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PREVIEW THE YEAR'S UPCOMING GEAR

NEW LAPTOPS, GAMING PCs, HOME AV  
DEVICES, BIZARRE TECH + MORE INSIDE

## HANDS-ON WITH THE HOTTEST NEW TECH

LATEST GADGETS & PCs REVIEWED

- \* DELL'S XPS 13 GOES CONVERTIBLE!
- \* APPLE AIRPOD EARPHONES
- \* SUPER-SMART ROUTER-NAS



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ASUS Australia & New Zealand





EDITORIAL  
UNFETTERED SPECULATION

[ LOVE, SEX, SECRET AND GOD ]

## How to not suck at passwords

MANY OF US ARE STILL LEAVING OUR BEST LINE OF DIGITAL DEFENCE WIDE OPEN;  
HERE'S WHAT YOU SHOULD DO TO PROTECT YOURSELF.

[ DAN GARDINER ]

IT'S BECOME A familiar story: almost without fail, a short time into the new year, news stories start circulating about how terrible and insecure our passwords are. The 2016 list of the most-commonly used passwords once again tells that same terrifyingly mundane story: despite years and years of warnings, many people just can't be bothered with passwords. By scouring data that's been publicly released after major hacks, security firm Keeper Security extracted the login details of 10 million accounts and found that a whopping 17% of users were employing the password '123456'.

I do get it: passwords are hard. Having to invent different logins for every site and service you use would be a monumental task, so the temptation to take shortcuts is perfectly understandable. And I admit that, until about five or six years back, I was fairly lackadaisical when it came to passwords, too — while I took some precautions (like at least making my primary email password and banking logins unique), I had also settled into the habit of reusing a handful of passwords across numerous sites. And in this age of ubiquitous hacks, where even big companies like Yahoo! are at risk, that's just asking to be fleeced. The problem with reusing the same password everywhere should be fairly clear: if just one service gets hacked and that password gets leaked, the hacks will now have the login for all your accounts. With so much of our lives now online, not using unique passwords is like using the same lock on the door to home, car, office and gym locker. Sure, it might be convenient, but it means thieves need just one key to

compromise your entire life.

So how should you go about securing yourself? As we've said on more than a few occasions within the pages of *TechLife*, using a password manager is the best choice. These apps and websites make password security easy by automatically generating and keeping a database of all your passwords — so the only password you'll actually need to remember is the one to access your password manager itself. If you want an all-in-one solution, our current recommendation is LastPass ([www.lastpass.com](http://www.lastpass.com)), a cloud-based service that you can access via the web and also via dedicated apps for Windows, Mac, iOS and Android. LastPass just went free recently, so there's not even a fiducial excuse for not using it. (If you're more of a 'roll-your-own' kind of user, look at the open-source KeePass ([keepass.info](http://keepass.info)) and then perhaps syncing your password database file with a cloud-storage service like Dropbox or Google Drive.)

Account hacking and ransoms are an unfortunate part of the modern computing scene and they're unlikely to go away any time soon, but with secure passwords, you can drastically reduce the damage and impact if you end up a victim. Setting up a password manager is absolutely worth the initial time it takes — and what's more, managing passwords actually become much, much *easier* after you've made the effort. ■



WELCOME  
IN THIS ISSUE

059



# DON'T DELAY: BACK UP TODAY

DON'T WAIT FOR DISASTER TO STRIKE: GET YOUR PC BACKUPS & STORAGE SORTED NOW WITH OUR ANNUAL SUPERGUIDE



[ PAGE 044 ]

*Resident Evil 7, Yakuza 0,  
Let it Die and more.*







015



008

053



058



054

## [ THIS MONTH IN TECHLIFE ]

### Intro

[ 003 ] Editorial

### Hotspot

[ 008 ] Dell XPS 13 2-in-1  
[ 010 ] Essential tech news  
[ 012 ] Apple AirPods  
[ 013 ] The news in numbers  
[ 014 ] Kickstarted  
[ 015 ] ZTE Axon 7  
[ 016 ] Pop science  
[ 017 ] Get psyched!

