesses lie. We measured the panel's brightness across 15 points on the screen, and noticed a maximum variation of 17.9% across the whole panel, with a noticeable dark spot on the middle and upper-left portions. This is markedly inferior to professional-class monitors, which routinely deviate by less than 5% across the whole panel.

One area where the Asus comprehensively bests the IPS opposition is in response time. This has long been a strength of TN panels – one of the reasons for the technology's enduring popularity with gamers – and the PB287Q is no exception to that rule. In our pixel-response tests, the Asus handled fast-moving onscreen items without excessive smearing, even at its default settings. Asus' Trace Free feature makes it possible to dial in more overdrive (essentially overclocking the individual pixels by increasing the voltage supplied), thus improving the clarity of moving items. This works well up to 60% of the maximum setting, at which point the side effects of the overdrive function – of which a visible halo around the edge of moving items is the most noticeable – begin to become distractingly visible.

## FEATURES AND DESIGN

At the rear of the monitor are twin HDMI inputs, a DisplayPort input and a pair of 3.5mm audio connections. One of the HDMI inputs has MHL support, which makes it possible to play content from and charge compatible smartphones and tablets. The DisplayPort input supports the



DisplayPort 1.2 standard and so allows a full 60Hz signal to be sent from compatible PCs and laptops.

In our testing, enabling the 60Hz mode was straightforward: all we needed to do was activate the setting using the monitor's onscreen display, and select the correct resolution and refresh rate in our graphics card's control panel. Thankfully, we encountered none of the faff and fiddly setup we experienced when testing the Asus PQ321QE.

The onscreen display is clear and easy to understand, but we weren't overly keen on the controls. Since Asus has mounted the physical buttons on the rear, it's often difficult to see which button corresponds with the onscreen legend, and we regularly found ourselves pressing the Exit button by mistake. Asus provides a variety of picture presets and image-enhancing features. Ultimately, we'd recommend leaving the monitor in Standard mode and setting the brightness to suit; the sRGB colour preset is more colour-accurate than the Standard image preset but, annoyingly, locks brightness at 127cd/m<sup>2</sup>.

## VERDICT

At first, we feared an affordable 4K monitor would be a disappointment, but the PB287Q defied all our expectations. It's an exceptionally solid all-rounder. Admittedly, the huge resolution does present some problems – scaling issues with older software, not to mention performance issues in games due to the huge number of pixels – but, at this price, we'd be tempted to take the plunge regardless. If you're after 4K thrills at a sensible price, the Asus PB287Q will take some beating.

IMAGE QUALITY  
FEATURES&DESIGN  
VALUE FOR MONEY



OVERALL





# EIZO COLOREDGE CG277

THE ULTIMATE PROFESSIONAL MONITOR GETS A MAKEOVER WITH A NEW BACKLIGHT AND ANTI-GLARE COATING; THE RESULTS ARE STUPENDOUS.

**PRICE** \$3299

**SUPPLIER** [www.eizo.com](http://www.eizo.com)

**E**izo has updated its flagship model, the CG277: it has an improved IPS panel, new LED backlighting and a healthy sprinkling of upgrades.

## FEATURES

The centrepiece of the ColorEdge CG277 is a 27in, 2,560 x 1,440 IPS panel. This might sound like old hat next to the new breed of 4K monitors we're seeing, but what the Eizo lacks in pixels it more than makes up for in quality. The previous model's CCFL backlight has been replaced by GB-R LED backlighting – a change that reduces power consumption and increases the colour gamut, which Eizo claims covers 99% of the Adobe RGB colour space. To ensure that every possible hue is visible onscreen, the CG277 supports full 10-bit colour inputs with a 16-bit 3D look-up table, or LUT, to maximise colour accuracy.

The CG277's killer feature, however, is its integrated colorimeter. Whereas other monitors will drift further and further away from their factory calibration as time passes, the CG277 can automatically adjust its own colour response to compensate. The sensor is hidden away in the display's lower bezel and, once activated, levers outwards and checks that the onscreen colours are exactly as intended. The Eizo can be set to calibrate automatically on a weekly or monthly basis, or after a set number of hours of usage, and you can set specific times so it's ready for action before you start work.

Needless to say, the result is a monitor that looks fantastic every time you switch it on. It also has a wide range of pre-calibrated colour presets – sRGB, Adobe RGB, Rec 709, EBU, SMPTE-C and DCI – which you can switch between by clicking the Mode button. Choose the colour space best suited to your application and the Eizo serves up supremely accurate image quality from the start.

## IMAGE QUALITY

We expected excellence from the CG277 and, by and large, that's

what it delivered. The sRGB mode covered 97.8% of the sRGB colour gamut in our tests, and achieved a colour temperature of 6,500K and a contrast ratio of 825:1. Colour accuracy was on a par with the best models here, too: it racked up an average Delta E of 0.7 and a maximum deviation of 1.97 – near-perfect, in other words.

With the CG277's Adobe RGB mode enabled, the results were equally impressive. We recorded superb gamma, colour temperature and contrast ratio readings, while the average Delta E of 0.97 and maximum of 2.23 were excellent. The Eizo's backlight is right on the money, though. We measured no more than a 5.4% deviation across the whole panel, with an average variance of only 1.5%. To the naked eye, the panel looks evenly lit from corner to corner, and there isn't the slightest hint of backlight leakage. Crucially, Eizo has finally upgraded its flagship with the same anti-glare coating it originally used on the 24in ColorEdge CX240. This may sound like a minor tweak, but the effects are dramatic. Whereas the previous model – the ColorEdge CG276 – and many of Eizo's high-end rivals exhibit a grainy sheen across the panel, this is reduced dramatically in the CG277. The result is a clearer view of fine detail when you peer close to the screen, and a markedly cleaner look to onscreen images.

The ColorEdge CG277 also provides deep, solid blacks, even when viewed from the sides, which is another huge improvement. By contrast, many rival IPS monitors suffer from a trait known as IPS glow, which manifests itself as a greyish glow around the panel's far edges when viewed at an angle and causes blacks to appear grey. We couldn't be happier that Eizo has remedied this issue.

## COLOUR CALIBRATION

In tandem with Eizo's ColorNavigator 6 software, the CG277's integrated sensor provides a wealth of colour-profiling options. For those who need accurate colour matching across multiple monitors, it's possible to use a third-party colorimeter or spectrophotometer (a high-end



calibration tool) as a reference point and correlate its results with that of the integrated sensor. With the aid of a supported spectrophotometer, ColorNavigator 6 also allows the creation of monitor colour profiles for mobile devices, such as tablets or smartphones.

## DESIGN

Physically, the CG277 looks every inch the professional display: it's a chunky, monolithic lump of a thing. Eizo hasn't redesigned the chassis for the past few generations, and thank goodness: there's nothing to improve. Adjusting the monitor's position requires two hands, but the CG277 stays exactly where you want it. Finally, a neat little plastic latch on the rear helps gather cables out of sight.

Connectivity hasn't changed a great deal, but Eizo has made a couple of key upgrades. Previously, only the DisplayPort input provided a 10-bit input; now, Eizo has added HDMI Deep Color support for full 10-bit input via HDMI. The CG277 also accepts 30fps 4K inputs via DisplayPort and downscales the image to fit its lower-resolution panel.

## VERDICT

The most off-putting thing about the Eizo ColorEdge CG277, however, is its price. Judged by any yardstick, this is a frighteningly expensive monitor. In truth, for most people, it's overkill. But, for anyone who requires absolutely reliable colour reproduction day in, day out with zero faff, the CG277's combination of refined image quality and innovative features is impossible to beat. If we had our way, every monitor would be as good as the CG277.

IMAGE QUALITY  
FEATURES&DESIGN  
VALUE FOR MONEY



**OVERALL**



# ACER K272HUL

ACER'S AFFORDABLE K272HUL SKIMPS ON THE FEATURES BUT SERVES UP FINE IMAGE QUALITY FOR THE MONEY.

**PRICE** \$550

**SUPPLIER** [www.acer.com.au](http://www.acer.com.au)

It's amazing how little you need to spend to get a good-quality monitor these days, and the Acer K272HUL is a prime example. Squeezing in a 27in, 2,560 x 1,440 panel for less than £400 is quite a feat.

The panel itself is a little unusual. Built by AU Optronics, a company better known for its vertical-alignment (VA) LCD panels, the Acer's AHVA panel is actually a form of IPS technology. To the naked eye, it puts in a great performance: viewing angles are just as wide as the best IPS monitors, and colour reproduction is bold and reassuringly natural.

For such a keenly priced 27in monitor, the Acer puts in a sterling performance. Brightness peaks at a respectable 290cd/m<sup>2</sup>, and the contrast ratio of 833:1 is only a little lower than the best monitors we've

reviewed. The dimmest area was in the panel's top-right corner, which was 13.9% less bright than the centre point. Look more closely, however, and you'll see backlight leakage from the panel's left and right edges – this is a budget monitor, after all.

Colour accuracy is outstanding for the money. The Acer doesn't quite cover every hue in the sRGB colour gamut – we measured a coverage of 98.2% – but the average and maximum Delta E results of 1.84 and 3.89 respectively aren't far off the figures we've seen from professional monitors. If there's a weak point in the Acer's performance, it's that its colour temperature of 7,193K gives whites a cold, bluish tone. Thankfully, this is easy to fix: we activated the monitor's manual colour-temperature control, and with red, green and blue set to 50% intensity.

There are DisplayPort, HDMI, DVI and VGA video inputs, a 3.5mm audio input and a DisplayPort output



for daisy-chaining a secondary display. However, there's a price to pay for getting top-notch performance on a shoestring budget: the glossy, black body feels cheap and nasty, and the wobbly stand provides only forwards and backwards tilt adjustments.

There's only one thing standing in the way of the Acer's success, and that's the equally affordable AOC q2770Pqu. Acer has marginally better colour accuracy, but the AOC has superior build quality, an extra year's warranty and an adjustable stand. If you prize image quality over all else, however, the Acer K272HUL remains a fine buy.

IMAGE QUALITY	★★★★★
FEATURES&DESIGN	★★★★★
VALUE FOR MONEY	★★★★★
<b>OVERALL</b>	★★★★★

# AOC Q2770PQU

A BARGAIN OF A 27IN WQHD MONITOR WITH A DECENT ADJUSTABLE STAND AND SOLID ALL-ROUND IMAGE QUALITY

**PRICE** \$575

**SUPPLIER** [www.aocmonitorap.com](http://www.aocmonitorap.com)

AOC is no stranger to building good-quality monitors on the cheap, and the q2770Pqu sees the company in fine form.

It's impossible not to be impressed by how much AOC has packed in for the money. While the chassis feels plasticky and lightweight, and the stand lacks the solidity of pricier models, it's spot-on functionally. It takes only one hand to adjust the stand's position, and although there's some wobble, the stand itself is flexible, offering 130mm of height adjustment, tilt and swivel and a portrait mode.

On the rear of the monitor, there are DisplayPort, DVI, HDMI and VGA inputs, as well as 3.5mm audio input and outputs. Impressively, AOC has also found room in the budget for a four-port USB hub. There are two USB 3 ports on the monitor's right-

hand edge, one of which is capable of charging USB devices while the monitor is on standby, and two USB 2 ports at the back.

The technical performance is great for the money. AOC has employed one of Samsung's Super PLS panels (a variant of IPS technology), which, according to our X-Rite colorimeter, covers 100% of the sRGB colour space. The contrast ratio is right on target at an impressive 948:1, and brightness peaked at 277cd/m<sup>2</sup>. The backlight isn't merely potent; we noted only the slightest bit of backlight leakage around the panel's edges, and it's fairly even, only varying by an average of 6.5% across the whole panel. The worst area was a dim spot on the left-hand of the panel where brightness dropped by 12.8%.

The ruddy skin tones we noted can be explained by a slightly warm colour temperature – 6,396K – but all-round colour accuracy is actually very good, with average and maximum Delta E



figures of 2.38 and 5.99 respectively. We were unable to improve the colour accuracy by tweaking the controls manually; the AOC ships with these settings from the factory.

The combination of features and image quality is positively brilliant for the money, and only Acer's K272HUL comes close at this price, with slightly superior colour accuracy. In the final reckoning AOC clinches victory with a more balanced package. Grab one quick – the AOC q2770Pqu is a steal.

IMAGE QUALITY	★★★★★
FEATURES&DESIGN	★★★★★
VALUE FOR MONEY	★★★★★
<b>OVERALL</b>	★★★★★



# DELL P2815Q

GOING FOR BUDGET 4K MONITOR GOLD, THE P2815Q IS HOBBOLED BY ITS LACK OF 60HZ SUPPORT AND INCONSISTENT IMAGE QUALITY.

**PRICE** \$799

**SUPPLIER** [www.dell.com.au](http://www.dell.com.au)

Just like its Asus-branded competitor, the Dell P2815Q mounts a 28in, 3,840 x 2,160 TN panel atop an adjustable stand. The attractive, curvaceous chassis swivels left and right, tilts into portrait mode and rises up and down by 115mm. Connectivity is solid, too, with the P2815Q touting DisplayPort, mini-DisplayPort, an MHL-compatible HDMI port, a DisplayPort output for daisy chaining a second display and a four-port USB 3 hub.

Straight out of the box, the Dell P2815Q's image quality looks similar to the Asus', if not marginally better. Brightness peaked at 290cd/m<sup>2</sup>, contrast reached a solid 882:1 and colour temperature measured a perfect 6,504K. To the naked eye, colours looked just a touch lighter on the Dell, but it was a slight difference. We're

convinced that the Dell and the Asus are using a very similar, if not identical, TN panel.

The X-Rite colorimeter wasn't quite so convinced: it pinpointed problematic hues in the greens, blues and dark yellows, and a swathe of inaccuracies in the Dell's handling of greyscales. The result is an average Delta E of 3.28 and a maximum deviation of 6.28 – a decent result, but not exceptional. We took some time to test each and every one of the Dell's picture presets and, weirdly, we found the Dell's Text image preset to be the most colour-accurate of the bunch.

Apart from errors in the greens and blues, it rectified all the problems we noted in the Standard setting – the result was an average Delta E of 2.55 and a maximum of 6.56.

By far the Dell's biggest limitation, however, is that it supports only a 30Hz input via DisplayPort or HDMI. This is immediately noticeable – the mouse



cursor stutters across the Windows desktop, and games are limited to a juddery maximum of 30fps.

We also suspect that the Dell suffers from an unusual amount of input lag. This manifests itself as a delay between making mouse movements and actually seeing the mouse cursor move on the display.

In our opinion, it's the high input lag and lack of 60Hz support that do for the Dell P2815Q. Image quality is on a par with the Asus PB287Q when it comes to static images, but we'd opt for the Asus for smooth cursor control and genuine gaming potential.

IMAGE QUALITY	★★★★★
FEATURES&DESIGN	★★★★★
VALUE FOR MONEY	★★★★★
<b>OVERALL</b>	★★★★★

# EIZO COLOREDGE CX241

A BARGAIN OF A 27IN WQHD MONITOR WITH A DECENT ADJUSTABLE STAND AND SOLID ALL-ROUND IMAGE QUALITY

**PRICE** \$2200

**SUPPLIER** [www.eizo.com](http://www.eizo.com)

The ColorEdge CX241 sits roughly in the middle of Eizo's ColorEdge family. The firm's cheapest wide-gamut model, it has a 24.1in IPS panel and a built-in correction sensor to ensure tip-top image quality.

Unlike Eizo's colorimeter-equipped ColorEdge CG models, the ColorEdge CX241's sensor isn't capable of optimising the monitor's colour accuracy. Instead, the sensor measures the brightness level and white point and adjusts the monitor's settings if they vary from the factory calibrated, or user-calibrated, white point values.

Impressively, though, the CX241 also supports full hardware calibration when used in tandem with a third-party calibration tool such as our X-Rite i1Display Pro. It isn't necessary to use third-party software, either: Eizo's

powerful ColorNavigator 6 software offers full hardware calibration support, and allows the monitor's internal look-up tables (LUTs) to be tweaked directly.

In terms of screen resolution, the 24.1in, 1,920 x 1,200 pixel resolution panel is fairly ordinary, but colour fidelity is generally top-drawer. In its factory-calibrated sRGB mode, the CX241 achieved 98% coverage and turned in an average Delta E of 0.62 and a maximum of 1.78. The Adobe RGB mode, meanwhile, covered 98% of the Adobe RGB colour space, and we measured an average Delta E of 0.64 and a maximum of 1.28 – as near to perfect as we could hope for.

In both our sRGB and Adobe RGB tests, we measured a colour temperature of just over 7,000K, which left whites looking noticeably cold. It wasn't until we manually set the colour temperature to 6,100K that the CX241 turned in near-perfect figures; thankfully, this didn't affect colour



accuracy in the process.

The adjustable stand feels sturdy, and the onscreen display gives easy access to the monitor's key features. At the rear, both the DisplayPort and HDMI sockets accept full 10-bit colour input, and there's also a two-port USB 2 hub.

The ColorEdge CX241 is a cracking performer, but with 27in rivals costing a similar sum, we just can't help craving a few more top-quality pixels for our money.

IMAGE QUALITY	★★★★★
FEATURES&DESIGN	★★★★★
VALUE FOR MONEY	★★★★★
<b>OVERALL</b>	★★★★★

# CLOSE COMBAT: GATEWAY TO CAEN

THE CLASSIC CLOSE COMBAT SERIES DELVES INTO AN OFTEN IGNORED NORMANDY CAMPAIGN.

**DEVELOPER** Matrix Games  
**PUBLISHER** Matrix Games  
**WEBSITE** [www.matrixgames.com](http://www.matrixgames.com)

For those of a filmic bent, rather than historical, it's easy to think that the sum total of the action of D-Day is all there is to the titanic campaign in to evict the German army from Normandy. But once the beach landings were done, and the US and British airborne had done all and more that was asked of them, there were hard weeks of grinding warfare to go.

Close Combat: Gateway to Normandy focuses on the operation code-named Epsom, a British attack on the German lines around the road hub of Caen.

It was a fascinating engagement that lasted less than a week, but saw elite German Panzer units, supported by weak conscripts, take on the overwhelming material advantage of the Allied war machine. Nonetheless, it was not nearly as one-sided as it could have been – German resistance was dogged, and German tanks infinitely superior to their Allied counterparts. On the other hand, the British plan was flawed from the start, and despite superior numbers, failed to achieve all of its objectives.

Which is why it's such a great subject for a game like Close Combat – it's a piece of history where it's easy to

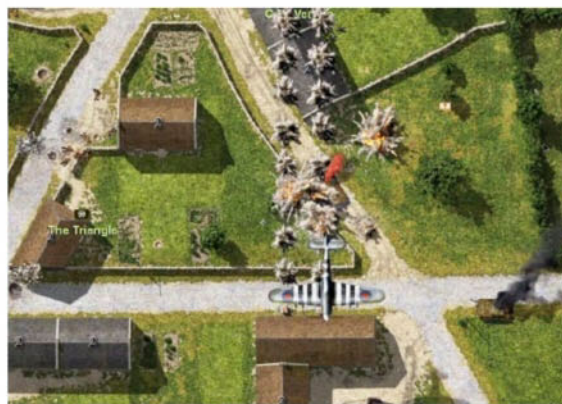
ask that most beloved of all wargamer questions: can you do better?

## HEDGE ROW HELL

There are a host of single-battle scenarios in Gateway to Caen, but the game's at its best when played in Campaign mode. Here, there are two layers to the game: the strategic portion sees you moving units between maps, as it were, taking positions to attack or defend important road junctions, supply depots, and so on. You can allocate artillery and air-support at this level, too, either to interdict movement, or to support units in battle.

The heart of the game, however, is in the tactical gameplay, where diverse battlegroups fight over everything from rolling fields to built-up towns. Particularly challenging is the biggest feature of the Normandy campaign, the great bocage hedgerows that could block line of site and movement, turning the campaign into a series of firefights fought continuously from one field to the next.

While the strategic layer tracks things like fuel, unit fatigue, and cohesion, the tactical layer tracks individual soldiers and vehicles in impressive detail. While Gateway to Caen is undoubtedly a game of fire and maneuver, it's also heavily focused on managing morale and unit psychology, while still tracking the more tangible elements of warfare such as ammo counts and blown off tank-tracks. This is where Gateway to Caen shines, even though it is starting to look more than a little long in the tooth. There are graphical elements, such as infantry sprites, that date back to the second game in the series, which can be good in terms of unit recognition, but there's



## PLATFORMS

PC only

simply not been a lot of work in this area from Matrix.

Thankfully, the same cannot be said for the game's AI, which is more aggressive than ever. There was a time when the game could really only be enjoyed by playing multiplayer, or setting yourself as the attacker in AI matches, but now enemy units move forward with much more verve. Given that the strategic layer is more than capable of resulting in some desperate last stands, Gateway is more than capable of challenging even experienced players. Tank AI is still a bit ropey and slow, but that's about the only mark worth mentioning against Gateway's virtual tactician.

Despite its age, Close Combat is still when of the best WW2 platoon-level simulations around. It's actually rather charming that it's still so devoted to its flat, top-down perspective, and it still delivers a more satisfying experience than Company of Heroes ever could. If you just want to see real tactics rewarded, without silly things like base-building or any other modern gumpf, this is the game for you.

**David Hollingworth**



Starting to look a little tatty, but still a gripping challenge of a game.

**RATING**







# GRID AUTOSPORT

CODIES ARE BACK IN THE GAME,  
RE-EARNING THE 'MASTERS' TITLE.