### Bargain Hunter

[ 024 ] Bargain tellies  
[ 026 ] Affordable back-to-school laptops

### Discover

[ 033 ] Audio dramas  
[ 036 ] Best alternative keyboard apps  
[ 038 ] New apps for every platform  
[ 042 ] Great browser extensions  
[ 043 ] Most-useful websites  
[ 044 ] PC & console game reviews  
[ 048 ] Right game, wrong time  
[ 050 ] Mobile game reviews

### Test Bench

[ 052 ] Synology RT2600ac  
[ 053 ] MSI Trident 3 VR7RC-05SEU  
[ 054 ] EHang Ghostdrone 2.0  
[ 055 ] Braun Oral-B Precision 9000  
[ 055 ] Transcend JetFlash 130

[ 056 ] Belkin Lightning Audio + Charge RockStar  
[ 056 ] Brother PT-P300BT  
[ 057 ] Exolens with Optics by Zeiss  
[ 058 ] Fujifilm X-T2

### Features

[ 018 ] CES special feature:  
The tech of 2017  
[ 084 ] VR: A TechLife primer

### Cover story

[ 059 ] Don't delay: backup today

### Help Station

[ 090 ] Get Windows 10 notifications under control  
[ 092 ] Enhance macOS Sierra's Today view  
[ 094 ] Advanced video editing in iMovie for iOS  
[ 096 ] Troubleshooting Android bugs  
[ 098 ] Minimising mobile data usage  
[ 100 ] Top extensions for securing your browser  
[ 102 ] Your guide to broadband tech  
[ 104 ] Master your DSLR: Lens aberrations

### Buyer's Guide

[ 109 ] The best tech products

### Back page

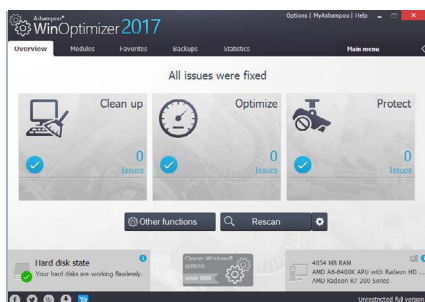
[ 114 ] Ridiculous tech

[ DOWNLOADS ]

# Exclusive software

**FULL-VERSION COMMERCIAL SOFTWARE EXCLUSIVELY FOR TECHLIFE READERS. THIS MONTH, WE'VE GOT TWO GREAT FULL-VERSION PROGRAMS TO HELP YOU GET THE MOST OUT OF YOUR PC.**

**ASHAMPOO WINOPTIMIZER 2017 & ABELSSOFT ANTILOGGER 16**



## HELP YOUR PC RUN TO ITS FULL POTENTIAL

STABILISE YOUR SYSTEM WITH ASHAMPOO WINOPTIMIZER 2017

FULL VERSION REQUIRES ONLINE REGISTRATION.

Ashampoo WinOptimizer 2017 stands for effective Windows optimisation, fixing errors and maintaining a smooth system performance. Various modules enable users to individually customise, analyse and optimise their Windows systems. Version 2017 includes the Win10 Privacy Control for added privacy protection on Windows 10 systems that disables unwanted telemetry and spy features. All cleaning modules have been updated and now support Microsoft Edge.

Download link: [www.ashampoo.com/techlife](http://www.ashampoo.com/techlife)



## THWART RANSOMWARE WITH EASE

FEND OFF MALICIOUS DATA RETRIEVAL WITH

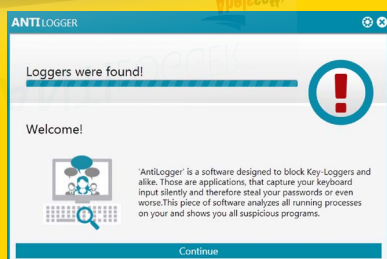
ABELSSOFT ANTILOGGER 16

FULL VERSION WORTH \$29.