**DEVELOPER** Codemasters  
**PUBLISHER** Codemasters  
**WEBSITE** [www.gridgame.com](http://www.gridgame.com)

**T**he racing/driving scene on PC has gravitated heavily towards the sim end of the realism scale, in recent years. Almost all of the new releases for PC, and those on the boil, have had a hardcore sim theme, leaving simple arcade thrashing to older titles like the fabulous Dirt 3 (also Codemasters). This hole needs filling!

Now that Codemasters has turned all game development over to the racing genre, the outfit has been able to deliver some proper quality, whereas before Codies games almost always had something amiss, like the netcode in the F1 games.

GRID Autosport wraps up the desire we all have to fang fabulous cars in a package that's polished and, well, damn good fun. Gone are the terribly designed menus, replaced with a classy and austere functionality, set to cool ambient music instead of crashing Euro-disco or glam rock. The old voice over bloke, who couldn't get a job as a game show host, is replaced instead with a lovely sounding lady and her soothing encouragement. As before, there's a somewhat massive list of real names to choose from, which probably

includes yours, unless it's Shia or LeBron, and I always get a bit chuffed when lovely voice lady tells me "great race, Ben!" after I win.

There's still no mouse cursor to be seen, alas, but Codemasters games have always been rooted in consoles. Another lose is having many functions mapped to your controller buttons, and with that a bit of trial and error to figure out which one is 'button 7', for example.

But that's all ok. On balance, the new good and the old bad balance out, and we haven't gotten started on the nuts and bolts yet. Which is fabulous. Driving is, well, I'm almost reluctant to say this because deep inside me a voice is shouting that I must be wrong... but it is indeed the most fun I've ever had on a race track (and I'm the biggest hardcore sim junkie there is).

It's all down to what we call the physics model, or, the way cars handle. Codies has totally nailed the fine line between intuitive handling, and dampened down extremes of what a car should be doing at the limit, so that even the craziest over-powered supercars are still enjoyable to drive straight out of the garage.

It's all about induced oversteer. You can trail brake into even the tightest corner and the nose tucks in eagerly. Tap the brakes and the pointy end



points in even further. Hit the gas -- even well before the apex, and the front end agreeably tightens into the turn. Now, this is bending the rules of physics just a bit, or exaggerating what should be happening, and almost all arcade games do this to varying degrees, but in GRID Autosport it just feels more right than ever before. It's as if you were driving a car hard when you were a kid, before you really understood car handling and thought you could just throw it around like a hero. But -- and this is important -- the cars still have enough of a connection to reality that you'll be able to apply your driving skills and get a better time.

Best of all, all this gels the moment you drive the game for the very first time! There's no 'learning the game engine' required, just start her up and go hard. It's terrifically exciting, instantly intuitive and very moreish.

Tackling the actual game modes gives you the traditional career mode, or just racing (or practising) on a single track. There are five disciplines (Touring, Endurance, Tuner, Open Wheeler and Street), and within each are enough cars to satisfy for a long time, and have you excitedly curious to try them all. The career mode is also structured around the disciplines. There's a bit of unlocking to do but you can mostly pursue the class you like best over several career levels.

Overall the experience is fantastic. Whether you want to go hardcore in an open-wheel formula around an F1 track like Sepang or Spa, or go mental swinging a Zonda through the fantasy Paris track it totally delivers a challenge that's not intimidating, is instantly gratifying yet has plenty of headroom to develop your skills, and I think is a keeper for your hard drive for those times when you just need the speed.

**Ben Mansill**



**PLATFORMS**  
PC • Xbox 360 • PS3  
Tested on PC



The very best arcade  
racer of the modern era.

**RATING**





## ATOMIC TUESDAY GOES OFF WITH A BANG!

THE CREW WERE IN MELBOURNE IN JULY FOR THE ALWAYS AWESOME COMPUTER GAMES BOOT CAMP AT MONASH UNIVERSITY.

Heading down for Monash's annual week of gaming-related goodness, the Computer Games Boot Camp, is always a pleasure. Monash University's Clayton campus puts on a hell of a show, inviting youngsters interested in further studies in the field to come along and get a taste of what the industry has to offer.

And it seems Atomic Tuesday is pretty much a permanent fixture.

Each Tuesday of the event we invite some of our favourite technology partners to come along and share the stage with us, talking the eager crowd through new technologies, hardware, and gaming trends.

And there might be a few prizes involved, too - which never hurts.

This year we were joined by Gigabyte and Asrock on stage, with SSD maker OCZ and our good pals at Corsair also showing off some irrisistable hardware-packed stands.

In between throwing a tonne of Corsair products into the crowd (thanks for all the keyboards, mice, and fans!), our guests shared their wisdom. Gigabyte covered off its new range of gaming laptops, including the more than a little attractive Aorus models. Asrock covered off on its latest Z97 and H97 motherboard range, including the also somewhat appealing Fatal1ty boards. And ThermalTake talked us

through picking the right case for the job, and the magic that is red LEDs.

When all was done, we hosted a Q&A for any of the kids to ask more about the products on show, general tech, or even what studies we all undertook to get us into the industry. We hosted the inaugural Atomic Quiz, sponsored by OCZ, and forced some 'lucky' possible prize-winners to dance off for a range of Corsair gear.

At the end of the show, we let the now prize-slatted crowd off the leash, and they spent a lot of time looking over our guests displays.

As usual, it was a great day for all concerned. Thanks for having us Monash, and we'll see you next year.









# THE A-LIST

ONLY THE BEST OF THE BEST MAKE IT TO PC & TECH AUTHORITY'S A-LIST

After just a single month as the A-List router, the Netgear Nighthawk AC1900 is being replaced... by the new Netgear Nighthawk X6. While this router can handle more streaming data and media than most of us require, it's undeniably the best, and in any case if you're not close to saturating your old router's bandwidth now you may well be soon.



#### WHAT WE SAID:

While there is no doubt that the Nighthawk X6 is an excellent solution for keeping our increasing numbers of devices connected to the net efficiently, those who already have a good router may be dissuaded by the price, however for those who are suffering the pain of device dropouts and 'too much data in too few pipes' could do a great deal worse than Netgear's latest offering. Android and iOS app support, and free backup software, it's a true winner and our new A-List wireless router champion.

There's a second new entrant in A-List this month, and that's the Asus Transformer Pad TF103C, which now occupies the Value spot for portables.



#### WHAT WE SAID:

Until now, if we'd been asked to recommend a budget tablet, we'd have plumped for the Nexus 7 without a second thought, but the Asus Transformer Pad TF103C has given us another option. For fans of large-screened tablets who might want to do a touch of work on the move, its performance, display quality and usable keyboard make it a worthy alternative.

## PCS DESKTOPS ▼

### HIGH-END PC&TA EDITOR'S CHOICE

★★★★★

PRICE \$3800

An extreme PC able to deliver perfect gaming performance, but also be equipped to handle the most demanding desktop apps.

**SPECIFICATIONS** i7 4770K CPU; AMD 295 graphics; Corsair Dominator Platinum DDR3 16GB; ASUS Maximus VI Extreme motherboard; ASUS ROG Front Panel; CoolerMaster Cosmos SE case; CoolerMaster V1000 PSU; Sandisk Extreme 2 240GB SSD; 2 x SanDisk Ultra Plus 256GB SSD; SanDisk Extreme Pro SSD 480GB



### MEDIA PC&TA EDITOR'S CHOICE

★★★★★

PRICE \$1159

This versatile media box is also perfectly capable of doing double-duty as a lightweight TV game box. Built to a budget with performance in mind.

**SPECIFICATIONS** Bitfenix Prodigy; Kaveri A10-7850K APU; - Gigabyte GA-F2A88XN-WiFi; Corsair Dominator 8GB; Thermaltake Water 3.0 Pro; Seagate 4TB SSHD; Corsair RM 650 PSU; Logitech Wireless Touch K400



### ALL-IN-ONE APPLE IMAC 27IN

★★★★★

PRICE \$1949 SUPPLIER [www.apple.com/au](http://www.apple.com/au)

If you can afford it, the 27in iMac is the finest piece of all-in-one engineering on the market. A truly powerful beast with performance to match its looks.

**SPECIFICATIONS** 2.7GHz Core i5-2500S; 4GB DDR3 RAM; 1TB Western Digital Caviar Black HDD; DVD writer; AMD Radeon HD 6770M graphics; 27in 2560 x 1440 LCD.



## HANDHELDS ▼

### SMARTPHONE HTC ONE M8

★★★★★

PRICE From \$820 SUPPLIER [www.htc.com.au](http://www.htc.com.au)

A beautiful, highly competent smartphone that's packed with clever features. Right now it's the best Android smartphone you can buy.

**SPECIFICATIONS** Quad-core 2.3GHz Qualcomm Snapdragon 801 CPU - Adreno 330 GPU - 2GB RAM - 16GB storage - 5in 1,080 x 1,920 display



### TABLET APPLE IPAD AIR

★★★★★

PRICE \$539 SUPPLIER [store.apple.com/au](http://store.apple.com/au)

The new iPad is pretty much the king of the hill when it comes to tablets, smaller and more powerful than ever before.

**SPECIFICATIONS** 9.7in 1536x2048 widescreen Multi-Touch display; 1GHz A5X processor, 16, 32 or 64 GB available; 3G and/or Wi-Fi connectivity; max 652g weight.



### EBOOK READER KINDLE

★★★★★

PRICE \$109 SUPPLIER [www.amazon.com](http://www.amazon.com)

The new model is quicker, slimmer, lighter and cheaper than before. If all you want to do is read books, its simple design and performance are perfect.

**SPECIFICATIONS** 6in e-Ink screen, 170g weight, 114 x 87 x 166 mm, 2GB memory, 10-day battery life - WEB ID 279534



# Like to save big? We're the way to go.



# PCS LAPTOPS ▼

## VALUE ASUS TF103C

★★★★★

**PRICE** \$429 **SUPPLIER** [www.asus.com/au](http://www.asus.com/au)

While ostensibly a tablet with a removable keyboard, it also fits tidily into the value portable category thanks to its immense usability and remarkably low price.

**SPECIFICATIONS** Quad-core 1.86GHz Intel Atom Z3745 • 1GB RAM • 8GB/16GB eMMC storage • 10.1in 1280 x 800 IPS display • dual-band 802.11n Wi-Fi



## PERFORMANCE AORUS X7

★★★★★

**PRICE** \$2999 **SUPPLIER** [aorus.com](http://aorus.com)

Super-sleek, light, outrageously powerful and with a spec-list that outclasses many high end desktop systems.

**SPECIFICATIONS** Q4-3.4GHz i7-4700HQ • 4GB/8GB DDR3L 1600, 4 slots (Max 32GB) • 17.3" Full HD 1920x1080 • NVIDIA® GTX 765M SLI GDDR5 4GB • mSATA 128GB/256GB, 2 slot 2.5" HDD 500GB/750GB/1TB 5400rpm



## PROFESSIONAL APPLE MAC BOOK RETINA

★★★★★

**PRICE** \$3199 **SUPPLIER** [www.apple.com/au](http://www.apple.com/au)

The machine that does everything right, and looks the part, too. We've chosen the top-end 2.3GHz i7 model with 16GB of RAM and a 512GB SSD plus GT 750M graphics.

**SPECIFICATIONS** 2.3GHz Intel Core i7; 16GB RAM; 512GB SSD; 15in 2880 x 1800 LCD; 1 x USB 3; 2 x USB 3; 2 x Thunderbolt 2; dual-band 802.11acn Wi-Fi; Bluetooth 4; 3G



## ULTRA PORTABLE LENOVO CARBON X1

★★★★★

**PRICE** \$2499 **SUPPLIER** [www.lenovo.com/au](http://www.lenovo.com/au)

Lenovo inherited – and built upon – IBM's legendary ThinkPad build quality, and added a much-needed dose of style to this highly capable machine.

**SPECIFICATIONS** Q4-2.1GHz Intel Core i7-4600U; 14in touchscreen (2560 x 1440); 8GB RAM; 256GB SSD; 802.11ac/abgn; Bluetooth 4



# PERIPHERALS ▼

## WIRELESS ROUTER NETGEAR NIGHTHAWK X6 AC3200

★★★★★

**SUPPLIER** [www.netgear.com.au](http://www.netgear.com.au)

Designed to keep pace with high-bandwidth content consumption, it is the router King.

**SPECIFICATIONS** 1GHz dual core processor with 3 offload processors, 6 High performance antennas, one 2.4GHz band and two 5GHz Wi-Fi bands

## DESKTOP STORAGE SEAGATE 2TB BACKUP PLUS DESKTOP

★★★★★

**SUPPLIER** [www.seagate.com](http://www.seagate.com)

This 2TB external drive still offers good value despite the rise of higher-capacity drives. The USB 3.0 adaptor makes for excellent transfer speeds.

**SPECIFICATIONS** 2TB external hard disk with NTFS; USB 3.0, with other docks available as optional; 44 x 124 x 158mm 894g.

## NAS SYNOLOGY DISKSTATION DS214PLAY

★★★★★

**SUPPLIER** [www.synology.com](http://www.synology.com)

The fastest NAS in our group test (PC&TA 197), with excellent media streaming capabilities.

**SPECIFICATIONS** 2.1GHz Intel Atom; 2GB RAM; 2 x USB 3 + 1 x USB 2; iOS and Android mobile apps; RAID 0, 1, 5, 10; JBOD.

## ALL-IN-ONE PRINTER CANON PIXMA MG5460

★★★★★

**SUPPLIER** [www.canon.com.au](http://www.canon.com.au)

The winner of our most recent printer group test, this combines excellent print quality with decent costs and is just as good at printing photos as it is documents.

**SPECIFICATIONS** 9600 x 2400dpi print; 2400 x 4800dpi scan; USB; 802.11n WLAN; 125-sheet tray; 455 x 369 x 148mm

## LASER PRINTER DELL B1160W

★★★★★

**SUPPLIER** [www.dell.com.au](http://www.dell.com.au)

The best all-rounder in our printer group test, with excellent text printing and decent costs.

**SPECIFICATIONS** 1800 x 600dpi resolution; USB 2; Wi-Fi; 150-sheet input trays; 331 x 215 x 178

# SOFTWARE ▼

## SECURITY KASPERSKY INTERNET SECURITY 2014

★★★★★

**SUPPLIER** [www.kaspersky.com/au](http://www.kaspersky.com/au)

The winner of this year's security software group test, a big improvement over recent years, and a good solution for beginners and more advanced users. Kaspersky AV software runs well on even low-end machines, and operates relatively seamlessly and with a small memory and OS footprint.

## BACK UP ACRONIS TRUE IMAGE 2013

★★★★★

**SUPPLIER** [www.acronis.com.au](http://www.acronis.com.au)

A clear and well-organised front end makes this easier to use than ever. Not much has changed from previous years, but it remains our go-to backup solution

## OFFICE SUITE MICROSOFT OFFICE 365 HOME PREMIUM

★★★★★

**SUPPLIER** [www.microsoft.com.au](http://www.microsoft.com.au)

The easiest to use Office to date.

## WEB DEV ADOBE DREAMWEAVER CS5

★★★★★

**SUPPLIER** [www.adobe.com.au](http://www.adobe.com.au)

This edition makes PHP and CMS its core focus, which gives it the new lease of life it so desperately needed.

## AUDIO CUBASE 7.5

★★★★★

**SUPPLIER** [www.steinberg.net](http://www.steinberg.net)

The addition of better filters solidifies this program's continued place on the A-List.

## VIDEO SONY VEGAS MOVIE STUDIO HD PLATINUM 11

★★★★★

**SUPPLIER** [www.sony.com.au](http://www.sony.com.au)

May not have the bells and whistles of other consumer editing packages, but its tools are efficient.

## PHOTO ADOBE PHOTOSHOP LIGHTROOM 5

★★★★★

**SUPPLIER** [www.adobe.com.au](http://www.adobe.com.au)

An excellent tool for photo management and light editing, as used by the pros and now available at a very reasonable price.



# KITLOG

**F**or the Game Box we've finally bitten the bullet and now recommend a mechanical keyboard. Replacing the otherwise excellent Razer Arctosa is the outstanding Corsair K70. We reviewed it several issues ago and criticised its useability as a general purpose keyboard, but after living with it as our day-to-day keyboard we're prepared to accept the compromises. Because, as a gaming device it's quite fantastic. Many little details combine, including positioning the function keys closer than usual to the main array, and three levels of backlit illumination.

## A NEW SCREEN?

Despite running a monitor roundup in this very issue, we're holding back on upgrading the gaming choice, because there's interesting developments in the form of screens supporting Nvidia's G-SYNC just around the corner. We'll have reviews next issue and will choose a new monitor then.

However! We are definitely updating the Perfect PC's screen, going with the ASUS PB287Q which impressed us so much in the roundup. It's 4K at a very reasonable price.



## NEW MOTHERBOARDS

We're sticking with the Asus ROG Ranger for the game box - but you would do equally well choosing either the MSI Gaming 7 or Gigabyte Z97X-UD5H, both of which were very impressive in this issue's Labs roundup. All three are priced virtually identically, so it's up to you to decide which slot arrangement and features (like better onboard audio) suits your needs best.

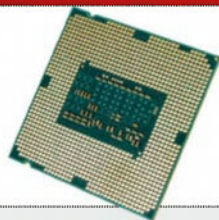
For the Perfect PC, though, our motherboard roundup has led us to select new kit. We're going with the Asus Z97 Deluxe (page 52). -There's plenty of cutting-edge technology crammed into this package. It's for those who want it all, and if you truly need all the bells and whistles that a modern LGA1150 system can provide, this is pretty much it. This selection also means that the Xonar Essence audio card is optional, as the Asus Z97 Deluxe has excellent on-board audio, so unless you are running very high end speakers it's more than enough.

## CPU

Finally, the Perfect PC's 4770K CPU is updated to the new 4970K (page 38).

## THE GAME BOX

### CPU



#### INTEL CORE I5 4670K

**PRICE** \$275

Gamers can do without Hyperthreading and save \$100 or more, compared to an i7. The K version is unlocked for easier overclocking.

### MOTHERBOARD

#### ASUS ROG RANGER

**PRICE** \$259

Fully featured, extremely well engineered. Alternatively, the MSI Gaming 7 or Gigabyte Z97X-UD5H are equally as good at the same price.



### MEMORY



#### KINGSTON HYPERX BEAST 16GB

**PRICE** \$240

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### VIDEOCARD

#### GIGABYTE GTX 760 OC 4GB

**PRICE** \$360

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## THE PERFECT PC

### CPU



#### INTEL CORE I7 4970K

**PRICE** \$400

Intel's top-of-the-line quad-core i7 delivers huge performance and can overclock easily to around 4.7GHz with the K version.

### MOTHERBOARD

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### MEMORY



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HOW TO

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**84**

SYSTEM BUILDER

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# HOW TO: Choose the best PC case for you

**DAVID HOLLINGWORTH** IS OUR IN-HOUSE CASE REVIEWER – HERE'S WHAT HE LOOKS FOR WHEN HE'S GIVING A NEW CHASSIS A ONCE OVER.



**T**here are a handful of PC components and peripherals that tend to last through upgrade after upgrade. You may swap out video cards regularly, or update your motherboard to each new chipset, but chances are you'll be holding on to some items far longer. Monitors come to mind, as do items like keyboards and mice, but one component that tends to stick around the longest is the case that houses all your precious PC parts.

Once upon a time the case market was, well... boring. A generous reader recently sent in a pile of old back issues, and looking at the intensely conservative beige boxes of yesteryear sparked something like nostalgia – but we're very glad those days are gone.

These days PC enthusiasts are spoiled for choice when it comes to their choices in case. From tiny Mini-ITX cases perfect for easy-to-hide lounge-room PCs or LAN boxes, to mighty desktop full tower designs, and a range of form-factors in between, there's a shape – not to mention colour and style – for almost everyone.

Which, ironically, has made the features inside our cases that much more important.

## OUTSIDE IN

Modern case design runs the gamut from austere to almost punk-inspired, and there really is no right and wrong when it comes to choosing something you like the look of. Some may not even care, but for a lot of PC users their machines are somewhat of a point of pride. But whether you like a case that's lit up like a Xmas tree or something you'd barely glance at a second time, there are some points worth looking out for.

First up, you should be looking for a range of IO options that suit not only what you need, but also your workspace. In terms of the latter, consider where on or beneath your desk your PC will be sitting, and on what side – there's no point getting a great case that has all the USB and

audio ports facing away from you. Similarly, if you prefer your PC on the floor under your desk, then ports on the upper surface will be far more convenient than ones facing into your legs or out in front.

**“There's a shape – not to mention colour and style – for almost everyone.”**

A lot of cases will also come with a windowed side-panel, so you can see into the case and bask in the glory of high-speed silicon. This is all well and good, but if you're not the type to care for such excess, make sure you're not paying extra for the privilege – many cases come in windowed and non-windowed models. Similarly, if your PC is out of the way, why bother? Save a few bucks and get something that is fully enclosed.

Speaking of case placement, this is pretty important for another aspect of case design – airflow.

## INSIDE OUT

Even basic case models these days tend to sport two or even three fans.

While modern hardware doesn't run nearly as hot as its forebears, good airflow is nonetheless an essential component of a good computer setup.

One of the best things you can do for your hardware is to make sure you choose a case with removable filters on all the air-intakes – especially if your PC will be living on the floor. Even in a tidy house, normal dust and other detritus, especially pet hair, can build up very quickly on fan intakes. Without a filter, this craft will clog your fans and build up on PC components, all adding to the thermal load of your machine. In serious cases, it could even lead to serious damage.

Not to mention just how skanky your case interior will look – and feel – when you next take it apart for an upgrade!

A removable filter means you keep components safe from grime, and can be removed for regular washing. We consider filters on the front intakes and the case's bottom vents essential.

Another essential component of case design is cable management. You might think that keeping cabling neat, tidy, and out of the way is just for folks with case windows, but it serves a more serious purpose. As we've already

▼ If possible, try and match your case choice with your motherboard so that the grommets are conveniently positioned.







alluded too, airflow isn't as critical as it used to be, but it's still something you want to aim for, and messy cables can really impede clean airflow. Even worse, cables are great at catch and collecting all the grime that might otherwise blow through your case.

For cable management, a few things are essential, for a number of reasons. A case with a lot of room behind the motherboard plate and between the outer panel is great for keeping cabling out of the way. Most cases with roomy spacing here will also have dedicated cut-outs for cable runs - make sure these come with rubber grommets



around the edges. This helps cut down on cable-wear, noise, and the possibility of catching delicate fingers on hard metal.

The last word on cooling - and most cases do this by default - is to make sure there are more fans sucking air into the case than there are exhaust fans. This makes for positive air-pressure inside the case, which can also help cut-down on dust build-up.

### ROOM FOR RENT

Of course, the main thing you'll be doing with your case is stuffing components in there. In this regard, we

Most decent cases will have easily accessible filters, so do please give them a clean every so often.

always look for a couple of things.

First of all, we're very find of modular hardware cages. These can be moved about, re-arranged, or even removed entirely to make room for larger components like high-end video cards. Even if don't have a super-long VGA card, removing part of the drive cage can greatly improve airflow when you don't need all the drive slots that are on offer.

And since we're considering SSDs essential these days, you definitely want a case that supports dedicated SSD slots.

The motherboard plate should have a cut-out behind the CPU, too, roomy enough so that you can easily mount and dismount coolers from your CPU. And when it comes to securing other components, especially large video cards, we really do prefer old-fashioned

## “Positive air-pressure inside the case ... can also help cut-down on dust build-up”

screws. Tool-less options may work for optical drives, but if you ever plan on moving your PC about, screws are just more reliable than often dodgy clip solutions. Your video card is often the single most expensive component in your system, so you don't want it flopping about.

Finally, you just want something that's solid. It's not always possible to get an idea of case build in the shop, but we've developed a pretty thorough testing methodology for this over the last decade or so - the drop test.

Well, it's not really dropping the case, more one edge of it. We lift the case up by its front edge, to a height of a few cm, and then let it drop. If there are any loose bits of chassis, you'll hear it. If the frame is at all poorly put together, you'll see it.

Cabling that's routed through to the back plate is all good to keep things tidy, but some cases offer less room here than others for the thick bulky cables.



### KITCHEN CARES

When we're talking about airflow, there's something else we've learnt - the hardway - about keeping things clean and clear.

Try to avoid being near the kitchen.

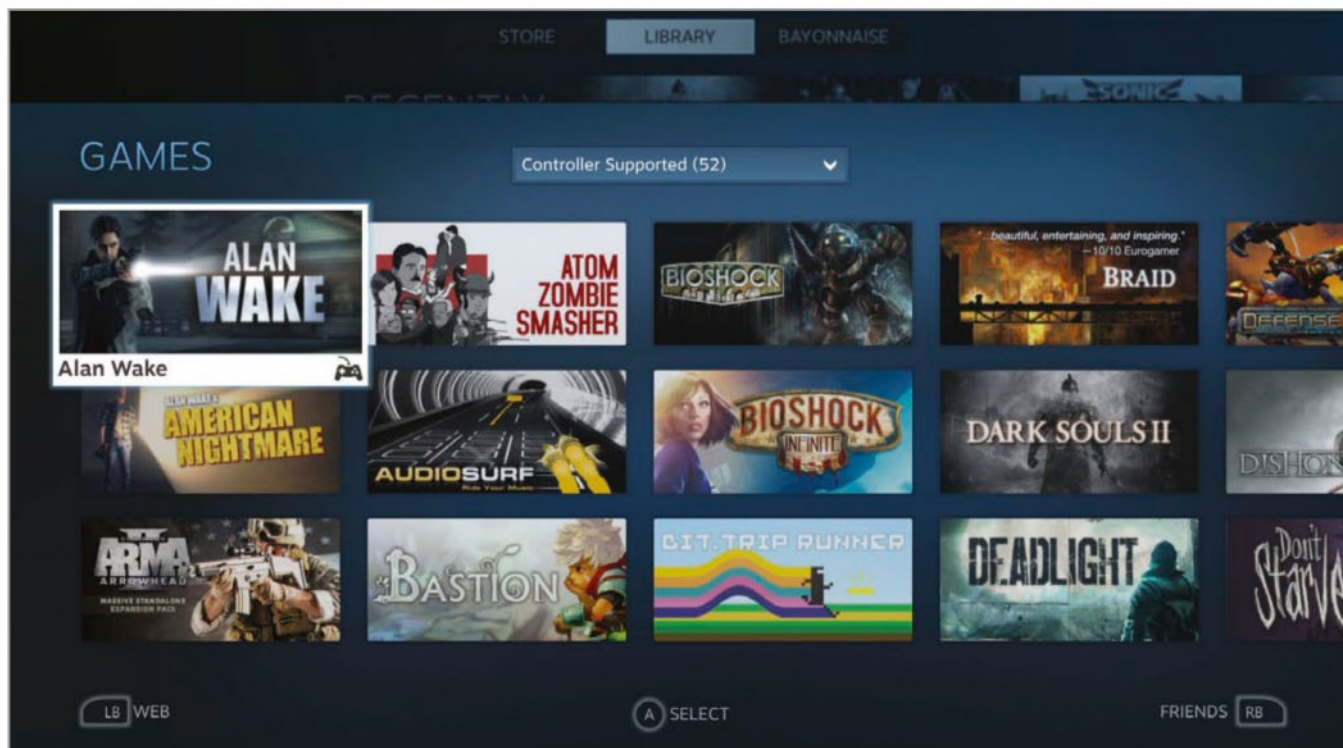
In a personal tale of woe, my own study is upstairs from our apartment's cooking area; it's all rather open, too, so steam and lovely food smells tend to drift straight upstairs. That's okay, but the grime build-up that comes with it is not. And it even gets into your case - a lovely, fine layer of more or less oily grit on every single surface.

So when we say filters are good, and keeping them clean is better, we really do mean it from hard-won experience.



# HOW TO: How to build your own Steam Machine

DON'T WANT TO WAIT UNTIL NEXT YEAR TO TEST DRIVE VALVE'S NEW GAMING OS FOR FRONT-ROOM PCS? **DAVID BAYON** BUILDS A BESPOKE STEAM SYSTEM



It's difficult to imagine PC gaming today without Steam. Valve's software platform has grown into an indispensable entertainment hub, with more than 75 million active users and almost 3,000 titles.

Today, Steam is synonymous with both the playing and purchasing of PC games, and Valve isn't finished: it wants our living rooms as well. Enter the free SteamOS, due to be sold on dedicated console-style hardware from next year - but available now as a downloadable beta to install on your own hardware.

If it looks familiar, that's because it is. Since late 2012, gamers have been able to switch Steam to Big Picture mode, which replaces the text-heavy interface with a larger, more visual approach designed to be navigated

using a controller. It was a smart move that made Steam more accessible to sofa gamers. On the face of it, SteamOS looks like more of the same, but there's far more to it than that. The slick surface hides big internal changes, none bigger than the fact this

**“Don't be surprised if Netflix and Spotify find their way into the SteamOS interface”**

implementation of the Steam platform isn't a Windows application - it's an entire operating system based on Linux. The current focus is gaming, but Valve hopes to develop SteamOS into a general entertainment platform: the project website reveals that the

developer is already “working with many of the media services you know and love”, so don't be surprised if the likes of Netflix and Spotify soon find their way into the SteamOS interface.

Like all Linux-related projects, the decision to move in this direction has both good and bad points. The big downside is that any games you've bought on Steam for Windows or Mac almost certainly won't work on SteamOS. Valve is encouraging developers to port their games across, but since Linux has a comparatively tiny userbase, it's a tough sell to the big studios. The situation will surely improve over time, and it's possible to work around the problem using a technology called In-Home Streaming, which we'll discuss later. Right now, though, fewer than 500 games run



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◀ Gigabyte's Brix Pro comes with a motherboard, a processor and integrated graphics – just add a hard disk and RAM

natively on SteamOS, of which very few are genuine big names.

The upside of Valve's approach is flexibility. You can run whatever software you want on your Steam Machine (see Beyond gaming, p88), and from next year you'll be able to walk into a high-street shop and choose from any number of pre-built SteamOS systems to suit your needs and budget. Alternatively, you can download SteamOS right now, install it on a PC of your own and get started.

## BUILDING YOUR OWN STEAM MACHINE

The beauty of the Steam Machine concept is that, unlike a traditional gaming console, you're free to mix and match hardware. Building your own, whether by repurposing an old PC or putting one together from parts, can be an ongoing project, with faster components gradually brought in as the demands of the latest games increase over time.

If you're the kind of tinkerer who

has tech lying around the house, a good way to get started with SteamOS is to recycle an old PC wholesale. The OS has a short list of hardware requirements: you'll need a 64-bit processor, which has been standard for the best part of a decade, at least 4GB of RAM and, officially, a 500GB or larger hard disk – although we've seen reports of successful installs with as little as 100GB. Hitting these requirements shouldn't be difficult: RAM is cheap these days, and a new 500GB 2.5in hard disk shouldn't cost more than \$60. As for graphics, the initial beta release of SteamOS in December worked only with Nvidia chips, but AMD and Intel GPUs are now fully supported.

The biggest issue may be the motherboard. The official SteamOS installers require a modern UEFI boot system for setup; if your motherboard is more than a few years old, you won't have this. There's a workaround, however, via an ISO that lets you install SteamOS from a DVD drive

using an old-school BIOS. This isn't featured on the install page, but it can be downloaded from <http://repo.steampowered.com/download/>. Be warned: this release has received "very little testing", so stick to the recommended methods if possible.

If you're building a new PC for use as a Steam Machine, consider hardware that's suitable for a living room. Ideally, you want the case to be small enough to sit comfortably next to a Sky+ box, and the whole thing has to be quiet, which puts a firm ceiling on the size and number of fans allowed for cooling. Finding the right balance between performance and front-room friendliness is tricky, so don't expect to easily knock up a dirt-cheap Steam Machine that's more powerful than the latest generation of consoles.

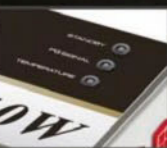
There are some very good compact cases from which to choose. At the extreme end of the scale, you can find units barely larger than a 17cm mini-ITX motherboard: SilverStone Petit and Akasa Euler are good examples. The limitation of such cases is that there's no space for a discrete graphics card. Since SteamOS is (for

**“The graphics card will likely be the main source of heat and noise within your chassis”**

now, at least) focused on games, you may prefer to consider a case such as the SilverStone Sugo or Cooler Master Elite 120. These mini-ITX cases offer extra space lengthways for a PCI Express graphics card and include the larger power supply you're likely to need. If you're thinking of moving your Steam Machine from room to room (or from house to house), another option is the BitFenix Prodigy, a hugely popular mini-ITX case with a built-in carrying handle and enough room for high-performance components. Its height means it will sit next to the TV rather than below it, however.

Gamers may instinctively gravitate towards a powerful GPU, but the graphics card will probably be the main source of heat and noise within your chassis, and there's no point going overboard with muscle you won't need. If your target display is a 1080p TV, there's no need to buy a card that can throw out advanced lighting effects at 4K resolutions. Mid-range cards such as the AMD Radeon R9 270 or the older

◀ Classic 3D shooters are in short supply on Linux – at present, fewer than 500 games run natively on SteamOS – but if quirky indie games are your thing, you'll be well served



PSU status monitor

Cable management



## What the critics say:

The Thermaltake Toughpower XT 875W offers a great combination of features, aesthetics, quality, versatility, and performance. If you're a person that appreciates quality design and construction, then the Toughpower XT 875W will not disappoint you. – Pure Overclock

Radeon HD 7850 can handle today's games at Full HD resolution. If you're happy running games at Medium detail settings, you could step down to a more modest card such as Nvidia's GeForce GTX 650.

More casual gamers don't even need a discrete card, as many older or less

## "If you've used Steam's Big Picture mode, you'll know what to expect from SteamOS"

mainstream games will run well on integrated graphics. All-in-one systems such as the Intel NUC or the Gigabyte Brix Pro come with a motherboard, processor and integrated graphics as standard - all you have to do is add a hard disk and RAM. Since the Brix Pro features the powerful Intel Iris Pro Graphics 5200 GPU, we used this as the basis of our own DIY Steam Machine.

### SETTING UP THE OS

Since SteamOS is still in beta, we recommend you don't install it on a PC you use every day. Don't worry too much, though: the system works well right now, even if Valve doesn't yet view it as quite "finished" enough to push out to less tech-savvy users.

Assuming you have a UEFI motherboard, there are two easy ways to get going with SteamOS, both of which are detailed and hosted at <http://store.steampowered.com/steamos/buildyourown>. These builds are updated regularly, so be sure to check the "discussions" link for the latest advice.

The first method, which Valve calls the Default Installation, automates the hard work, but it requires a destination drive of at least 1TB for the image to install successfully. To perform this installation, download the 2.3GB file and unzip it to a FAT32-formatted USB flash drive, then simply pop that into your intended Steam Machine and boot from it. When the SteamOS setup screen appears, choose Restore Entire Disk, then reboot the machine when the process is complete. Given suitable hardware, setting up a Steam Machine is as simple as that.

The longer method - called Custom Installation - uses a custom Debian installer, so we recommend it only if the capacity of your hard disk is too small for the first method, or if you're comfortable with a Linux terminal and want more control over partitions

## BEYOND GAMING

SteamOS focuses on gaming, but that isn't all it can do. The main interface features a web browser with an innovative "first-person" approach, in which you move the whole page around a central crosshair. It takes a bit of getting used to, but it actually makes browsing the web rather practical - if not exactly enjoyable - using a controller.

If you want to be more ambitious, SteamOS allows you to switch to the Linux desktop. This opens up the OS to far more than games and clunky browsers: since SteamOS is based on Debian 7, with a bit of know-how you can quickly install whatever Linux programs you like.

If you're looking for a general-purpose OS for your living-room PC, however, SteamOS isn't your only choice. You can always install a regular distribution such as Linux Mint or Ubuntu and use the generic Linux Steam client for gaming, since games that run natively in SteamOS will work in this client as well, and even In-Home Streaming should work just fine.

and installation options. Since we've equipped our Gigabyte Brix Pro with only a 250GB hard disk, we're using this method.

At around 1GB, the Custom Installation is a smaller initial download than the Default Installation. Again, start by formatting a USB flash drive as FAT32 and unzipping the files onto it, then boot from it. If you're feeling confident, you can choose the Expert Install option and configure dual-booting and partition sizes, but we're going to choose Automated Install to handle the bulk of the setup process.

When that's done, the system will boot into the Debian desktop and - once you've connected to the internet - automatically download and install the latest SteamOS build files. The system will restart and a partition manager will create a recovery partition, after which you can select the Reboot option to complete the process. From here onwards, it's much like installing any OS; you run through some basic setup menus and sign in to SteamOS with your Steam account login.

### MEET STEAMOS

If you've used Steam's Big Picture mode, you'll know what to expect

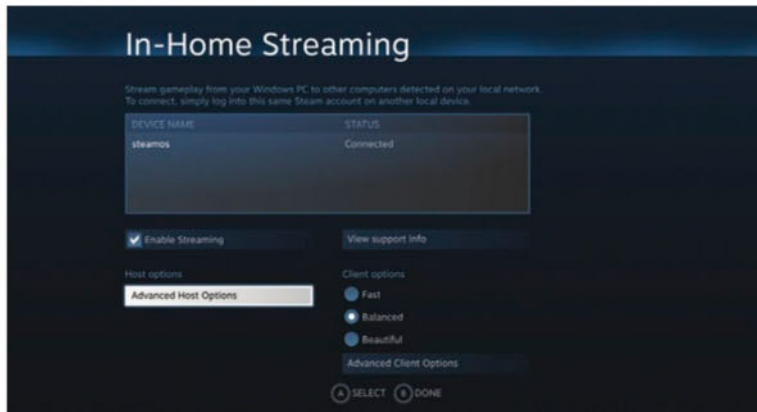
from SteamOS. The main menu is a simple three-option affair, with big buttons to take you to the Steam Store, your games library and your profile. The first thing you'll want to do is head to your games library and set the dropdown filter to display only SteamOS-compatible games. You can install these with a click, or buy more from the store, which rather teasingly neglects to apply the SteamOS filter on its promotional carousel.

Getting around with a mouse is fine, but the interface is more suitable for use with a console-type controller, and Valve has its own innovative Steam Controller in development. Unlike almost every other gamepad on the market, it ditches the traditional thumbsticks in favour of two circular, clickable, high-resolution touchpads that - according to Valve - can more closely replicate the fine control and precision of a desktop mouse. They also provide haptic feedback so as to send more information to the player than the rumble packs of current controllers. We'll find out how well this really works when the first Steam Machines arrive later this year (see The machines, opposite).

► Valve is developing the Steam Controller, which features two high-resolution touchpads







▲ In-Home Streaming lets you outsource the legwork to a Windows PC

For now, you can plug in a standard Xbox 360 controller – or indeed any USB controller that works with Steam. Menu options are automatically restyled as button prompts, and you'll quickly get the hang of swishing back and forth through menus as you would on any console.

As for gaming performance, we found the Brix Pro proved quite capable. With its Core i7-4770R processor and Intel Iris Pro graphics, it breezed through the ageing Half-Life 2 and Portal at 1080p, and did a sterling job with the surprisingly addictive Euro Truck Simulator 2. Since there are few cutting-edge SteamOS titles, it's difficult to test more demanding games in the native environment, but, running Windows 8 on the

Windows games, each with a Steam button where Play would normally be.

Valve recommends at least 802.11n Wi-Fi to use In-Home Streaming; sadly, even though our network met this requirement, we found the experience suffered from input lag, choppy sound and intermittent freezing. Once we switched to wired Ethernet, the experience was rock-solid. We were able to stream Dark Souls II smoothly at 1080p and the highest quality settings, and repeated the trick with several other recent titles. We occasionally noticed a split-second input lag, which could conceivably cause problems in very fraught scenarios, and minor compression artefacts were visible in busier moments. Overall, however, we didn't encounter any serious problems.

As well as a fast network connection, In-Home Streaming requires a client system with hardware acceleration; virtually all recent laptops and PCs tick that box. Also, the game runs in full-screen on the host system, which isn't exactly an efficient way to play. However, it raises the compelling prospect of ultra-cheap Steam clients that don't need the power to run games themselves – and, dare we predict, potentially a Steam online streaming service at some point.

**“The software's slick and stylish TV interface is a match for any current console”**

same hardware, we were able to get Battlefield 4 running smoothly at 720p with Medium detail settings.

The lack of Linux-compatible games is a major issue for SteamOS, but Valve has produced a workaround: In-Home Streaming. This feature, which entered open beta at the start of May, lets you outsource the legwork to another PC running Windows but display and control the game from your Steam Machine.

To test this, we set up a fairly powerful Windows PC (Intel Core i5 processor, 4GB of RAM, AMD Radeon HD 7850 graphics) on the same home network as our Gigabyte Brix Pro running SteamOS. Upon starting Steam on the host system, the Brix Pro's Installed list immediately filled up with

## THE VERDICT

SteamOS is a bold attempt to take the fuss out of PC gaming and extend its reach beyond the techie crowd. The software works well, with a slick and stylish TV interface that's a match for any current console. Once video services and other apps round out the entertainment on offer, it will have genuine potential.

Will the dedicated hardware side of things catch on? We're not so sure. The Brix Pro we used excludes storage and RAM, and, with its integrated graphics, it's at the bottom end of what we'd consider a viable Steam Machine.

## THE MACHINES

Valve won't be making Steam Machines itself; instead, it has invited third-party manufacturers to come up with their own designs. Due next year, the early designs we've seen have been a mix of insanely powerful monstrosities and cleverly constructed living-room boxes – and since there's no need to pay for a Windows licence, some are even affordable.



Take the baseline CyberPowerPC Steam Machine (top), expected to offer an AMD A6 processor and AMD Radeon R9 270 graphics, plus 8GB of RAM and a 500GB hard disk. If it makes the journey to Australia prices unscathed (which it inevitably won't), the US\$499 tag makes it an appealing console alternative.

At the other end of the scale, witness what can happen when a manufacturer goes overboard. The Origin PC Chronos Steam Machine (below) looks like an amplifier and houses a pair of 6GB Nvidia GeForce GTX Titan graphics cards, providing vastly more power than a 1080p TV will require.

There's no price information yet, but Origin is offering it as a dual-boot system, perhaps acknowledging that SteamOS alone can't justify a huge investment.



When dedicated devices arrive next year, it's expected the manufacturers will aim for console prices, but even that's a questionable proposition for a device with limited games support and an uncertain future – after all, the PlayStation 4 and Xbox One are here now and guaranteed to run the latest Call of Duty and FIFA releases.

A new platform will always need time to build up a software library, and there's no reason why SteamOS can't rise to compete squarely with the established consoles. Today, it's great for making use of a spare PC or assembling a living-room PC. ■

## HOW TO:

# How to create a website quickly with Website X5

LOOKING FOR A PROFESSIONAL-LOOKING WEBSITE? **DARIEN GRAHAM-SMITH** TRIES OUT A USEFUL APPLICATION THAT CAN CREATE ONE IN MINUTES.