Online crime is booming. And the favoured tools of cyber-criminals are perfectly effective enough to provide them with plenty of valuable user data. They can catch many users all too easily with so-called 'loggers' — all the victim needs to do is open the attachment of a spam email or visit an illegitimate website and, thus, the logger will be downloaded and begin embedding itself into the victim's computer. As the name implies, Abelssoft AntiLogger 2016 thwarts their attempts.

Download link: [www.techlife.net/exclusives](http://www.techlife.net/exclusives)

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FIPP



## THE WALL

GUFF AND STUFF



## Save the slides

Compliments on an excellent publication. As I am heading for retirement, I started to look at digitising my 4,000 or so slides several months ago. I weighed up the pros and cons of various possibilities — i.e. getting it done professionally or doing it myself. I chose the latter and bought a manual device which made me realise that I needed a lot of time and patience. I subsequently purchased a semi-automatic second-hand device (PowerSlide 5000) akin to a slide projector but without a lens. It worked well for a while but started to introduce artefacts into the resulting TIFF or JPEG end products. To cut a long story short, I tried to get to the bottom of the problem and contacted the manufacture only to find out that no service was available in Australia. Sending the unit to the US was not a viable option.

There must be more people like myself that want to digitise their precious slides. Perhaps you can do an in-depth article on this somewhat neglected part of technology at some future date.

[ FRED HOETMER ]

*Ed replies:* You're right that photo-scanning is an involved process Fred — we did a big cover feature on converting almost every analog type of media (not just images, but audio and video as well) a couple years back, in TechLife #38 (June 2015). In testing, for that, we found the best option for scanning photos was the Epson Perfection V39 — a \$150 flatbed scanner that's still current two years later. There's no dedicated slide mode with the V39, though if you step up to the next model (the Perfection V370 at \$250, pictured above), it has the built-in capacity to scan 35mm negatives and slides and will do multiple frames at once — up to six negatives or four slides. That should at least speed things up a little bit...



## Backing up photos to the cloud

As a long-term TechLife subscriber, I have read over the years about various apps that can find and sort photos but can't think of them right now. I have photos on my PC, iPad, iPhone and in iCloud and would like

them all stored in the cloud in year order in a format that is accessible from any device. How would you suggest I go about this?

[ VANESSA ]

*Ed replies:* Our current favourite for this kind of cross-device, all-encompassing photo backup is to use Google Photos, which has applications on iOS, Android, PC and Mac that, once installed and configured, will automatically upload any photos on your devices to the cloud. It's free for uploading any photos up to 16MP and videos up to 1080p — if you want higher-resolution (i.e. professional-grade) backups, you'll need to take up a subscription. ■

[ COME ON, HAVE YOUR SAY! ]

We want to hear what you think. Add to these discussions or email your views (in fewer than 250 words) to [techlife@futurenet.com](mailto:techlife@futurenet.com). All correspondence becomes the property of TechLife and is subject to editing. Letters must include full name, street address, suburb, state and phone number to be considered for print publication. Address and phone details will not be published.



## HOTSPOT

YOUR GUIDE TO HOT NEW TECH



[ PUNY BUT POTENT ]

# The perfect portable gets even better

IT'S A LITTLE MORE EXPENSIVE, BUT DELL'S 13-INCH LAPTOP JUST ADDED TABLET CAPABILITIES. IS THIS NOW THE ULTIMATE 2-IN-1?



## Dell XPS 13 2-in-1 (9365)

SPICING UP A LEADING LAPTOP ALL OVER AGAIN.

FOR THE PAST few years, Dell's ever-evolving XPS 13 has been seen as one of the darlings of the laptop PC world. And the 2017 version looks to be no exception. That's because, for this year's model, Dell has finally created a hybrid version of its leading laptop, and it's as versatile and as beautiful as you'd expect. It comes with the same 11-inch frame, and 13.3-inch size screen as its predecessor, but the 2-in-1 design brings a new wrinkle to the XPS range without totally disrupting it.