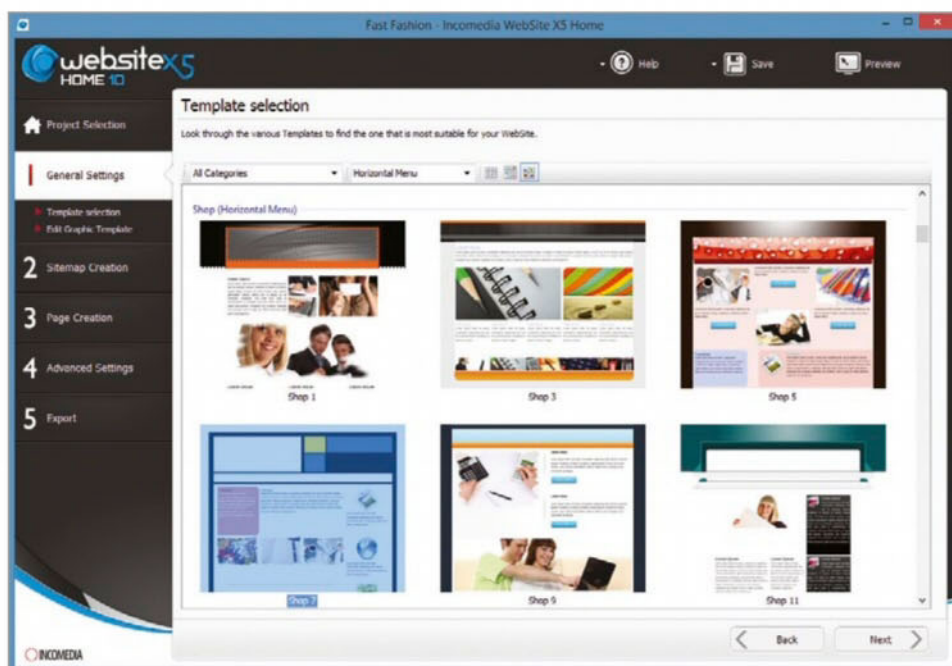
Incomedia Website X5 Home 10 is a website-creation tool with the emphasis on speed and ease of use. It can help you put together a professional-looking site in a matter of minutes, without having to write a line of code. Building on a library of hundreds of templates, it provides an easy, visual way to assemble pages, menus, slideshows and more – and it's free with the software download issue of this month's *PC & Tech Authority*.

## GETTING STARTED

Once you've installed and registered Website X5, the first time you start up the program you'll see a Start page, from which you can view tutorials and other resources – or dive in and start creating your website. If you have time to spare, the 12-minute video tutorial gives an overview of the program's capabilities; alternatively, click on the Website X5 Gallery to view a selection of real-world websites created with the software. This will give you an immediate feel for the sort of layouts that can be created, and may provide some inspiration for your own site.

When you're ready to start working on your own site, click the Start button to access the main Website X5 interface. This is arranged as a five-step process, corresponding to the stages of creating a new site. In practice, you'll likely end up hopping back and forth through the steps as your website takes shape, but the linear framework keeps things focused.

Once you've made one or more sites with Website X5, they'll be



available to edit in the pane at the bottom of the window. Since we're starting from scratch, we'll enter a name for our new project – in

**“The default templates are divided into categories such as Sport, Nature and so forth...”**

our case, a site for the fictional Complicity Consulting Services – and click Next to kick off the creation process.

## GENERAL SETTINGS

The first thing to do is enter a few details about your site, including the title, description and keywords – these will help visitors find it through search engines. This is also where you enter the address of your website. This edition of Website X5 doesn't handle the process of registering this address for you, nor provide hosting for it, but there are plenty of companies out there

that can set you up. Alternatively, you can upgrade to the Evolution 10 edition of the software, as we'll discuss below.

At the bottom of this window, you'll see the option to upload a website icon, also known as a “favicon”. This is a square graphic that will appear in your browser tab (like the Amazon “a” or the Facebook “f”). You can create this in any image editor, such as the free Paint.NET (also available with our software download edition, or visit [www.getpaint.net](http://www.getpaint.net)). Don't worry about the size; Website X5 will shrink your image to the standard 16 x 16 scale.

Click Next to advance to the template-selection stage of the process. There are 250 designs to choose from, with either horizontal or vertical navigation bars. The default templates are divided into categories such as Sport, Nature and so forth, but there's no need to restrict your choice of design to the relevant categories. You can download additional templates





at <http://tinyurl.com/l5jfxlp>. In our example, our imaginary IT consultant has chosen the Nature 2 template; another click of the Next button takes us to the Edit Graphic Template page. Two tabs along the top let you switch between editing the header and footer, and a toolbar lets you insert text or overlay an image onto the background; these can be dragged into position with the mouse. The lower pane lets you adjust the appearance of these elements to suit your preference.

While making changes, you can click the Preview button at the top of the window at any time to open a preview of your site – exactly as it would appear to a visitor – in a preview browser. You'll probably want to hit this button regularly as you develop your pages.

## SITEMAP CREATION

Now that we have the general look of the site worked out, the next thing to do is plan out its structure. Website X5 uses a hierarchical approach, so you can create top-level pages – which appear as clickable links in your page's menu – and submenus that appear when the visitor moves their mouse over them. This edition of Website X5 doesn't support multiple levels of submenus, but if you need that ability you can upgrade to an edition that does.

Another limitation of the Home edition is a maximum of 25 pages per project. For most small businesses and personal projects, this should be ample – as splitting information across too many pages makes it harder to find.

You can come back to this page at any time to add or reorganise pages, so don't worry about perfecting

your sitemap right away. However, one thing you may want to do is click on each page in turn and select Properties to enter a page description and keywords; again, as this also helps web searchers find your page. You can also change the titles of your pages from this window if you don't want them to be the same as the menu items that link to them.

One of the biggest challenges in web design is organising the content of each page into a clear, attractive layout. Website X5 handles this with a grid-based approach. By default, the content area of each page is divided into a two-by-two grid, each cell of which can contain text, an image, a video, a Facebook "Like" box and so forth. You can add and remove rows and columns using the buttons above the grid display, and populate them by dragging objects from the right-hand pane into the desired cells. To span an element across multiple rows or columns, simply drag its handles to expand it.

Once you have a layout you're happy with, select an object within your page grid and click Edit to specify its actual content. In the case of a text object, this opens a simple text editor. You can type or paste your text into the main field and use the formatting toolbar along the top to tweak its font, size, style, colour and alignment. If your text is going to appear on a dark background, click the far-right icon in the top row; this toggles the editor background between white and dark grey. The icon next to it wraps your text to the width of the cell in which it will appear, so you can get a better idea of how it will look on the page.

To insert a hyperlink in your text, highlight the relevant text and select the Insert Link button. You'll see options to select a page from within your site, a remote file, URL or an email or Skype address. You can also set a link to trigger the browser's print function or show a message box, and if you click the Description tab you'll see the option to set tooltip text that will appear when the visitor moves their mouse

## “Organising content is a breeze with Website X5's grid-based approach”

over the link. Do this with an image object and you'll be prompted to upload an image from your hard disk or fetch one from a specified URL. You can also give your image a title and enter some alternative text that describes it.

It's good practice to fill these in; although not many people these days are browsing on text-only computers, this information can be helpful to visually impaired visitors using screen-reading software, and it also gives search engines a better idea of what's on your site. Clicking the Edit button opens a new view that lets you crop and rotate your image and adjust its colour balance and exposure.

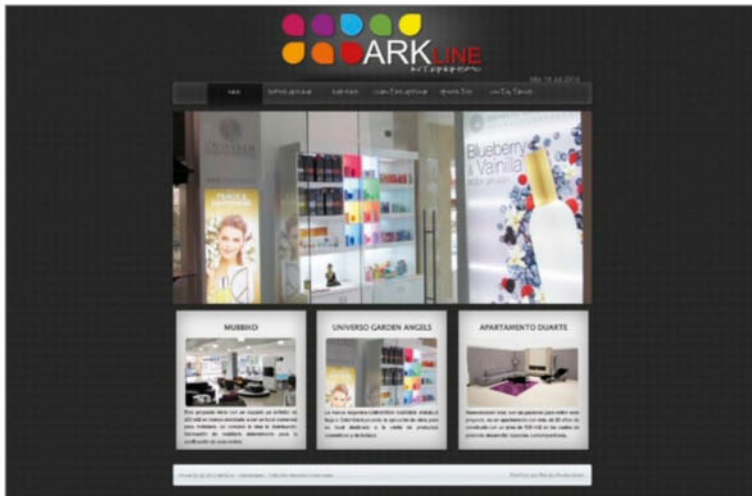
You don't get a wysiwyg view of your page as you make these edits, but you can see a preview of what each cell contains by simply clicking on it – and you can always click the main Preview button to test your whole site.

Once you've set up the content for your first page, clicking Next will move you onto the next page in your site and so on. If you're working with a site of many pages, this can become a little tiresome; an alternative way of getting to a specific page is to switch to the Sitemap Creation view and then double-click on the page you want to edit.

When your pages are all filled with the requisite text and images, it's time to apply the final touches. Two of the options in the Advanced Settings pane let you tweak the appearance of the menus. You can edit the size, colour and typographical appearance of items, and also determine how they behave when the mouse pointer is moved over them. Don't miss the Menu Items tabs at the top of the Main

◀ Website X5 is used by all manner of individuals and companies; you can browse a directory of real sites created using the tool on its website





Website X5 is as powerful as it is versatile, here's one more site created using this software.

format, so you can then move it across to a different computer running Website X5.

The sites you can create with Website X5 are slick and functional enough for a huge range of uses; if you need more versatility, you may wish to upgrade to the Evolution 10 edition, which retains the simple approach of the Home edition, but adds more advanced features including tables and graphical slideshows. There's also support for email forms and mouseover effects, plus a library of 6,000 royalty-free images to use in your sites. This alone is a relatively rare inclusion in a website package, so dive in and take full advantage. We have had a look through many of these images, and the variety is healthy. Sure, there are a few cheesy clip-art-style images, but used wisely even these can add a lot of personality to an otherwise uninspired site.

Website X5 Evolution 10 also comes with a domain and 30GB of web space for 12 months, which should be ample for most needs, even image or generally file-heavy ones. It all adds up to be an interesting proposition, so start building your site! ■

Menu and Drop Down Menu settings pages; these give you an extra degree of control.

Also under Advanced Settings is a page of options for Styles and Models; these let you customise the general appearance of text and links. In the Tooltip tab, you can set the appearance of any tooltips you've set up.

When you're happy with this, it's a good idea to hit Preview and take a last look over the site. Then, move onto the fifth step, Export. The

default option is to upload your site to the internet; if Website X5 doesn't know your server details, you'll be prompted to enter them.

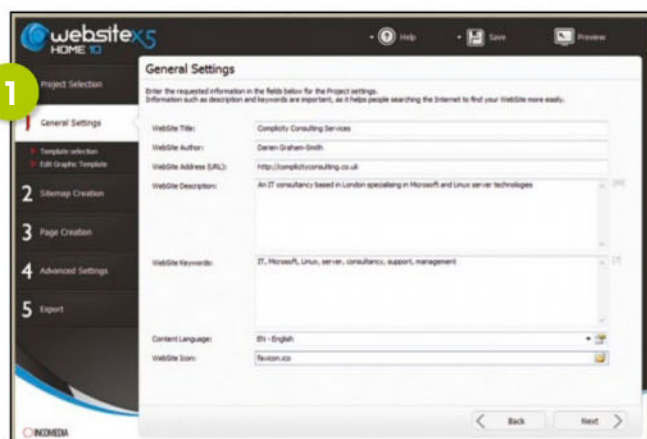
If you prefer, you can export the site to a local disk location. One reason you may want to do this is to edit the HTML code before it's uploaded, so you can, for example, insert a code snippet for tracking how many people visit your site, if you're signed up to such a tracking service. The final option exports your website in Website X5's own

**Ranked in  
the *top 1%*  
of the world's  
universities, an  
IT degree from  
Monash can  
*take you further.***

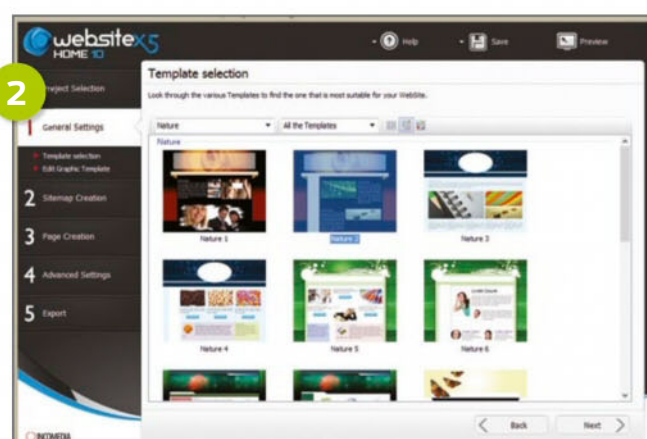




## ▼ WALKTHROUGH Create your first website with Website X5



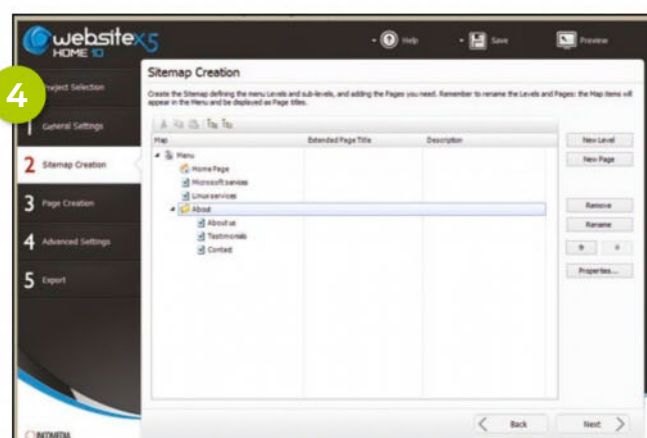
▲ Start by entering a few basic details about your website. Filling in the Website Description and Keywords fields can make it easier for people to find you on search engines, so it's worth taking a moment to think about how you want to present your site to the great and the good of the web.



▲ You can filter the available templates by theme, and by whether they use a vertical or horizontal menu bar. Don't worry too much about finding the perfect fit right now; you can come back to this page and switch templates at a later date – your site will be updated instantaneously.



▲ The header and footer will appear on every page of your site. It's a good idea to put contact details and other information in the footer, since this means visitors never have to search for it. You can overlay graphics and text onto the background template to stamp your own character onto your site.



▲ It's easy to plan out your various pages and decide how they fit together. When you preview or upload your site, a menu will be generated automatically that reflects your arrangement. Don't forget to set descriptions and keywords for all the important pages of your site.



▲ Website X5's grid-based approach puts everything in its place without any need to worry about the intricacies of CSS layout, guaranteeing a clear, attractive layout. Simply create a grid to suit your content, then drag your chosen media into the appropriate cells to populate the page.



▲ Hit Preview to see your handiwork. If you're happy with it, click Export to upload it to the live server, or write it out to disk for any final tweaks, such as the addition of a code snippet for tracking purposes. We managed to put together this respectable-looking front-end in a matter of minutes.



# ***The best reason to buy an iPad***

Your other favourite technology magazine now has an iPad edition featuring everything you love in the magazine plus exclusive extras each month including additional photography and video. Change the way you view your tech. Head to iTunes now to download the app.



# Antivirus is still a mess

**JON HONEYBALL** FINDS THAT THERE IS SUCH A THING AS TOO MUCH SECURITY – AND THAT SOME FORMS OF PROTECTION CAN BE OF NO HELP AT ALL

**S**ometimes I believe it would have been better to tell my friends down the pub that I work as a gynaecologist or a geologist, rather than someone who does things with computers. That really would have made my life much simpler. Last Friday, my good friend Mike came up to me, pint in hand, and asked: "Is there anything that can be done to make my laptop stop grinding away so hard on its hard disk?" Well, yes – there are quite a few things to try, but the most important is that I'll have a nice ale to start.

Actually, to be honest, I really don't mind it too much when good friends turn to me to help dig their computer out of a hole. It's a whole lot better than taking the sick machine to some "yoof" with a skin problem in a retail-park emporium, whose first reaction is almost certainly going to be wrong, and will involve lots of sucking air through his teeth, while muttering: "I fink you'll be needing a new laptop." And, in addition to the warm inner glow bestowed by being a good Samaritan and friend to someone in need, it's often quite instructional to witness firsthand just what can happen to a real computer in the hands of a well-intentioned user.

Mike handed me a bag containing the offending Toshiba laptop, one that regular readers might remember as a previous star of this column: the one that got itself infected with a particularly objectionable bit of ransomware a few months ago. Yes, the same dreaded machine was back in my face, once again.

A few days later, after dinner, with not much on TV, I decided to fire up the ailing Tosh to get some idea of the size of its problems. To say that it was slow is an understatement – it struggled to get as far as the Windows desktop, then took forever to do anything else at all. Truly, this was a laptop that had its paws stuck in treacle. You may remember how, in the previous episode of the ongoing saga of this wretched machine, it was hit broadside by some nasty ransomware that had managed to get straight past its fully up-to-date antivirus program.

As a result of that experience, Mike had decided to change vendors for his defensive software, and the laptop now had a full AVG installation. Yet a quick look revealed something deeply wrong with this setup, with warning messages that showed it wasn't really doing anything at all – and it hadn't updated itself in many months, despite having a full and current licence.

At this point, one's immediate guess was that this machine was suffering the effects of some other nasty piece of malware, which had managed to knock the incumbent antivirus solution for six, so I went

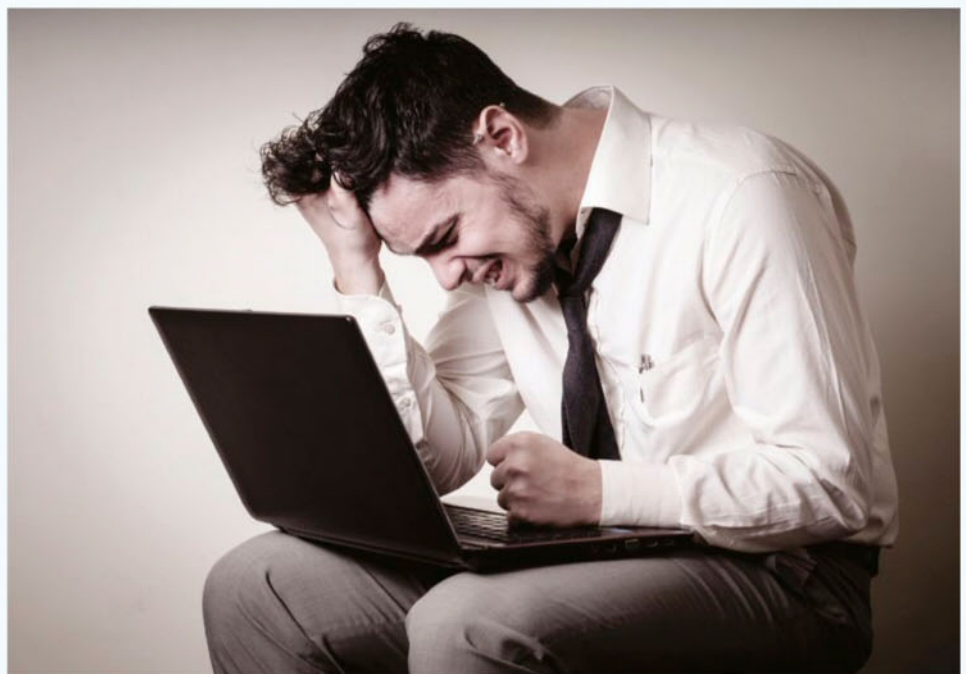
over to the Microsoft Security Essentials (MSE) website and ran its in-place scanner. Opinions may differ about this product, but at least it's a known quantity, and I find it to be a good place to start. But it found nothing, after churning away on the hard disk for ages. Hmmm...

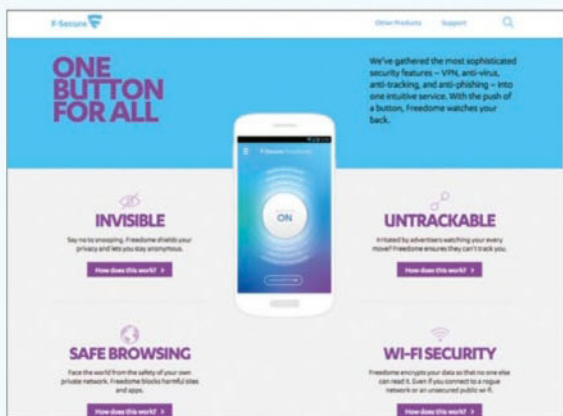
The next thing was to look at the processes in task manager and applications currently running, which is always a good starting point before diving into the power tools at Microsoft's Windows Sysinternals site. Hold on a minute – why was there a process running that claimed to belong to McAfee when this computer had AVG installed? Some further digging showed the McAfee process belonged to tools that came from BT NetProtect Plus, and a quick phone call to Mike unveiled that he was now on BT Broadband and it had been suggested that this was a good thing to install. Well yes, it might have been, if you had nothing else installed. But this computer had a full installation of AVG. And what's this? MSE too? To clean things up a little, I ripped out the McAfee/BT products and MSE, but I still couldn't persuade AVG to work – it continued to complain that required services

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Telling my friends I worked as a gynaecologist would have made my life much simpler

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weren't running. A check of the Services function in Windows showed that there was indeed a key AVG service that should have started automatically, but wasn't actually running.

Trying to start it manually failed, with an error message flashing up, at which point I decided it was simpler to remove AVG off the computer altogether and build it back up from there. However, AVG refused to uninstall - it fell over during the uninstallation process, saying that I didn't have the necessary rights. Normally I'd lose patience at this point and start ripping through the Registry, nuking everything, but I decided to check out AVG's website and found some tools there that should reset the permissions on all the components. After running these, it still wouldn't work, but I could at least uninstall it.

Finally, Mike's machine was clean, and incomparably more sprightly than when he delivered it to me, but there was something else lurking - something called a "Xacti inbox toolbar". A quick Google showed that this was some sort of search-engine toolbar. It definitely wasn't needed, and neither were the other three web-browser toolbars I found. After yet more purging, the machine was finally back to a truly clean state. Neither Mike, nor any member of his family, had done anything wrong: they had merely followed various reasonable recommendations that managed to turn a fairly capable (if somewhat tired) Toshiba laptop running Windows 7 64-bit into a stumbling nightmare. That it's possible, even easy, to get caught out so badly in 2014 is something that someone, somewhere, should be very ashamed of. The AVG vendors?

▲ Freedom fell short when it came to identifying "bad" websites such as this one



This search-engine toolbar wasn't needed, and neither were the other three I found



**JON HONEYBALL**  
Computer journalist and consultant specialising in both client/server and office automation applications.

Perhaps. Microsoft? Maybe. But things shouldn't still be this bad.

## MICROSOFT SURFACE PRO 3

I'll confess I wasn't at the recent launch event of the Surface Pro 3 - I'm not invited to these things any more. The web has been full of Microsoft apologists gushing about the ways in which this is a game-changing device, and how it will make us rethink the way we work with toasters and small dogs. Or something like that. I've used both the ARM and Intel versions of the first two generations of Surface pretty extensively - in fact, right up to the point at which my impulse to throw them all out of the window became too threatening to my new premises. Too heavy, too awkward, wrong aspect ratio, poor connectivity, and keyboards that wouldn't have been out of place on a child's toy. Oh, and with a pen that could be latched on only if you didn't have the power plugged in at the same time. And if you wanted to use them on your lap, you definitely needed legs longer than mine...

The new one does look better - lighter, a better aspect ratio and a better kickstand. That "look ma, no moving parts!" keyboard appears to have been consigned to the dustbin, but there's still only a singular USB socket. And I appear to still have the same 29in inside leg I had before. The price, however, has gone up, right into that stratospheric region where only Apple seems to be able to breathe: \$1828 for the specification I'd require, including a keyboard. This is no small amount of cash for a Windows laptop, and a huge amount for a tablet. You know, I may just hold my fire a little longer to see whether the long-rumoured iPad Pro will be released, or whether it's just a figment of someone's imagination.

## F-SECURE FREEDOME

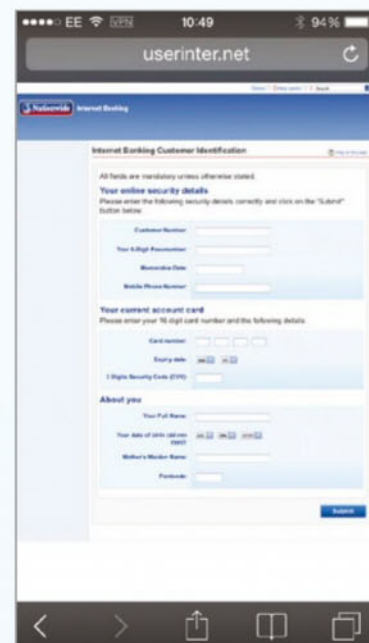
A few years ago I had lunch with the CEO of a large, well-known and respected company. Over dessert I mentioned that they really ought to bring together their cloud assets and other management technologies into one package, and make it possible for a home user to set up a simple virtual private network (VPN) tunnel into a cloud-based data centre, where the company would be running all the necessary content, scrubbing, caching, anti-virus work and so forth. The customer could then sit happily at home, or at a web café, safe in the

knowledge that their connection to the internet was actively clean and monitored. The CEO loved this idea and said they'd organise for me to visit them in the US to talk to their engineers. Nothing came of it, but I still thought the idea had merit.

So imagine my delight at discovering that F-Secure was thinking along exactly the same lines with its new Freedom product. Install this onto your computer (initially for iOS and Android only, but with Apple OS X and Windows coming shortly) and you can tunnel into its data centres around the world. There, your connection could be anonymised, cleaned and scrubbed to perfection. Clearly, this was something I had to try out, so I downloaded the iOS version onto my phone and set it up. The user interface is designer-weird, by which I mean that it was clearly designed by someone who knows how to make something that looks interesting but which is unfortunately a pig to actually use. The setup process is equally unusual, requiring me to install a profile into my iPhone. However, it seemed to work and I could set it so that I appeared on the internet to be in the US or some other place.

Then the problems started - connections started dropping, web browsers didn't function, emails stopped flowing. Turning Freedom on and off again didn't help. Uninstalling

▼ Freedom is marketed as a security and privacy solution, cleaning and monitoring your internet connection







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The inflated claims of the antivirus industry of the past won't work in this new era

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it immediately returned my iPhone to normal operation, and reinstalling made it work again, in its VPN-tunnelled fashion, right up to the point where it decided to stop working again.

One of the features it claims is that it will protect you from phishing and other nasty browser attacks so, sitting at my desktop, I looked into my email spam folder and pulled out an email that was a few hours old. It was a typical banking phishing attack, telling me to log into my Nationwide bank account to verify my details. The link took me to a site that clearly wasn't Nationwide, which Google Chrome immediately identified as a bad site. I took its URL over to my iPhone and tried it there and, despite Freedome claiming it was working, this bad website appeared immediately on my phone and asked me to enter my password and banking details. That's when I uninstalled it for the final time.

I still like the idea behind Freedome, since I'd laid out exactly the same design idea to that company years ago. It has huge merits and enormous potential, but it requires a 100% level of trust from the user. The very first time it trips and falls is the point at which that customer walks away, never to return. The somewhat inflated and bombastic claims of the antivirus

industry of the past won't work in this new era of cloud services.

I raised all these points, and others, with F-Secure's PR agency and tech support via emails, and they protested that the configuration problems were down to Apple, because it transpires they're actually using Apple's VPN technologies. Regarding the configuration issues, they said: "Good points. Some of 'em are at least 99.99% on Apple, though." To which, my response is: "Hmmm." Regarding the unacceptability of their anti-phishing capability, or lack of it, they said: "We have issues, too, and we will fix those that are in our hands to fix." I'll return to this in a few months, to see what progress they have made.

### AJA BLU-RAY RIPPING

Last month I mentioned the extremely tasty Aja Io 4K interface box that I'd added to my Mac Pro. This device offers video input and output in HDMI 2 at up to 4K/60p, along with a raft of other professional formats, such as serial digital interface (SDI). Last week in the lab, we were looking at the user interfaces on some Blu-ray players from a usability angle, and discovered that many of them were just as unpleasant and incoherent as those on so-called "smart TV" abominations, which are being foisted on the public by large companies that really should know better.

In order to document our judgements, it would have been useful to grab some stills. Aha, I thought, let's put the Io 4K box in between the Blu-ray player and the TV - using its HDMI input and output sockets - to create a "man in the middle". Unfortunately, the 65in TV in question is on the other side of the lab from my working desk area, but the Io 4K connects via Thunderbolt, and I happened to have a spare 20m Thunderbolt fibre-optic cable. I carefully strung this

▲ LEFT: Many Blu-ray player UIs are unpleasant and incoherent; above is an example of a Sony Blu-ray player's menu captured live  
RIGHT: The "man in the middle" was successful - a Blu-ray movie caught via the Aja Io 4K interface box

across the lab, using the appropriate rubber floor mats to keep health and safety at bay, then fired up the Aja box - and it worked.

Back on the Mac Pro, I used the Aja software to set the box to pass-through, set the correct video modes for input and output, and there it was - the video running on my Mac Pro desktop. Press the record button and it was recording it to disk, too, in real-time. And what's that? Play an actual Blu-ray disc and that appears on my Mac screen too? And can be recorded? Now, the Io 4K box specifically states that it doesn't support copy-protected High-bandwidth Digital Content Protection (HDCP) feeds, but here it was, recording *The Hobbit* in Full HD resolution onto my Mac Pro.

Obviously I pressed "Stop" at this point, because recording anything like that would be a violation of someone's copyright and would definitely be wrong. But a person with fewer scruples than myself may find it a good way to make a perfect Blu-ray transfer. A polite Muttley-like snigger is in order, methinks. You could use HandBrake and do it all in software, but there's a certain elegance to just sitting the Io 4K box sweetly in the middle of the HDMI cable. ■

### 4K FOOLISH

Sony has announced its second-generation 4K media player box, the FMP-X10. I saw this at CES in January, and the first question I asked the suit guarding it was whether it would work with TVs other than Sony's - unlike the first version, which was locked to the company's hardware. I was assured this wouldn't be the case for the X10, and was sufficiently excited to place an order, only to be greeted by the following statement: "Compatibility: The Sony 4K Ultra HD Media Player (FMP-X10) is exclusively compatible with Sony 4K Ultra HD TVs. It is not compatible with 4K Ultra HD TVs from any other brand." Again, Sony's demonstrated that it's learnt nothing. Attempts to control the market have ended in tears before - and they will this time, too.

# DVD contents

Apps, essentials, full software, drivers & more!

**N**ot only do we have an exceptional collection of apps onboard the DVD this month, but for one of them – WebSite X5 – we've included a tutorial in the magazine's pages to get you up and running with this versatile software.

**A**s you will discover, Website X5 is a terrific app for building a site, even a complex one. If you have always wanted to have a go at creating a website but have, perhaps, been put off by the expense, then get going with Website X5, it's all yours. Perhaps, too, you already have a site, but are disappointed with its tools and updating it or adding new content is becoming a chore. Once again, give this app a shot and it may turn out to be the salvation you were looking for.



## WEBSITE X5 HOME

WebSite X5 Home is an easy-to-use WYSIWYG web design tool which can help you create websites, blogs, online stores, digital photo albums and a whole lot more.

Unlike many similar applications, WebSite X5 Home doesn't require web design experience or low-level knowledge of the technology. You don't have to edit HTML code or debug JavaScripts: instead, the program acts as a straightforward wizard, walking you through every step of the design process.

You start by choosing from 128 professionally-designed site templates – just browse a thumbnail gallery and select the one that suits your vision.

The next step is to build your site map, which defines the menu structure of your site. (You might have a top-level option

called "Tips", which leads to another menu with "Windows XP", "Windows 7" and "Windows 8".)

Designing individual pages is then just a matter of dragging and dropping different elements. You could add a simple text box and type into it to add whatever content you need, and it's just as easy to add images, videos or audio files, Flash animations, maps, and a range of social network gadgets (Facebook buttons, Google+ badges, AddThis "Share" options and more).

You can take a look at your work at any time with a click of the Preview button. The site may be fine-tuned with custom menus, colours, fonts and more. And once you've finished, the site can be saved to disk, or directly published to the web via FTP.



## Paragon Backup and Recovery 14 Compact - FULL VERSION

Paragon Backup and Recovery 14 Compact is an easy-to-use application which can back up anything you need protecting: from individual files and folders to entire hard disks and their partitions.

The program opens with a Windows 8-style launcher that's got colourful tiles to point you towards its various functions. You'll probably want to start by clicking "Backup", and this launches Paragon's "Smart Backup Wizard" to walk you through the process.

The wizard presents you with six main backup options. You can save your My

Documents folder, ask the application to preserve specific types of media files – including photos, songs and movies – or backup Outlook-based email archives. It's possible to save individual files or folders and entire hard disks.

Make your choice and there are one or two more questions to answer. Where would you like to save the archive? Should it be password-protected? Do you want to run the backup once, or on a schedule?

For the most part, though, it's all very simple, and you can have something like an Outlook backup configured in less than a quick and easy minute.





## Ashampoo Music Studio 4 - FULL VERSION

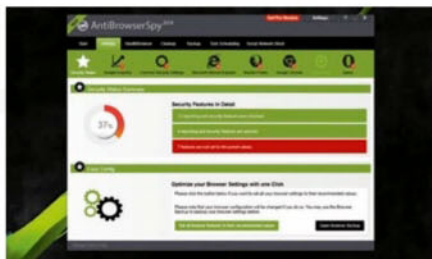
Ashampoo Music Studio 4 is a capable collection of tools which makes it easy to build, manage and share your entire music collection.

You might start by ripping some tracks from CDs, and saving them as WMA, OGG or WAV audio files. The program can also record files directly from a microphone, or the line-in of your sound card. And it can even strip the soundtrack from a video, saving it as a more convenient audio file.

If you already have plenty of music files, you might prefer Ashampoo Music Studio ability to edit them (cut, trim, copy, paste, fade and more). The Normalize tool helps you keep a consistent volume level across a set of audio files, while the Conversion option will convert particular files into a more usable format.

And there's plenty more. An Organize function will rename and relocate your files into a logical folder structure, so they're easier to find. There's a built-in tool for burning audio and MP3 CDs, and you even get a tool to help you design disc covers.

There are plenty of features to explore, then, but a well-designed interface ensures the program is very easy to use. The various functions are divided into logical categories ("Record", "Burn", "Edit Cover"); hovering your mouse cursor over an icon displays a tooltip with more details, and a series of helpful wizards walk you through everything you might want to do.



## AntiBrowserSpy 2014 - FULL VERSION

Every browser claims to protect your privacy online, and most do a good job - but only if they're configured correctly. That can be a problem, as the main browsers have plenty of privacy-related settings that are sometimes confusing or well hidden.

AntiBrowserSpy 2014 offers a quick and easy solution, instantly scanning your browser

settings, reporting any potential privacy risks and suggesting settings that would rectify these issues. Once you're happy, the program can optimize all your settings for each browser with a click, and you can also delve in and change individual settings yourself. It doesn't matter which browser you use, either - this tool supports Internet Explorer, Chrome, Firefox and Safari.

AntiBrowserSpy 2014 goes further with its own advanced options. The program's Social Network Block disables social network plugins - "Like" and other buttons - which may allow Facebook to track your online actions. Flash and Silverlight cookies can also be blocked, protecting you from even more tracking tricks.

Websites may also be able to identify you through your browser User Agent, a text string which lists your browser version, installed plugins and other details. But AntiBrowserSpy 2014's StealthBrowser feature changes the User Agent occasionally, making you appear to be someone else entirely.

Your web history can be another source of privacy problems. You probably know how to clear this already, but AntiBrowserSpy 2014 can simplify the process even further by deleting all your browser histories at once. Or you might set up the built-in Task Scheduler to automatically clean any part of your browser history, whenever you like.

Perhaps best of all, AntiBrowserSpy 2014 includes a very useful browser Backup tool. Exactly what it protects depends on your browser, but if you're running Firefox then it's able to save and restore your passwords, bookmarks, cookies, settings, form data and add-ons, automatically or on demand.

It's an excellent tool which could save you a lot of hassle, and may justify installing AntiBrowserSpy 2014 all on its own.

## MAGIX Photostory easy SE - FULL VERSION

MAGIX Photostory easy SE is a powerful tool which can transform digital images into a professional video slideshow.

Getting started is as easy as pointing the program at your source images. They're imported in just a few seconds, and organised in a slick timeline.

Your pictures almost certainly won't be in the right order, but it's easy to drag and drop them into place.

Individual pictures can be tweaked in many ways, with tools to adjust brightness, contrast, gamma, colour, sharpness and more. Photostory can rotate or flip an image, zoom in or out, or apply some basic special effects ("Sepia", "Black and white", "Add noise"), and you can even set up animations to smoothly zoom or pan across any picture.

There's just as much power elsewhere. Photostory doesn't just allow you to add a text caption to an image: you can set its font, size, style, alignment, colour, border, shadow and position. And a set of templates make it easy to set up subtitles, ticker captions, TV-type scrolling credits, and more.

If you need a soundtrack, then there's support for adding an audio file, or directly recording your own commentary.

And once you've finished, your slideshow can be exported as a video file (MPEG, MP4, WMV), published directly to YouTube, or shared online via your MAGIX Online album.



## DVD CONTENTS No 202 / SEPTEMBER 2014

**WINDOWS:** CCLEANER + CUTEPDF + DEFRAGGLER + DEEPBURNER + FOXIT READER + APPLE ITUNES + MALWAREBYTES' A/M + SANDBOXIE + SPYBOT S&D + VLC MEDIA PLAYER + WINRAR + WINZIP + 7ZIP **INTERNET:** AOL INSTANT MESSENGER + VUZE + DROPBOX + GOOGLE CHROME + FILEZILLA + M/S SECURITY ESSENTIALS + MOZILLA FIREFOX + MOZILLA THUNDERBIRD + SKYPE + STEAM + ZONEALARM **TROUBLESHOOTING:** SERIAL CODES + BLANK REGISTRATION WEBSITE + CAN'T FIND A FILE? + INSTALLATION ERROR **HELP:** DISCLAIMER + DAMAGED OR FAULTY DVDS + USING THIS DVD + INSTALLING SOFTWARE **EDITORIAL:** BURNING AN ISO IMAGE + PC&TA EDITORIALS **LINUX:** LINUX MINT **FEATURES:** SPARAGON BACKUP & RECOVERY COMPACT + WEBSITE X5 HOME 10 + ASHAMPOO MUSIC STUDIO 4 + ANTIBROWSERSPY 2014 + PHOTOSTORY EASY SE **DRIVERS:** ATI CATALYST + NVIDIA FORCEWARE

**INSTRUCTIONS:** Open Windows Explorer, navigate to your DVD drive and double-click Index.html in the root directory. **DISC PROBLEMS:** To replace faulty DVDs, please send the discs to: PC & Tech Authority DVD Replacements, Level 5, Building A, 207 Pacific Highway, St Leonards NSW 2065

Make sure to include your name and postal address on the back of the package so that we know where to send the replacements. For all other DVD related issues email [cd@pcandtechauthority.com.au](mailto:cd@pcandtechauthority.com.au). As the delivery platform only, PC&TA and Haymarket Media cannot and will not provide support for any of the software or data contained on these discs. Although all discs are virus scanned, Haymarket Media cannot accept any responsibility for any loss, damage or disruption to your data or computer system that may occur while using the discs, the programs or the data on them. There are no explicit or implied warranties for any of the software products on the discs. Use of these discs is strictly at your own risk.

# Input Output



**DAN RUTTER** BRINGS THE ANSWERS TO YOUR QUESTIONS LIKE NO-ONE ELSE CAN

## ROTATE TYRE AIR, TOP UP BLINKER FLUID

**I** When a computer shop (or big-brand chain...) offers a "tune up" or "optimisation" for extra money when you buy a new computer, what do they actually do? I've asked, and got palaver about viruses (sell a lot of brand new computers with viruses already on them, do you lads?) and system performance (brand new computers with fragmented hard drives?). Is this literally money for nothing?

G. Ewers

**O** Not usually, but it can come pretty bleeding close.

One thing you can do to a new brand-name computer that genuinely will make it better is uninstall the shovelware it comes with - trial versions of crummy virus checkers, lousy Wi-Fi connection management hardware that does nothing the operating system itself can't already do, et cetera. The shovelware problem isn't as bad as it used to be, but it's still out there, and it's still difficult to persuade, say, Sony, to not give you a bunch of Sony-branded folderol.

Apart from that, there should, as you say, not be anything on a new computer that needs tuning up. If the tune-up service does anything, it probably just prunes out some

(allegedly...) unnecessary startup items, and/or charges you for the installation of free software, like Web browsers or one of the antivirus programs that're actually good.

Once you've been using a computer for a while and installed various things, pruning the startup items can make a significant difference. Msconfig.exe used to be the standard way of doing that; Autoruns (bit.ly/autoruns) is better. And if you want to look more competent than 90% of computer-shop "optimisers", try Ultimate Boot CD, [www.ultimatebootcd.com](http://www.ultimatebootcd.com).

## GOOD NEWS! MY COMPUTER DID NOT CATCH FIRE!

**I** But the cheap fan heater next to it did, and my workmate seized the opportunity to grab the dry powder extinguisher off the wall and blast the flaming plastic, and because the side of my PC case is off (a whole other story there we need not get into), now the computer is full of extinguisher powder.

How disastrous is this? From past letters it seems you're the guy to ask about weird substances in PCs. I've already taken the computer outside and shaken all the obvious powder out. There's plenty left in nooks and crannies, though.

B. Charlton



▲ If there are a few stripes on a normal screen, it's probably a cable. If there's nothing but stripes, it could be something worse.

**O** The powder in standard "dry chemical" extinguishers is bicarbonate of soda, which is pretty kind to computer components. (If the powder is yellow then it's probably monoammonium phosphate, which is worse. But white powder plus cheap extinguisher equals bicarb.)

Bicarb dissolves readily in water to make a not-very-harmful alkaline solution, so you can clean it out of slots and out from under chips and so on with clean water. Remove moving-parts drives for separate cleaning, and then tapwater should be fine for the rest of the computer. Use demineralised water if you're fancy.

(You can even get away with pouring a little water on hard drives, since none of it is likely to make it through the fibre-filtered breather hole. Don't come crying to me if you drown a drive, though.)