In other words, Dell will still keep making the traditional version, so don't worry, purists.

### PRICED HIGHER

Dell is starting the XPS 13 2-in-1 at a slightly highish \$2,299, compared to \$1,899 for the regular laptop edition. The base 2-in-1 model comes packing an FHD (1,920 x 1,080) touchscreen with a 7th-generation Intel Core i5 processor with Intel HD Graphics 615, 4GB of RAM and 128GB of solid-state storage.

From there, you can expect the usual upgrades you've seen from the XPS 13 the past few years: an Intel Core i7 processor (still Kaby

Lake), a QHD+ (3,200 x 1,800) touchscreen, up to 16GB of memory and as large as a 1TB SSD. The top spec model costs \$2,790 with various configurations in between to suit your needs and budget.

### STILL SOLIDLY DESIGNED

Once famous for making sturdy but rather pedestrian-looking machines, Dell's sense of design has skyrocketed in recent years, and the XPS 13 2-in-1 is a delight to behold. While keeping the same general look and feel of existing XPS devices, this model adds two hinges made of steel and encased in machined aluminium for additional durability.

The anodised aluminium lid and carbon fibre palm rest make a welcome return, all within the same 11-inch frame as the preceding model. In short, this is the XPS 13 you already know, but with some subtle, yet impactful changes.

The base model weighs in at just 1.24kg with higher spec models being slightly heavier. All models measure just 8mm at their thinnest point and 13.7mm at the thickest. All told,

**DELL XPS 13 2-IN-1 (9365)**  
\$2,299–\$2789.99  
[www.dell.com/au](http://www.dell.com/au)

### CRITICAL SPECS

13.3-inch 3,200 x 1,600 (Quad HD+) or 1,920 x 1,080 (Full HD) screen;  
7th-gen Intel Core i5 (up to 3.2GHz, 4MB cache) or Core i7 (up to 3.6GHz, 4MB cache);  
128GB SATA SSD / 256GB PCIe SSD / 512GB PCIe SSD / 1TB PCIe SSD;  
4GB, 8GB or 16GB RAM;  
Intel HD Graphics 615;  
Thunderbolt 3 with PowerShare, DC-in and DisplayPort; USB Type-C 3.1 with PowerShare, DC-in and DisplayPort; microSD card reader; 3.5mm headset jack  
802.11ac dual-band Wi-Fi, Bluetooth 4.2;  
30.4 x 0.8-1.4 x 1.9cm; from 1.24kg weight





that's a shaving to the tune of 2mm, which is impressive considering the laptop's 2-in-1 trappings. The device is easily held in one hand, and the light weight makes adjusting between its hybrid modes that much easier.

The XPS 13's palm rest feels as comfortable and responsive as ever, as do the glass-covered trackpad and backlit chicklet keyboard (with a satisfying 1.3mm of key travel) — all carry-overs from the previous models. However, one carry-over we wish hadn't is the webcam, which is still positioned below the display near the hinge.

While Dell has wised up and centred the infrared-equipped 720p HD webcam (hello, Windows Hello), it's still going to show off our double chin during meetings. At the very least, you can orient the device in a tent position so that the webcam faces upright.

The last major feature about the XPS 13 to make it into the 2-in-1 iteration is that beautiful, nearly bezel-free InfinityEdge display. The returning IGZO panel is notched at either 1080p Full HD or Quad HD+ resolutions — depending on which

model you choose — but either way, brings plenty of brightness (400 nits), contrast (1,000:1 ratio) and viewing angles (up to 170 degrees).

#### SPECS AND PERFORMANCE

In addition to the handful of things you can change about the XPS 13 2-in-1 before you hand over your cash at the checkout, Dell has loaded the machine with plenty of other goodies. In wired connectivity, you have two USB-C ports (one being Thunderbolt 3, but both can charge), a now-smaller microSD card reader and a 3.5mm headphone socket.

On the wireless front, the XPS 13 2-in-1 comes with the expected 802.11ac Wi-Fi and Bluetooth 4.2 with Miracast and Intel Smart Connect supported.

Now, all of this is powered by what Dell is calling upfront a “lower-power” processor, though both Core i5 and i7 options can reach 3.2GHz and 3.6GHz clock speeds, respectively. That said, Dell has devised a dynamic power management system focused on temperature that should work extra well with a laptop cooler when you

need that extra oomph.

That power management should also help keep the included 46Whr battery powering the whole system for a little longer. Dell promises up to 15 hours of juice from the Full HD version of the XPS 13 2-in-1, while the Quad HD+ flavour will enjoy a still-lengthy 8 hours and 35 minutes — based on its own tests. Of course, your mileage will vary depending on usage.

#### A GREAT 2-IN-1?

We may be barely a quarter of the way into 2017, but Dell has already crafted one of the most impressive laptops of the year. With the public perception of 2-in-1 laptops far better than it was even a year ago, it's picked a good time to bring those features to its leading laptop.

The XPS 13 2-in-1 sacrifices almost nothing in achieving its new design, save for a smaller microSD card reader and a standard barrel connector for power. That said, despite its massive improvements and centring (at last), we're still not exactly excited about the webcam beneath the screen.

We were thoroughly impressed by the now-hybrid XPS 13. Dell's managed to bring a new level of form and function to its most pleasing product for not much more cash to start than the traditional version. We can't wait to see what it comes up with next. ■

ONCE FAMOUS FOR MAKING  
STURDY, BUT RATHER  
PEDESTRIAN-LOOKING  
MACHINES, DELL'S SENSE  
OF DESIGN HAS SKYROCKETED  
IN RECENT YEARS.  
AND THE XPS 13 2-IN-1  
IS A DELIGHT TO BEHOLD.



### LEGAL PERMISSION TO DISCONNECT NEW FRENCH LAW MEANS WORKERS DON'T HAVE TO CHECK WORK EMAIL AFTER HOURS.

In a bid to tackle burnouts and stress in an 'always-on' work culture, the French Government has passed a law that requires companies to negotiate clock-off times with staff, after which employees will have the right to ignore any work-related communication. If no such agreement can be reached, companies are required to publish a 'charter', explicitly outlining expectations and rights of the staff when they're off the clock. [SS]

### THE NOT-SO-SMART SHOPPING SPREE ALEXA SMARTHOME DEVICES ACCIDENTALLY ORDER HUNDREDS OF DOLLHOUSES.

Alexa-powered Amazon Echo devices in numerous homes in San Diego woke up when they heard a TV newscaster say, "I love the little girl, saying 'Alexa ordered me a dollhouse'." All he did was report on a Texan six-year-old asking Amazon's voice assistant if she could order a dollhouse and play with her. The next thing you know, Echoes around San Diego had mass-ordered dollhouses, inundating the California TV station with complaints.

[SS]

### POPULAR CUSTOM ANDROID OS CYANOGENMOD KILLED OFF

BUT SWIFTLY REBORN, WITH A NEW LIFE  
AND A NEW LOGO, AS LINEAGEOS.

There was bittersweet news for lovers of the custom Android OS CyanogenMod late last year, as its parent company Cyanogen Inc abruptly shut down. The upshot of this, however, is that, by being open-sourced, the OS has been born anew under the LineageOS moniker. As this iteration of the veritable phoenix is still quite young, we're sure to expect some fixes and alterations in the coming weeks, but for now, you can follow its progress on [github.com/lineageos](https://github.com/lineageos).

[HD]



[WE MISS THAT GUY ALREADY]

## The post-Cold War chill

AFTER ELECTION HACKING, US EXPELS 35 RUSSIAN DIPLOMATS.