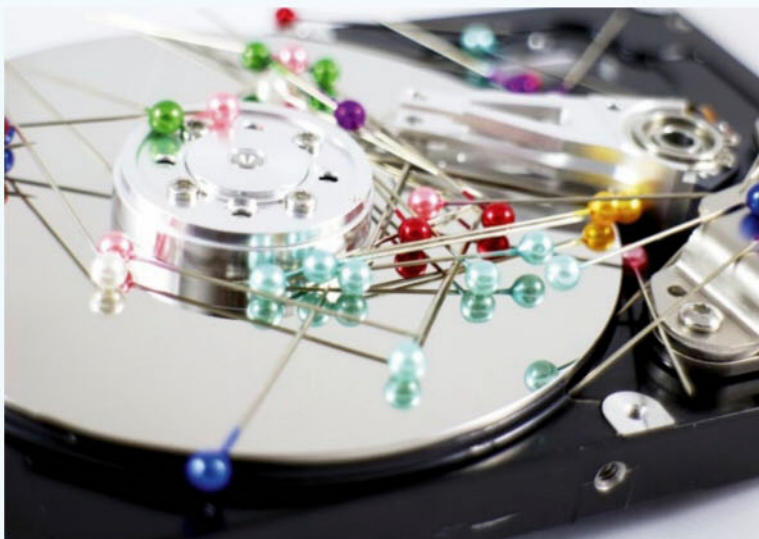
After washing, dry components very thoroughly with sun and breeze - especially if you're doing this the lazy way and cleaning things while they're still plugged together - and the computer has a surprisingly high probability of working fine. Pay attention to fans and heat sinks, though; fan bearings can get clogged with powder, and so can closely-spaced heat-sink fins.

If the weather doesn't cooperate, the new, less defective fan heater you will presumably soon be buying will also dry a computer effectively, on low heat for more time than you'd think.

## STRIPES ARE SLIMMING

**I** My old Dell Inspiron 1545 suddenly has numerous randomly spaced green vertical stripes on the screen. Taking a screenshot and looking at it on another computer shows a normal picture, so I presume it's the screen

◀ It ain't cheap to optimise Windows with magnetised pins.





that's the problem. Apart from that the laptop is fine, but it's not young and a new screen for it would probably cost more than a whole new laptop the same age. Is this worth fixing?

*Alex Heron*

**O** The problem is almost certainly not the screen itself but the ribbon cable that goes from the laptop mainboard to the screen, through the hinge of the laptop. That ribbon cable gets bent every time you open and close the laptop, and cracked conductors in the cable commonly result after a while. (The only laptops immune to this problem are the tablet-ish weirdoes that have the mainboard behind the screen.)

In your case, some wire responsible for the green subpixels (each LCD-screen pixel is made up of a red, a green and a blue subpixel) is locking them all on at some locations.

A normal human with an unremarkable set of screwdrivers can replace the screen ribbon cable in most laptops, and Dell have good downloadable PDF service manuals for their products. It's also not difficult to find a new or new-ish ribbon cable; I just did a quick eBay search and found one under \$10 delivered.

If you've never done this before, just work slowly and think about what you're doing - so, for instance, don't yank cables out of their connectors without checking for little plastic clips that hold them in.

About the only way you can seriously screw up if you're slow and methodical is by doing electrostatic damage to components. To avoid that without needing a wrist-strap and conductive workmat and so on, just talismanically touch exposed metal on the laptop as you work, to keep your body and the laptop chassis at the same electrical potential.

## THEY'VE FORGOTTEN IT TOO

**I** Why, when you click the "forgot password" thing on a Web site, do they always give you a new password, not just tell you the old one? If they're worried about e-mail security which I suppose makes sense, how is it better to change a user's password, if that user wasn't the one who clicked "forgot password" in the first place?

*Laurie Harris*

**O** They don't send you your password because they don't know what it is.

## I/O OF THE MONTH

### WHERE THE MAGIC HAPPENS

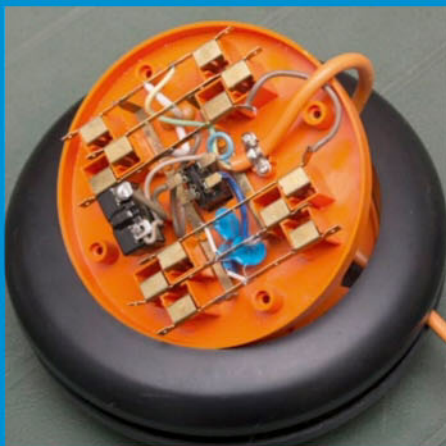
**I** I have a nifty round orange "Powertech" four-outlet power board, which got left out in the rain after a party where I had my computer on the veranda for music. I thought I could probably rescue it and unscrewed the top and cleaned it all out, and it looks good as new now, but I'm curious: what are the three round blue things in there (see photo)?

**This is supposed to be a surge protector, but those are the only components I can see in there besides copper wires, copper strips, a switch, what I take to be a circuit-breaker, and one little light.**

**How much protecting from surges do those round blue things actually do? Are they smoothing capacitors, which you've written about before? Should I be powering my computer from something better than this?**

*Ed Bowling  
Carl Solares*

**O** They're metal oxide varistors, or "MOVs", and they are indeed the only component in a standard "surge protector" powerboard that



actually does any surge protecting. (The circuit breaker is only there to trip if you grossly overload the powerboard, or there's a short circuit. If you'd plugged the powerboard in when it was still full of low-conductivity rainwater, the circuit breaker probably wouldn't even have noticed. If your house has a safety switch in the breaker box, though, that would have tripped.)

The picture resolution's good enough that I could read "471KD14" on those MOVs; search for that and you'll get datasheets for these precise components. What the datasheets don't say, because electrical engineers are expected to know it already, is that MOVs wear out. They will indeed protect you from surges, to some extent, but only a few big surges or several little ones. And then they might as well not be there at all.

Most "surge protectors" are in service for many years, which means that almost all "surge protectors" in use in the world don't protect from surges at all any more.

On the plus side, three MOVs don't provide very good surge protection in the first place, so you haven't lost much! And the power supplies for most computer gear are quite tolerant of ugly incoming mains, so unless you live somewhere with particularly unreliable power, you needn't worry about getting a better power filter. It's still nice to run your computer from an uninterruptible power supply, though, because that'll let you ride out brief power cuts that might not have damaged the PC, but certainly would have instantly turned it off.

I've written about this before:  
[www.dansdata.com/gz039.htm](http://www.dansdata.com/gz039.htm)  
[www.dansdata.com/sbs9.htm](http://www.dansdata.com/sbs9.htm)

◀ The guts of any normal powerboard, rolled up!

Standard procedure for computer password security is to run the password through a "hash function", which turns it into a string of random-looking characters, which are what the server stores.

When someone tries to log in, the password they give is hashed the same way. If it matches the stored hash, they're allowed in.

(It's theoretically possible for two passwords to have the same hash, a so-called "hash collision". You are far more likely to be hit by a crashing jumbo jet while trying to log in to someone else's account than you

are to come up with a hash-collision password.)

Password security works this way so that miscreants who get their hands on the username/password data cannot immediately use it to log in. Instead, they have to "reverse" the password hashes, which is computationally outrageously expensive.

Well, that's how it all used to work, at any rate. I last wrote about the state of play in password hackery only about seventy years ago, in computer time, at my site:  
[www.dansdata.com/gz140.htm](http://www.dansdata.com/gz140.htm)

# Office Mix

**SIMON JONES** IS IMPRESSED BY MICROSOFT'S NEW PRESENTATION TOOL, AND TAKES A TRIP BACK IN TIME TO THE EARLY YEARS OF WORD-PROCESSING SOFTWARE.

**T**his May, Microsoft launched a customer preview of a new add-in and service for PowerPoint, called Office Mix. This provides a way to turn PowerPoint presentations into rich educational experiences – that is, into interactive online lessons – and then to deliver them to students using a variety of mobile devices. It's more than only an enhanced presentation product: it's more interactive than a screencast; it can be made more engaging than a lecture; and, hopefully, it will be more fun for the participants too.

To employ Office Mix, you start with a conventional PowerPoint presentation, to which you can then add screen recordings that depict you using various other applications, still images, SmartArt and screenshots – more or less anything you deem relevant to the lesson. You can also add prerecorded videos, interactive content and quizzes. Quizzes may be multiple-choice, true/false or free response – you set up the questions and the available answers, and indicate which format to use. You can also provide hints to help the students if they get stuck.

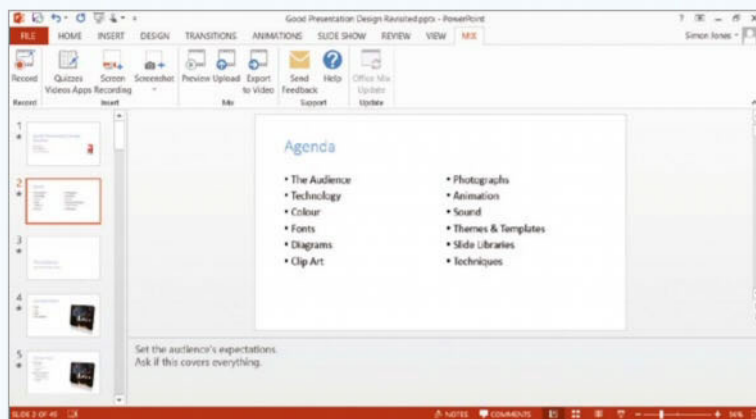
Office Mix comes with links to a range of available interactive content that includes simulations of experiments in physics, chemistry, biology, earth science and mathematics from the PhET project at the University of Colorado. You can also choose from science and mathematics teaching resources provided by the CK-12 Foundation; be warned that these can be highly US-centric in their cultural references (although they do mostly employ metric units). Most of these CK-12 resources can be cut up and used to provide separate pieces on different slides – just remember to give them a credit if you do so, as the materials are freely shared under a Creative Commons Attribution-Non-Commercial licence. There are also hundreds of videos from the Khan Academy, covering maths,



Office Mix turns PowerPoint presentations into rich educational experiences



**SIMON JONES**  
An independent IT consultant specialising in Office Automation, Visual Basic and SQL Server.



▲ Office Mix starts as a conventional PowerPoint presentation, but to this you can add things such as screen recordings, still images, SmartArt and screenshots

science, economics and computing.

Once you have your presentation slides prepared you can record yourself – in audio and/or video – talking your way through the presentation and drawing or highlighting things onto the slides as you go. The Khan Academy style is simply to talk while writing on a blackboard, and there are no pre-prepared slides; the CK-12 style is to have a problem set out on a slide and then talk about it while writing out the steps you need to follow to get to the answer on the blank area of that slide. Other people may use the presentation slides as simple illustrations and then talk over them – perhaps occasionally highlighting words or other elements on the slides. These audio and video recordings are embedded into each individual slide: you can embed a video either as a thumbnail, which you can resize and place anywhere on the slide, or alternatively as full-screen.

The built-in microphones and cameras on modern laptops and tablets can be okay for this purpose, but you should definitely make a test recording first to check that the quality, volume and so on are adequate. If you're working on a laptop it's usually a good idea to raise it up off the desktop surface, so that you're looking straight into the camera rather than down at it – a low camera angle emphasises chins and noses in a way that's not merely unflattering, but may even look quite intimidating. When a student views your video, you don't want to appear to be towering over them or looking down on them.

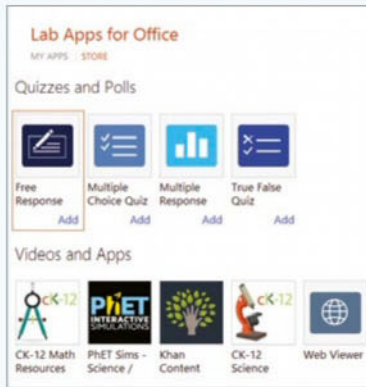
If the built-in camera and mic on your laptop or tablet aren't up to the job, better-quality ones are relatively cheap and easy to obtain

nowadays. In practice, I find that microphone and camera positioning is often more important than the actual cost of the equipment, and that you should try not to move around too much while recording to avoid an audio track that continually booms and fades. A headset microphone can help in this respect, but try to find a fairly small and discreet one if you're appearing in the video, so that you don't look like an airline pilot. Touchscreens or pen-enabled tablets make it very easy to draw or annotate your slides during a video recording, although a mouse will do at a pinch. Take care that any typing or drawing doesn't sound too loud and distracting if you're using the built-in microphone on a laptop or tablet: the tapping of fingers on the keys or scratching of the pen on the screen can be carried quite distinctly into a built-in microphone through the fabric of the device, as can the noise from its internal fan.

Any audio or video commentary you record using Office Mix is broken up and attached to the individual slides to which it refers, so you can reorder the slides after you've recorded the commentary without needing to re-record the entire presentation. This also means that if you make a mistake on any slide, you'll only have to re-record the commentary for that one slide to fix it.

I've made several training screencasts in the past, and I've usually had to design the visuals, write the script, record the visuals, and then record the commentary all as separate activities, since it can be very difficult to operate the application you're demonstrating smoothly while speaking exactly





▲ Content for Office Mix includes scientific and mathematical resources from PhET and CK-12

to the script in real-time. Making any fluffs in the video or audio meant either recording the whole thing again, or at least a tiresome editing session to cut and splice different video and audio clips together – post-production tasks that often took much longer than I would have liked because of the complexity of general-purpose video-editing software. Office Mix makes it easy to re-record and rearrange parts of the presentation, slide by slide, which will save a lot of time.

### SHARING THE LESSONS

Once you've created and recorded a lesson you can share it through the Microsoft Office Mix web service. After you publish your lesson, you'll receive a short link to it on the Mix website: simply give that link to your students and they can watch the lesson, interact with its content, and answer the questions, from virtually any portable device. You can choose whether you'll share with only the people in your own organisation or with anyone who's received the link – or to make the mix publicly available to everyone on the internet. The students won't need to have PowerPoint or Windows installed to be able to view and interact with a Mix lesson: all it takes is an internet connection and a browser. The latest versions of all the major PC browsers are supported, including Chrome, Firefox, Internet Explorer and Safari, with support for Android and Apple tablets promised soon.

Android, iOS and Windows Phone smartphone users can all see the Mixes as plain videos without the interactive content. You can download a Mix for later viewing offline, but that will also miss out the interactive elements, and if you don't want to upload a Mix to the Office Mix website at all, you

can still export your presentation, without any interactive content, as an MP4 video file and share or publish that any way you want.

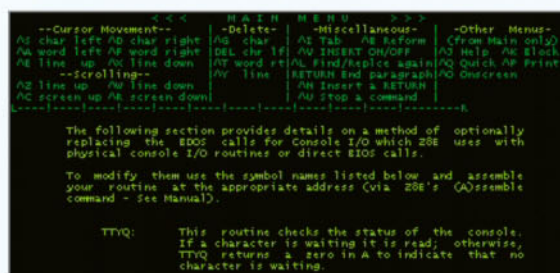
One nice feature is that – as well as being able to jump forwards and backwards through the presentation – a student can speed it up or slow it down, varying the playback speed from 80% to 200% normal speed. This is great for lectures that are going too slowly to keep their attention, or too fast for them to keep up. When students view the Mix, their progress gets tracked so that you can later see who watched it, how far they got, and also how well they did on any quizzes it contains. These analytics are nicely displayed and easy to understand.

Office Mix is an interesting beast. Some parts of it are wholly new – such as the quizzes and recording video of other applications – but much is simply repackaging of existing content, such as the Khan Academy, CK-12, and PhET simulations, and reusing existing PowerPoint features, such as recording commentary and exporting a presentation as video. While it's aimed squarely at the US market, that shouldn't be a serious hindrance to using it elsewhere – it could be useful for all kinds of training scenarios, not only in schools. For example, teaching people how to use a new piece of software, introducing new business practices into a company and so on. This is still only a customer preview – there are many more features planned, including an ability to export the analytics to let students see their own scores, and to organise groups of Mixes into courses. What's more, anyone who's familiar with JavaScript and jQuery can write their own Mix app to provide more content or interactivity, with the software-development kit to enable you to do this is at <http://labsjs.blob.core.windows.net/sdk/index.html>.

There are plenty of tutorial and sample Mixes available on the Office

“Office Mix makes it easy to re-record parts of the presentation, slide by slide”

▼ Although it looks archaic now, WordStar was one of the best word-processing packages of its time



Mix website at <https://mix.office.com>, along with the ability to sign up for the preview and to download the add-in for PowerPoint 2013. If you don't have PowerPoint 2013 but want to try out Office Mix, you can request a free six-month trial of PowerPoint 2013 through the Microsoft Connect website once you've signed up for the Office Mix preview itself.

### OLDE-WORLD WORD PROCESSORS

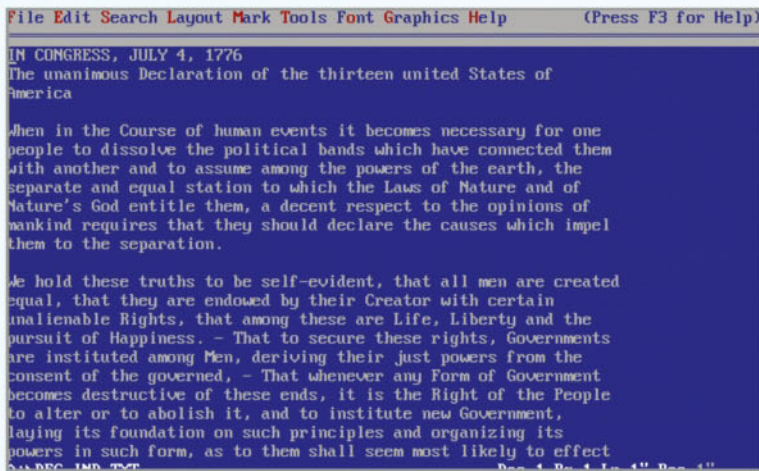
George RR Martin, author of the A Song of Ice and Fire novels – better known as Game of Thrones – has told US TV host Conan O'Brien that he uses an old copy of WordStar 4 to write all his novels, which could be seen as a rather extreme version of “if it ain't broke, don't fix it”. WordStar was indeed a very capable word-processing package, probably the best of its time, and it was certainly the best-selling one during most of the early 1980s, until it was overtaken by WordPerfect in around 1985. Originally written for the 8-bit CP/M operating system and later ported to MS-DOS, it made very few assumptions about the computer it would be running on, and didn't even mind if the keyboard didn't have dedicated cursor keys: by holding down the Ctrl key along with the cluster of keys on the left of the main keypad – E, S, D, X, A and F – you could perform the same cursor-movement functions.

However, if you're one of those people who hate the way the ribbon takes up screen real-estate in modern editions of Word, you'd have really hated WordStar: in some versions, 13 out of the 25 lines visible on its text-only display could be taken up by menus, prompts and status indicators (although of course, just as with the ribbon, you could easily turn these down or off to leave you with a very clean display of your document). It's also because computers of that time had only green-on-black character-based displays that there was no way to see the effect of text emphases onscreen, such as italic, colour or different fonts. If you were lucky, your monitor might have been able to display bold as brightened letters (IBM) or underlined (DEC).

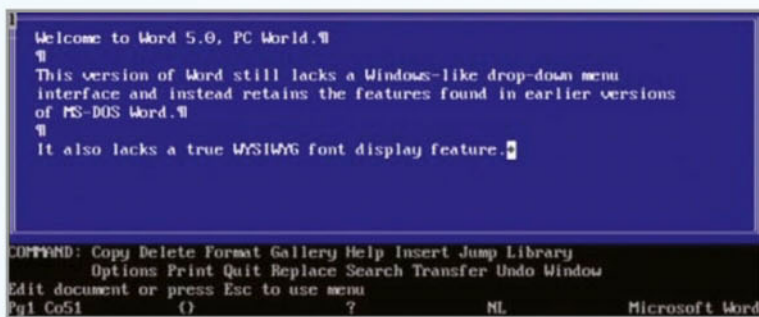
WordStar was at the top of its game by version 4 in 1985. Later versions, although they introduced many good new features, couldn't compete with WordPerfect, nor later on with Microsoft Word.

## TIMELINE OF EARLY WORD PROCESSORS

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
WordStar	1			3	3.3	WordStar 2000	4		5		6	7	WordStar for Windows		
WordPerfect	1			2.2				4.2			5.1			5.2 for Windows	
Microsoft Word					1		2	3	4 (DOS)		5 & Word for Windows	5.1	5.5	v	6



WordPerfect, with its user-friendly features such as Reveal Codes, had largely seen off WordStar by the end of the 1980s



Microsoft Word in its earlier incarnations didn't look much like the Windows application we know today

WordPerfect 4.2, introduced in 1986, was a game changer, introducing automatic numbering of lines, paragraphs and footnotes, all very important to lawyers and academics. Its Reveal Codes function hid the formatting codes from the user until they needed to see them, and its formatting codes were named using understandable text labels such as Bold rather than unintelligible control characters, as in WordStar. By 1989 and the introduction of WordPerfect 5.1, the game was just about over for WordStar. WordPerfect could create tables, its user interface was cleaner and easier to use, and WordStar had split its own market by introducing a version called WordStar 2000, which shared virtually nothing but the name with the original program.

Coming up on the outside fence, however, was Microsoft's Word. Its first versions were designed to be used with a mouse, even though they still ran under character-

based DOS rather than Windows, and Microsoft actually produced this mouse - its first ever piece of hardware - and bundled it in the box with Word so people could buy both together. Word was wysiwyg from the start, able to show bold, italic and underline on its display, although it couldn't yet render different fonts onscreen. Although Microsoft had demonstrated a version of Word running under Windows as far back as 1983, it didn't release this until 1989, and the DOS and Windows versions were developed in parallel until version 6 in 1993. By version 5.5 (released in 1991), the user interface of the DOS version had been made similar to that of the Windows version.