IN RESPONSE TO the alleged email hacking by Russia during the 2016 Presidential election, then President Barack Obama gave 35 Russian intelligence operatives 72 hours to leave the United States over the New Year period. He even blocked Russia from accessing two compounds in New York and Maryland that were used for "intelligence-related purposes" by Russian personnel. Obama also placed sanctions on two Russian intelligence agencies — the GRU and the FSB. And in a bid to expose the Russians, the US released a report of forensic evidence that links the cyberattacks to servers used by Russian intelligence services.

In retaliation, the Kremlin, which denounced the hacking allegations, recommended that Russia should expel 35 US diplomats from their country, stop US personnel from using a holiday home in western Moscow and bar access to a warehouse north of the city. But Vladimir Putin refused to take any action, being hailed by current President Trump as being "very smart".

[SHARMISHTA SARKAR]

[CAN'T TALK, DRIVING]

## Hands-free calls still distract drivers, says Australian study

YOU'RE A BAD DRIVER EITHER WAY.

HARD ON THE heels of the blanket ban on mobile use for provisional drivers in NSW comes a study documenting the effects of mobile phone distraction on road safety, including reaction time and driving performance. The tests, conducted in a driving simulator by a scientist at QUT, revealed that drivers using hands-free and handheld devices had the same decrease in reaction time — 40% longer than those not using a phone at all — and tended to brake excessively.

As the scientist explained, "It appears that the increased brain power required to hold a phone conversation can alter a driver's visual scanning pattern." Meaning drivers look at objects without actually 'seeing' them. But you don't need to keep mum — having an in-car conversation isn't as distracting to drivers as passengers are able to "alter their dialogue based on the driving environment".

With the death toll from road accidents on the rise in Australia — with nearly 1,300 deaths in 2016 alone — the results of this study raises concerns about the legality of using hands-free devices while driving. [SHARMISHTA SARKAR]





[ BIG BADA-BOOM ]

# Samsung explains why the Note 7 went boom

PROMISES IT WON'T HAPPEN WITH FUTURE PHONES.

NUMEROUS EXPLOSIONS, TWO recalls, about US\$5 billion and a four-month long investigation later Samsung has finally solved the mystery of the exploding phone battery in its Galaxy Note 7 phablet. At a press conference held in Seoul recently, the South Korean company announced there were two separate battery defects that caused both the original batch of Note 7s and the subsequent replacements to blow up.

The external casing of the batteries in the original batch of Note 7s that went on sale in August 2016 was too small for the handset, causing the batteries to overheat and ignite. Samsung recalled all Galaxy Note 7s and replaced them with handsets that had batteries supplied by another manufacturer — Amperex Technology. Being in a hurry to roll out sufficient batteries for the replacements, the supplier introduced manufacturing flaws which, along with other minor contributing factors like missing insulation and sharp protrusions, saw the second batch crash and burn. Samsung issued another recall in October and has since pulled the plug on the S-Pen totting phablet. [ SHARMISHTA SARKAR ]

[ #SORRYNOTSORRY ]

# Microsoft admits Windows 10 upgrade push was too aggressive

WELL, KIND OF...

TO MANY USERS, Microsoft's promise of a free Windows 10 upgrade turned sour due to the company's use of aggressive and constant nag prompts. The debacle played out over many months and saw Microsoft seemingly content to ignore complaints from thousands of users who were inconvenienced in varying degrees. One woman landed a US\$10,000 settlement after the update process crippled her office computers, while a member of an anti-poaching group in Africa took to Reddit in a rage after his pay-per-MB connection got hit with the 17GB update.