WordStar, and particularly WordPerfect, were far too late in moving over to Windows. WordStar for Windows was released two years after Word for Windows, and was very poorly

received, while WordPerfect for Windows was even later and more plagued by problems. It had to abandon some of its established keystrokes because they clashed with Windows functions. Late to market, buggy and slow, the later WordPerfect 6 and 7 for Windows did nothing to change this - they required the fastest hardware that was available at that time to keep up with even a moderately fast typist.

Many people have blamed Microsoft for these failures, accusing it of keeping some Windows APIs secret from rivals to slow down their development cycle and hamper their applications' performance. And indeed, following the release of WordPerfect 7 in 1996, then-owner Novell, did sue Microsoft for "anti-competitive acts". A memo was discovered in which Bill Gates indicated that Microsoft should withhold certain "namespace extension APIs" from its competitors, but one of the judges commented: "It is well established that a monopolist generally has no duty to co-operate with its competitors," deeming Microsoft's behaviour "aggressive" rather than "anti-competitive".

The case rumbled on through the appeals courts until, in April 2014, the US Supreme Court finally dismissed Novell's claim, signalling game over once and for all. ■

## TURN OFF

So, why does George RR Martin still use a word processor that's almost 30 years old? One of the reasons he's given is that he doesn't like the predictive spellcheckers built into modern software that change his words without asking. Given all the unusual names and words coined for the fantasy worlds he creates, I can see how that might be a problem - except that it's so easy to turn spell check and auto-correct off. Another reason he gives is that his old word processor runs on an equally old DOS-based computer that isn't connected to the internet, which means that when he's writing he's free from distractions such as incessant emails and videos of amusing cats. With which sentiment I wholeheartedly agree...



# Taking a sideways look

**PAUL OCKENDEN** FINDS AN ALTERNATIVE USE FOR A LIFE-LOGGING TOOL, LOOKS FOR A STAND-OUT TABLET, AND HACKS A 9V BATTERY

I'm always in awe of people who can take an existing technology and apply it in a new field – something for which it was never really intended by its original inventor. I suppose the most obvious examples of this are that someone who first decided to use SMS (originally seen as a slightly enhanced paging protocol) to chat with their friends, or when Percy Spencer noticed that the radar installation he was working on melted the chocolate bar in his pocket, and thus realised that microwave radiation could be used for heating food.

I've even suggested non-conventional uses of technology in this column on occasion – for example, three-and-a-half years ago, I suggested that building surveyors might use a “toy” quadcopter as an alternative to climbing up long ladders or hiring cherry-pickers to inspect roofs and gutters. And guess what? I was chatting to a surveyor who was sat opposite me on the train the other day, and he told me that he'd just invested in a DJI Phantom for this very purpose! Okay, so that kit's a little more “grown up” than the Parrot AR.Drone that I originally wrote about here, but the principle still holds true – it's taking a technology designed for one purpose and using it for something completely different.

This same surveyor on the train was telling me that one of his biggest problems is remembering a property properly. He'll see several of them every day, and despite taking photographs of their key features and making copious notes, measurements and little layout sketches, by the time he comes to type up his reports at the end of the week, many of the properties he's visited over the past few days start to merge into one in his memory. He's been trying to find a suitable technology to help him recall which is which.

So far he's tried continuous video recording using an action camera, but that didn't work out: to find out which property it was that had the dodgy blue staircase required him to scroll through hour upon hour of these videos, and even on fast-forward that was tedious. He'd



It's possible to make use of technology designed for a completely different task



also tried setting his smartphone to take a photo every minute or so; once again, however, that was less than ideal because on the one hand it would miss important things in the gaps between the photos, while on the other, whenever he was standing still, it would take a succession of identical photos.

As I sat talking to my new surveyor friend, I wondered whether perhaps this was another situation where it's possible to make use of a technology originally designed for a completely different task. Recently, I've been testing a device called Autographer, designed for “life-logging”. It's a small, oblong camera that you sling round your neck on a lanyard, or clip to your clothing – and then you head out and about. The device will take a series of photos, which you can then share with friends and family via social media, either as a photo sequence or a video. It certainly isn't a device for those conscious of their own privacy (nor indeed that of other people). What's interesting about Autographer, however, is how it decides when to take a photo.

Rather than simply taking pictures at fixed time intervals, it employs a combination of sensors

– compass, visual, passive infrared, motion, acceleration, temperature and GPS – to help it to decide when to take another shot. When you're sitting still doing nothing, chances are it won't take a photo unless someone else walks past. When you're walking around a building, the sensors ensure that each time you change direction, enter a new room or climb a flight of stairs you'll get a few snapshots of the event.

In its original function as a life-logging tool, I'm not convinced that the Autographer works all that well: in particular, some of the shots can be quite blurry because the shutter speed seems slow (I'm guessing the lens aperture is a tad too small), and its wide-angle lens imparts a semi-fisheye effect that becomes tedious after a while.

Also, I have to admit that I felt a little uncomfortable while testing it: I either had to tell everyone I met that I may be taking their photo, or else I could choose not to tell them, but then they'd ask what that funny device clipped to my coat was, and I'd feel even worse because I hadn't warned them beforehand. Sometimes they didn't even mention the device, but in hindsight that was more awkward still,

since they'd probably realised I was recording them and thought me rude for not asking.

Perhaps it's my age, but this whole concept of life-logging simply doesn't appeal to me, especially when it's done photographically. I don't want to take covert pictures of either friends or strangers, and I certainly don't want to share such images with the world. But as a tool that simply acts as an aide-mémoire when surveying properties, no such moral issues arise. Even a blurry photo will do the job to remind you of a property, and that fisheye effect is a bonus, too, since it means you'll be taking in more of the surroundings. And, of course, privacy simply isn't an issue when you're surveying a building; the people who hired you expect you to take photos and keep a record.

The Autographer won't do away with the need for a traditional camera entirely – you'll still need one to take "proper" photographs of features for which its picture quality won't be good enough – but as a way to recall all your site visits over the past few days, it's perfect. I wonder whether the readers of this column can come up with any other "outside the box" uses for the kinds of technology I usually write about here? Preferably something that doesn't involve surveyors this time.

### STAND-OUT TABLET

I received a strange request over Twitter from reader John Jenkins. The vast majority of conversations I have with readers of this column lead me to believe you're far from being a bunch of fashion victims: that although you appreciate nice design, you're more into function than style. So I was a little surprised at John's initial request: "In a world of identikit iPads and Galaxy Tabs, is there a small tablet that will stand out from the crowd in the boardroom?" At first, on reading this, it appeared that John was looking for something to confer a spot of corporate one-upmanship, a startlingly attractive piece of kit that would make a style statement and help him get one over on his colleagues. As I just said, that felt completely at odds with the attitude of most of this column's readership.

However, once we moved beyond the 140-character confines of Twitter and started to communicate via other channels, I realised that I'd completely misinterpreted John's original question. He works in



▲ The Yoga Tablet has a unique design and a premium feel – and won't break the bank



The Yoga Tablet has a real premium feel to it, thanks to the solid metal back



sales, and one of the things that his company produces is an Android app concerned with "enterprise resource planning" and "supply chain management" – indeed, stuff that involves a higher concentration of management buzzwords per sentence than you could imagine. Although they give away this Android app for free, the server-side software that it talks to is eye-wateringly expensive, and it's important to present it in the best way possible so that it looks authoritatively expensive too.

Hence John's request for a tablet that stands apart from the usual crop, the majority of which are more or less mimicking the iPad to varying degrees. John's sales pitch actually involves leaving one or more tablets behind with each prospective client, so it's important that they look desirable and show off the app in its best light, especially given that he's usually meeting people at board level.

As he explained to me: "These are people driving Mercs and Beemers.

I want to leave behind something of similar quality. On the other hand, only 5% of these prospects will eventually turn into sales, so I need to watch the budget too – I'm paying for these devices myself, out of my commission..."

A high-quality Android tablet isn't difficult to find these days: there are still one or two turkeys on the market, but those early days of supermarket own-brand tablets have gone, and the majority on sale now are pretty good. As he mentions, he's also looking for something on a budget, which would normally steer him toward

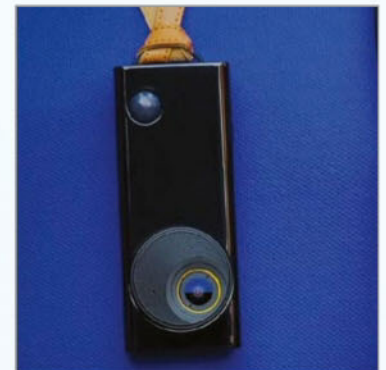
a model such as the \$199 Kogan Agora, but that neither stands out from the crowd of cheap tablets, nor does it exhibit the sort of "Mercs and Beemers" quality that John is looking for.

Even so, I think I may have just the tablet in my toy box: the Lenovo Yoga Tablet. It sports a fairly unique design: it's thin, but with a rounded bulge down one side, which makes it easier to hold; there's also a little kickstand that can either stand the device up vertically or else lay it slightly tilted on a flat surface.

Best of all, it has a real premium feel to it thanks to the solid metal back, unlike the plastic found on many other models. It certainly doesn't feel like a budget offering, yet the 8in version (it's available in a 10in variant too) costs around \$350, which is some way behind the iPad league when it comes to pricing.

It's a brilliant little tablet, and although it isn't the fastest on the market it's plenty fast enough for pretty well anything except hardcore gaming. The screen is impressive, and battery life is

▼ When its huge antenna is tucked away, the GSP-1700 is quite a neat unit



**PAUL OCKENDEN**

Owner of one of the oldest web agencies, Paul works on award-winning sites for many blue-chip clients.



excellent, too, lasting longer than any other 7in or 8in tablet I've seen. But what mostly sets it apart from the crowd is that distinctive wedge-shaped form coupled with its premium build quality. I'm sure it will go down well with the Mercs and Beemers brigade, too.

## GOING UPSCALE

Speaking of Lenovo Yoga products, you may remember that I wrote about the IdeaPad Yoga 2 Pro convertible Ultrabook last month. I know what you're thinking, but I do promise that the company isn't sponsoring this month's column. You'll remember that I loved the hardware but found that Windows, and in particular certain apps, made very poor use of its high-DPI screen.

Well, since I wrote that, a couple of updates have arrived that have made things a little better. I think the screen is now employing a slightly higher scaling value, and seems to integrate better with many applications, particularly those from Microsoft. There are still occasional problems – a driver update from Intel appeared in a window so small that I actually had to get out a magnifying glass to read the text; and Chrome still doesn't appear to want to co-operate as well with high-DPI screens as its browser competitors (although a couple of Registry tweaks help a bit, which suggests that work is being done in this area).

I was also pleased to see that application vendors are at last starting to take high-resolution touchscreen devices seriously. In particular, Adobe has announced updates to Photoshop CC that take full advantage of the resolution available, while also making the tools and menus a more friendly size. Hopefully this will be rolled out across the whole of the Creative Cloud suite.

## THE PEN IS MIGHTIER THAN THE SURFACE

Finally, a word about Microsoft's Surface Pro 3. I've only had the briefest of plays with one at the time of writing, but I was hugely impressed. I remember the fanfare when the original Surface was launched, and how Microsoft proclaimed that it had built the perfect device. Three generations on and the company finally seems to be getting there. This is a device that lifts the whole tablet concept above and beyond being a "content consumption" device.



▲ The Surface Pen is thicker than the Surface Pro 3, and so can't be stowed neatly in the device

Even the kickstand that it made such a fuss about at the launch event has been redesigned. It's a great package now, and the new Surface Pro Pen in particular works extremely well – far better than the Surface 2 version, and indeed better than any Wacom-type device I've ever used. The thin display stack helps enormously in this respect; it really does feel as if the writing is appearing just underneath the pen's tip, with no distracting parallax effects.

My only real disappointment is that the pen can't be stowed inside the machine's body, although there's actually a good reason for this. Since the pen has a 9.5mm diameter and the Surface Pro 3 is only 9.1mm thick, stuffing the pen into a stowage hole in the device is physically impossible. With the Surface Pro 2 you could attach the pen to the charging port magnets, but even that isn't possible with the new hardware.

Thankfully, the Type Cover does provide a space to stow the pen, albeit slightly awkwardly. That's only a minor irritation, though, and for anyone spending between \$979 and \$2279 on the new Surface, I reckon that along with the aforementioned Type Cover (which really should be supplied as part of the package: tut tut, Microsoft), the new Surface Pen is \$60 well spent.

And for anyone who does buy one, here's a little tip. The pen contains three batteries: two 319 wristwatch-style batteries and one AAAA alkaline cell. The watch batteries are easy enough to obtain from a jewellers, but the AAAA cell is a little trickier. As you can probably tell from the name, it's a smaller-still member of the AA/AAA

series. Although AAAA batteries are difficult to find, 9V smoke-alarm-style batteries aren't, and the good news is that many of these contain six AAAA batteries.

I've found them inside both Duracell and Energizer 9V batteries, but I've also found other brands that don't contain AAAAs. It's easy enough to peel off the outer metal casing, and inside you'll find the six AAAA batteries spot-welded together (you can pull off the tags easily using a pair of pliers). On rare occasions you'll find that the cells inside are a couple of millimetres shorter than an AAAA cell since they don't have the little "dome" at the positive end. Not ideal, but even these cells will usually work in the pen, since the spring inside the device's battery holder will normally take up the slack.

The clue to all of this lies in the names of the batteries involved: AAAA batteries are more correctly called LR61, while 9V PP3 batteries are properly called 6LR61 (that is, six LR61s). Obvious, isn't it? Not only will you find it far easier to buy 9V batteries (you'll find them on the shelves of supermarkets and newsagents where there are no AAAA cells in sight), but you'll also find it considerably cheaper to buy AAAAs this way. ■

## CHROMECAST

I'm a big fan of Google's Chromecast, but I had to laugh the other day when a friend described it as "a \$35 set-top box that needs the user to provide a \$200+ remote control". I think that description sums it up brilliantly, and that's why Roku's \$100 Streaming Stick may well be a better option for many people. Chromecast seems to be falling short of many buyers' expectations.



# Starting out with WordPress

**TOM ARAH** PUTS TOGETHER A PROFESSIONAL-LOOKING, STATE-OF-THE-ART WEBSITE WITHOUT THE NEED FOR COMPLEX CODING – AND FOR LITTLE OR NO OUTLAY.

**H**TML and the first web browser, WorldWideWeb, were famously developed on Tim Berners-Lee's NeXT computer. The NeXT was a high-end graphics workstation aimed at wysiwyg print designers, but what made the web so revolutionary was its core principle of "universal readership". This was achieved by authoring HTML based solely on the information content of each page, rather than its appearance. As such, the world's second web browser – developed by Leicester Polytechnic student Nicola Pellow under Berners-Lee's guidance – was "LMB", a Line Mode Browser designed to render a stream of text-only HTML one screen at a time on any internet-enabled device, including mouseless, teletypewriter-style dumb terminals. You can see what this primitive web looked like via the recreation at <http://tinyurl.com/q8wfd6dk>.

Browsing the platform-independent, The question that I'm most regularly asked is: "What is the simplest and cheapest way to produce a professional-looking website?" This generally leads to questions on my part about what you're trying to



**TOM ARAH**

Set up his design company in 1987. As well as design work, he provides training and consultancy services

achieve, how much time you're willing to put in, whether you'd be better off outsourcing it, and so on. Increasingly, such discussions lead to one suggestion: get yourself an account at WordPress.

When I mention "WordPress", most users tend to be surprised: their expectation is that I'd recommend a traditional web-authoring tool such as Dreamweaver, in which you write web pages directly using HTML and CSS. Such a package may well be the right choice if you intend to forge a career in web design or app authoring, but these are high-end tools with price tags to match. Moreover, while getting to grips with HTML and CSS isn't rocket science, most non-professional users have better things to do with their time – such as creating content.

Using a content management system (CMS) such as WordPress means you won't have to know anything about the underlying code in which your pages are written, while still having everything you need to create your site – for free.

Once the benefits have been explained, you might assume that most users would jump at such a

recommendation, but most seem to be put off. Although it's true they don't have unlimited budgets or time, they really want full-blown professional sites based on the latest web standards, which look modern and attractive and work well on all devices. The last thing they want is one of those ugly, text-only blogs that clutter up the web and all look the same. To which I respond: "I know, that's why I recommend getting a WordPress account..."

Even when people appreciate this advice, they may Google "WordPress" and find that it all looks a little frightening – as though you'll need a special hosting account to run the framework, or that installation will be intimidatingly technical. With a CMS, you also have to make sure that you're backing up all your content and keeping it secure, which sounds like a lot of work and may even entail risk. Indeed, getting to grips with PHP and MySQL sounds much harder than mastering HTML and CSS, when what they were really looking for was a simple, safe, turnkey solution. To which I will respond, once again: "I know, }that's why I recommend getting a WordPress account..."

Yet a mental block still persists – many users never try WordPress or, if they do, they allow themselves to be scared off before they've understood its full potential. That's a shame, and so I intend to show just how simple WordPress makes it to produce professional, fully functional, highly customisable, attractive, state-of-the-art websites with absolutely no coding. For free.

## STARTING UP

Naturally, the first step is to sign up. Make sure to visit <https://wordpress.com> rather than <https://wordpress.org> – both sites are run by the same company, but the latter is the home of the platform as a whole and this is where you would download the necessary files to manually install WordPress. There are good reasons why advanced users may want to do this, but there are also good reasons to let the kind folk behind WordPress directly host your site. Not only is it easy to get started, you can outsource all concerns about backup and security to the people who know the framework best, freeing yourself from the need to know anything at all about PHP and MySQL, through which WordPress works its wonderful magic.

On the WordPress homepage, you'll see a large Create Website button. Click on this and you'll be taken to a form where you enter your email address, a



username, a password and the name of the site that you're planning to create. Don't worry when it calls this your "blog address" - you're going to produce a fully fledged website - and don't worry much about the name, since you can change it later. Once you've entered these details, scroll down and hit the Create Blog button. You'll be sent an email with which you can activate your account. This shouldn't take more than a minute, and while you're waiting you can check out the different paid-for services on offer.

The option that WordPress promotes is its Premium option, which offers 13GB of storage, better design control and video handling, removes all ads, and includes a customised domain name, such as <yourname>.com. All of this for US\$99 per year is pretty good value. Don't rush the decision, though, as you can save yourself money by buying only the add-ons you need: for example, the Custom Address option can be had from US\$13 per year, while No Ads is US\$30. If you don't need more than 3GB of space, and can live with the occasional discreet advert and a <yourname>.wordpress.com address, the hosting really is completely free.

By now your email should have arrived, and once you're logged in, the WordPress homepage will suddenly look entirely different. Whether you like it or not, you're now part of the WordPress community and are encouraged to explore what others are publishing via the Freshly Pressed page, and to find relevant sites and follow their content via the main Reader page. Don't be too cynical about this: for bloggers in particular this is a great way of finding people with similar interests and building up your own site's following. However, that's all down the line: job number one is to simply get your site up and running.

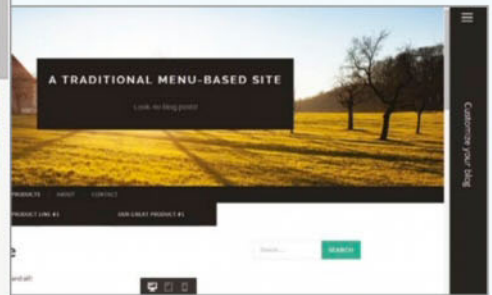
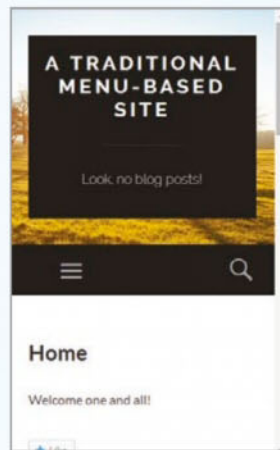
To do this, click on the My Blog tab, which lists all your sites. Currently there'll only be one, but there's nothing to stop you adding as many as you want using the Create Another Blog button in the left-hand column. At the time of writing, tens of thousands of WordPress sites are added every day, and the total number hosted runs into the tens of millions, including surprisingly big names, such as Forbes and CNN. The most impressive statistic is the number of monthly page views served, which is approaching 15 billion. What this means in practice is that you can be reasonably confident WordPress knows what its doing when it comes to hosting, and that (although there are no guarantees) your site's unlikely to suffer downtime, and should provide a

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The total number of sites hosted by WordPress runs into the tens of millions

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▼ Simply visit [wordpress.com](http://wordpress.com) to start creating your own personal blogs and professional websites



▲ With advanced features such as responsive design, WordPress is more powerful than most users assume

smooth, secure experience for visitors.

Below the name of your site you'll see that the first link is Dashboard, and clicking it will take you to your site's main control panel. Don't be put off if this looks complex and intimidating at first sight - this is a sign of the power at your disposal, and you'll soon get used to the way everything works. The most important thing to grasp is that you generally access functions through the persistent sidebar menu that runs down the left-hand side of the screen, which is organised into categories such as Posts, Pages, Comments and Appearance, each acting as a link to a dedicated page. If you're on a small screen, this menu might be collapsed to graphical icons with fly-out links.

## PAGES NOT POSTS

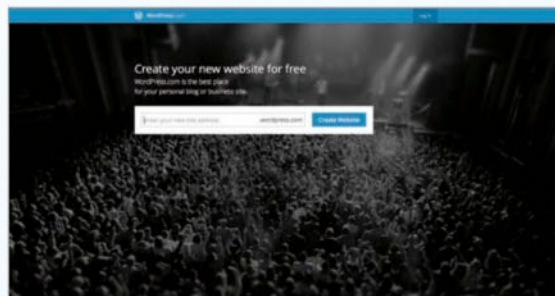
WordPress started life as a personal blogging platform, which clearly remains a core strength and target market. However, you probably want to produce a conventional website, complete with traditional menu-based navigation, and this means that you'll need to focus on Pages rather than Posts. Click on the Pages link in the sidebar and you'll see that your site currently consists of a single pre-supplied page called About. Hover over this and context-sensitive commands will appear below, including Edit. Select this and you'll be taken to a new page where you can quickly update the pre-supplied content and format it using the button

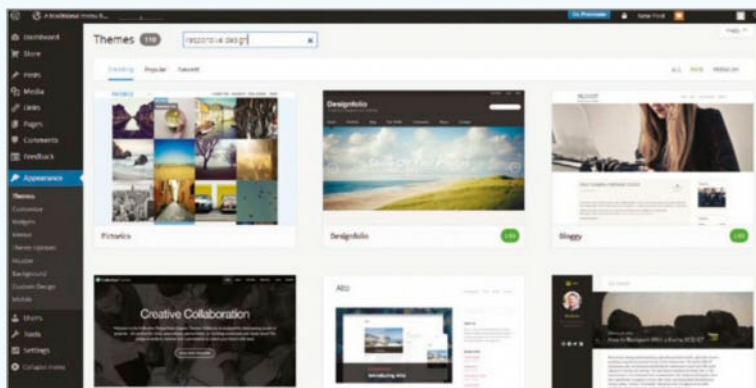
bar running across the top of the text area.

You may well notice that there isn't any obvious Add Image button but, again, don't worry. WordPress's text-only blogging days are long gone: you simply need to get used to the way that it handles graphics. To add an image to your page, click on the Add Media button above the text area, which opens a large tabbed dialog. Select the Upload Files tab and then drag the files that you want to upload onto it, or select them individually. Once your files have been uploaded they can then be accessed from the Media Library tab. Select an image and you can give it a title, caption, alt text and description, and then choose from a range of sizes and alignments before inserting it into your copy. A handy new capability is the ability to interactively resize images directly within the text-edit box. Click the large Update button on the right-hand side of the screen and you've created your site's first page.

Now you need to add the others. I'm assuming you've already worked out a typical site structure - let's say with Home, About Us and Contact pages, and a main section of the site given over to the products or services you provide. Create these pages using the Add New command from the Pages section of the sidebar (not Posts) and hit Publish as each one is finished. If you don't want comments on your pages and don't want Like and Share buttons to be added automatically, you'll need to disable these options in the Discussion and Likes and Shares option boxes (if these aren't visible, toggle them on using the Screen options dropdown in the top-right-hand corner of the main Dashboard). Working this way you can quickly create all the main pages of your new site.

You're now ready to see what your site actually looks like, which you can do at any time using the prominent link in the persistent menu bar running across





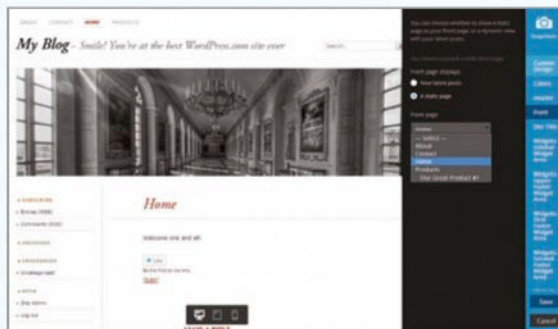
- ▶ Much of the design power of the CMS comes from its themes
- ▼ You can customise your site in a multitude of ways

the top of the screen. Before you do, though, prepare yourself for a surprise. In the old days, WordPress used to default to presenting your site using a simple, minimalist theme that did indeed look like those aforementioned ugly, text-only personal blogs cluttering up the web. Nowadays it's moved up a notch and randomly selects a theme to apply (in my case, "Chateau"). This is sort of an advance, but the chances of it being a good fit for what you're trying to achieve is pretty slim. What currently greets your site visitors is a random image, a less-than-informative header ("My Blog - Smile! You're at the best WordPress.com site ever") and the less-than-welcoming message: "Apologies, but no results were found for the requested archive. Perhaps searching will help find a related post." It may be handy that site search is automatically built in, but all this is some way from the professional face that you want to present to the public. Once again, don't panic, because it's easy to take control of your site's appearance.

To do this you'll need to return to the Dashboard and then select Appearance | Customize, which shows your site down the left of the screen while running down the right is a fly-out menu. The options on offer will vary depending on the current theme, but the most important controls are always available: the Header option lets you upload a custom image; the Site Title option lets you add a more relevant title and tagline; and the Front option lets you change your front page from defaulting to showing posts and instead show a static page that you can then choose from the dropdown. Be sure to make your changes permanent with the Save button at the bottom right of the screen.

## MENUS, WIDGETS AND THEMES

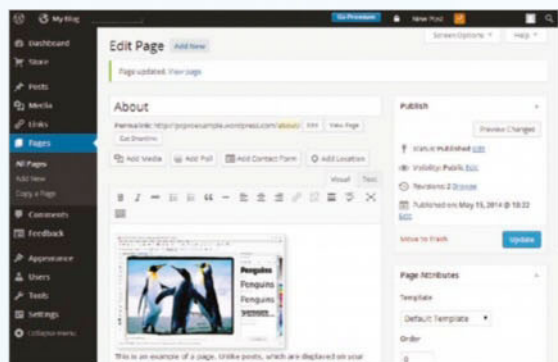
You now have a traditional page-based website, complete with menu-based navigation, rather than a post-based



blog; there are still things to sort out, however, starting with the menu. WordPress has automatically added the pages you've created so far, but you'll need to take full control by using the Appearance | Menus page, where you can customise the menus by adding and reordering your pages and customising their titles. By dragging to indent the menu items, these can be presented as drop-downs and fly-outs, essential when you're dealing with hierarchical site structures that involve more than a few pages. Finally, you need to go to the Appearance | Customize page, select the Menu option and specify that your customised menu should be used as the new primary menu.

Now you have your page-based navigation sorted but, depending on your theme, you're likely still to be displaying a number of post-based navigational links, which is confusing and irrelevant since you don't have any. You can replace these links

- ▼ For a website, you need to create Pages rather than Posts



with something more appropriate via the Appearance | Widgets page where you'll see a list of widgets. These are simply blocks of content designed to appear around your main page content. Most are blog-orientated, such as lists of recent posts and comments, but if you drag on the Text widget you can add some text to describe your site, to highlight a special offer, for example.

The framework for your website is taking shape, so now you need to make sure that you've chosen the best possible theme for it, based on your content and target audience. You do this at the Appearance | Themes page, which lets you select from more than 250 styles, with more added every week. You'll notice that some of the themes on offer cost money, but you certainly shouldn't rule these out: some are stunningly good, and a good theme can make or break your site. There are also around 175 free themes, however, so you should be able to find something suitable. Once a thumbnail catches your eye, hover over it and select Preview to see how your site looks in that theme.

I've saved the best for last. First of all, select a modern theme that supports "responsive design". Now visit your site in a desktop browser and start dragging inwards to make the window narrower. What you'll see is that, as you drag, your design completely reorganises itself to make the most of the space available. For example, drag down to smartphone size and you should see your menu bar shrink down to a touch-friendly, expandable button icon. Such adaptive handling is vital now that mobile access is becoming as important as desktop, and it's by no means simple to set up the necessary code manually - but WordPress offers this advanced capability built-in and for free. Moreover, because your site is based on a CMS, as web standards continue to advance, you'll be able to keep up with the latest developments simply by changing your theme. ■

## HOSTING AND MORE

WordPress has plenty more to offer, and I'll be returning to it in greater detail in future, but I hope this introduction has shown you why I recommend it for those taking their first steps on the web. With WordPress providing the hosting as well as the framework, you really are getting a lot for your money - especially if you aren't spending any at all!



# Change Worlds – disruptive technology!

**FIONA TEAKLE** NOT ONLY EXCITEDLY EMBRACES NEW TECHNOLOGY, BUT PLANS AHEAD TO USE IT WELL.

**T**echnology is changing the world more than we know it and more than we thought it would. We continue to become more reliant on it and even the way in which we use technology is changing. The biggest impact on our lives is the concept of disruptive technology and this is only going to increase, with technologies and the next big thing growing year on year.

Disruptive technology has the potential to not only improve our day to day lives, but also significant improvements in business and economics. The challenge for business leaders is the need to understand the technology that is heading towards them, but how they can use it correctly. Using technology for the right reason and not just for the sake of it, is when businesses will rise. Being open to constant change, not only in strategy but also technology and managing that change will be critical to success.

When you start to think about disruptive technologies, you can see the demise of companies that haven't been on top of the technology. This only highlights the benefits of being proactive and understanding the potential for disruption in advance, so you can turn it into an opportunity.

So what are some of the upcoming disruptive technologies that you should start thinking about:

- Wearable technology - the start of this technology is already reaching the market; especially in fitness products, smart watches and connected glasses, this however is the only the beginning. The benefits that consumers will gain from the devices are huge, especially in terms of personal health information. Technology is being created that can monitor pulse, blood pressure, weight and even glucose levels for diabetics.
- Driverless cars - hard to imagine allowing a driverless car to drive you to work, brings new meaning



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“you can see the demise of companies that haven’t been on top of the technology.”

to multi-tasking. We are starting to see the beginning of this through automatic parking; however this is only the beginning.

- Crowdsourcing - getting a group of people from all over the world to assist in the work product or funding of a particular project. The one most people would be familiar with is Wikipedia; instead of hiring writers and editors to document the pages, they gave the world the ability to create information on their own.

Another popular and more recent technology to be released via crowd funding is the Pebble (a smart watch). When connected to a phone, it can receive a vibrating alert to text messages, emails, incoming calls, and notifications from social media accounts. Since its release a number of other applications have been developed which interact with train timetables. The bigger picture is that it gives people who have an incredible idea, but no funding an opportunity to make their dreams become a reality.

Some of the issues that are apparent regardless of the technology are around trust. Are people going to feel empowered enough to trust the technology that they are using is safe, secure and causing no pain to anyone else?

I think this is going to be an ongoing issue. If you understand the technology, you know the rigor it will of gone through to get to this stage, and reach an opinion of whether that was enough for you and your family to trust the technology. However, on the other side, if you don't understand the technology, there is always an element of fear. The fear of unknown is relevant for everyone not just in technology, but in



all aspects of life. Yet, as we increase our reliance and the way in which technology interrupts our life, are we going to be more willing to trust it? Current experience with social media certainly seems to indicate this.

While all this technology is starting to appear, I feel we are only seeing the tip of the iceberg.

The idea of what technology may disrupt us into the future and change the world for the better is really a concept at the moment, while we can begin to see some trends it will be an ongoing change and challenge to the world as we know it.

## YITCON

This year the ACS is proud to present Youth Festival of ICT (YITCon) will be held on 9 and 10 October 2014 at The Forum in Melbourne, VIC. YITCon brings together more than 1,000 senior secondary students, university students, and young professionals interested in ICT careers to discover how they can prosper in the digital future. The conference motto is “Change Minds, Change Futures, Change Worlds.” You can follow the updates on YITCon via Twitter at [twitter.com/yitcon2014](https://twitter.com/yitcon2014) or on Facebook at [www.facebook.com/yitcon](https://www.facebook.com/yitcon)

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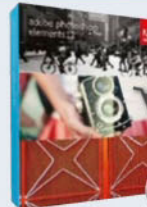
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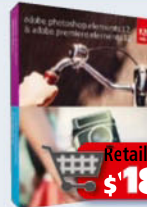
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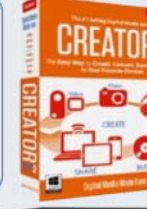
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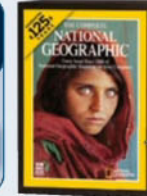
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# If Lightning were to strike a Mozart concerto, it could be dazzling, says Jon Honeyball

**“** This has turned into a month of interesting audio issues. I'm writing this while sitting in the main control room at Abbey Road Studios, arguably the most famous recording studio in the world as a result of the work done here by The Beatles. Even being in the building gives me goosebumps.

I'm assisting my good friend Tony Faulkner with the recording of some classical piano and orchestra pieces. I can't name names, but the performers in question are world-class, and no-one can doubt the provenance of the studio. I've set up recording equipment and a set of microphones parallel to Tony's: his recording will be used for the CD; mine is for R&D purposes so that Tony and I can experiment with some ideas we're working on.

We're not the only ones experimenting with sound. Recently, Tony and I attended the monthly lecture by the Audio Engineering Society, where our friends from Meridian were presenting new and potentially groundbreaking research into how we actually hear things, and how much is driven by the sounds of nature. This is uncovering different lines of thinking in terms of perception and neural understanding, aided by the advances in MRI and CAT scanning technology over the past few years.

But it was an announcement made quietly at Apple's Worldwide Developers Conference that kick-started this audiophilic month. It seems that Apple is expanding the use of the Lightning connector on the iPhone to include digital high-definition audio.

This would also allow the removal of

the clunky 3.5mm analogue headphone jack, the prospect of which set the internet aflame. How dare Apple even think about taking away the 3.5mm headphone jack? (I should point out that Apple makes no mention of taking away the 3.5mm audio jack, of course, but the conspiracy theorists have decided that, since the iPhone 6 will apparently be thinner, it won't have space for the socket.) Maybe they're right, but I really couldn't care less whether or not the old 3.5mm socket goes. Lightning is, as I've covered before, a beautifully elegant plug and interface. It can decide, at the time of insertion, how its various pins will be allocated to power and data tasks, and what sort of data it will carry.

The move to headphone audio over Lightning has fascinating ramifications. If you wanted to make a new generation of noise-cancelling headphones, for example, it would be great to bring the processing work back into the iPhone itself, so the noise shaping and cancelling could be done in conjunction with tone shaping and level control of the source material. This way, you could aim for a much higher level of noise cancellation, aggressively countering the ambient noise, and yet do it in a way that's far more respectful of the source material. You could change this processing depending on content, too; the noise cancelling and shaping required for music is quite different to that required for a phone conversation.

By sending digital rather than analogue data out of the device, and allowing the Lightning connector to act as a conduit of digital information, all this can work. Today's solution - where the audio is pumped through the 3.5mm

audio socket into the analogue domain and then processed by the limited capabilities of the circuitry within the headphones themselves - is thoroughly inadequate. If Apple decides to take away the 3.5mm socket, there will surely be a clever adapter that will sit on the Lightning socket to put it back. Just look at the incredible HDMI interface for the iPad: inside that little plug is an entire computer, including an ARM processor, which apparently receives its boot code when you plug it into the Lightning socket.

**“Apple's acquisition of Beats Audio will allow it to rapidly push forward the leading-edge technology within its plugs”**

Apple has shown it can do leading-edge technology within these plugs, and the acquisition of Beats Audio, with its market share of more than 50% of luxury headphones worldwide, will allow it to rapidly push forward this technology. Improved noise cancelling on trains and planes and within motorbike helmets is a force for good and should be applauded.

If I have to fiddle with another damnable micro-USB plug again, I'll end up throwing the device out of the window. Micro-USB is the ultimate in sadomasochistic IT and should have been knocked on the head a very long ago.

Oh, but excuse me, the conductor is about to start again - I have to press Record. Mozart piano concerto, first movement, take eight... **”**



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**Distributed by:** Network Services Company, Australia; Netlink, NZ

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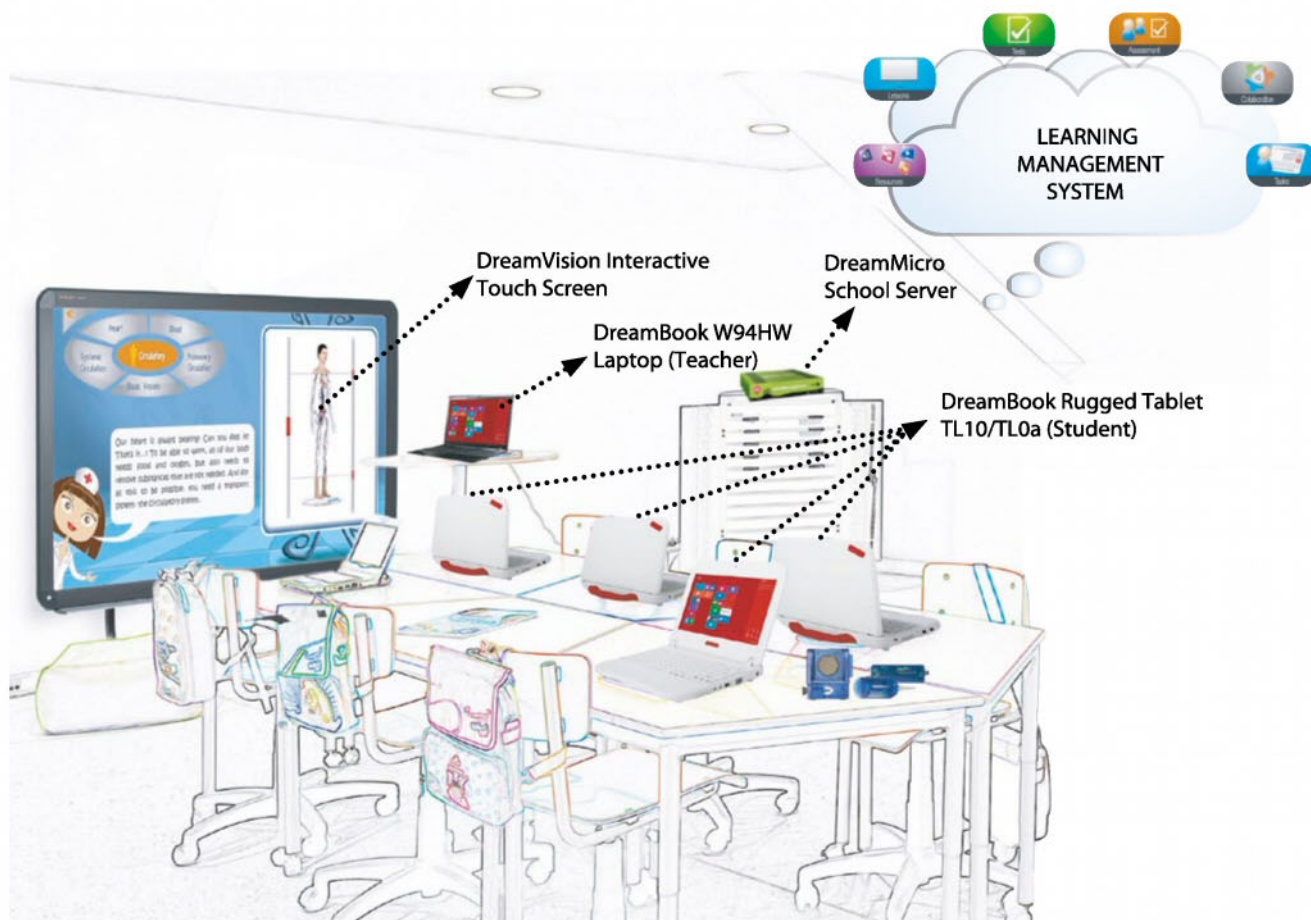


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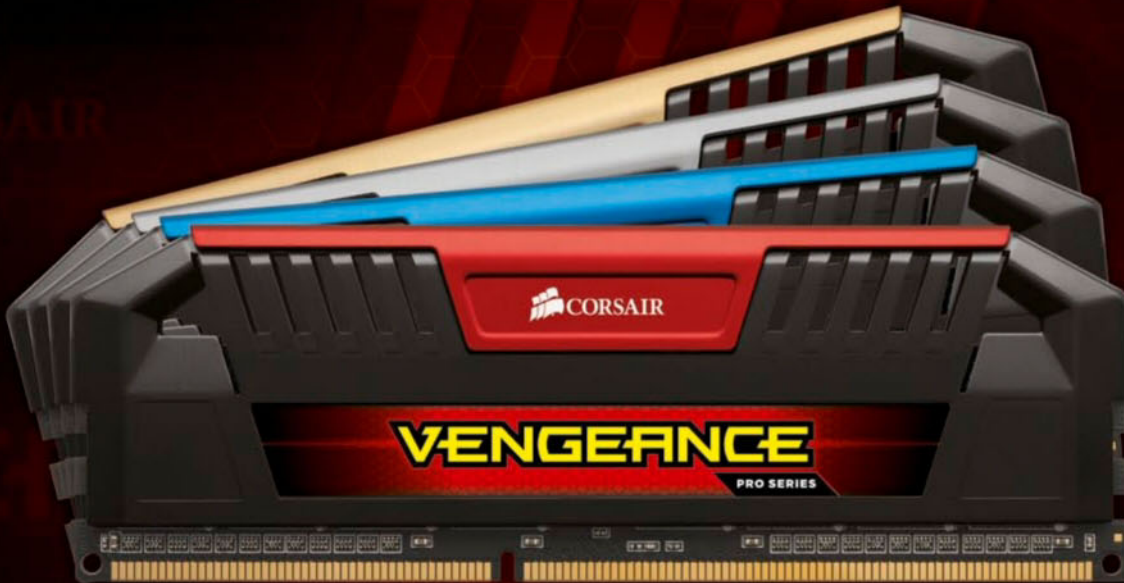
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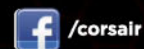
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