Along with some pointed security concerns from the community, the majority of complaints were aimed at the sneaky malware-esque approach that Microsoft took with its update prompts, with one example being a red 'X' in the corner of the window that, when clicked, didn't disregard the update as expected, but just scheduled it for later. In early January, Microsoft's Chief Marketing Officer mentioned on the Windows Weekly podcast that the red-X incident was the "one particular moment ... we had gone too far", although he also stated that he thought they "got it right" for a lot of the year and weren't "too aggressive". [ HARRY DOMANSKI ]

[ WWW.TECHLIFE.NET ]

## SNOWDEN'S EMAIL SERVICE OF CHOICE, LAVABIT, HAS RETURNED THE FLOOR IS LAVA ONCE MORE.

On January 21, Lavabit re-launched its webmail service after having to suspend its operations mid-2013 due to a US investigation into Edward Snowden, one of the service's users. Lavabit offers a private and secure encrypted webmail service using the newly released "global standard" Dark Internet Mail Environment (DIME) and Magma, the mail server itself. Two paid options are available with 5GB or 20GB of storage for new users, while existing users can migrate their accounts to the new system. [ HD ]

## AUSSIE POLITICIANS AMONG VICTIMS OF SECOND MASSIVE YAHOO BREACH

MAYBE GOVERNMENTS SHOULD AVOID EMAILS ALTOGETHER?

Late last year, it was revealed that hackers gained access to almost a billion Yahoo users' details in March 2013, and as we've recently learned, some of our high-ranking politicians, judges and defence officials were among them. Information from US security company InfoArmor indicated that more than 3,000 of the login details were linked with Australian Government accounts, which is particularly troubling considering the amount of time hackers have had to exploit this. [ HD ]

## FINALLY, MECHS!

NOW WE HAVE SOME EXTRAVAGANT BATTLES TO LOOK FORWARD TO.

Standing 4 metres tall and weighing almost 1.5 tonnes, the Method-2 is the "world's first manned bipedal robot" — also known as a mech. The machine, which is being developed by South Korean company Hankook Mirae Technology, is designed to allow humans to work in extreme conditions they otherwise couldn't, such as Fukushima's disaster area, offering a protective cockpit where the pilot can control the mech's limbs by moving his own. Flippin' excellent! [ HD ] ■



[ GET AN EAR FULL ]

# Apple AirPods

THE FIRST APPLE-BRANDED HEADPHONES  
YOU'LL WANT TO WEAR.

[ ALAN STONEBRIDGE ]

APPLE'S PREVIOUS FORAYS into headphones managed to elicit mockery from many people, so let's make a couple of things clear about its new wireless AirPods right away: they sound great, and they're surprisingly comfortable to wear for a lengthy duration, even if their visual similarity to cabled EarPods may make you think otherwise. Unlike EarPods, though, they didn't fall out of our ears even once in weeks of testing, though we can't account for variations in ear shapes.

The EarPods that come with the iPhone sound too muffled and lack clarity, so we use them only as a last resort. AirPods, however, are delightful, giving good output with our iPhone set to 50% volume — though background noise can readily leak in since they don't form an airtight seal. Audio quality stayed great even as we cranked up the volume close to max.

Apple's battery-life estimate of five hours from a full charge appears to be accurate, and even a little conservative; with volume at around 70%, we saw about 17% of the battery capacity used per hour.

In Settings in iOS or the Bluetooth pane in macOS, you can customise how the AirPods behave when you double-tap either earpiece. Invoking Siri is the default, or you can opt to play/pause — removing an AirPods also does this, as long as you leave automatic ear detection enabled — or take no action at all. We would have appreciated the ability to skip a track without speaking to Siri or reaching for the iPhone; it's also a pity you can't set a different action for each AirPods.

The silence which sometimes precedes the chime that tells you Siri is listening feels more awkward with the AirPods, as you're reliant on that cue to confirm your double-tap has worked.

That aside, after a couple of days, we found the gesture easy to reliably use.

As for the beamforming mics (there's one in each AirPods's stem), they're meant to focus on your voice and filter out other sound, but our experience was mixed. Indoors and amid moderate noise outdoors, they worked great, but Siri became highly inaccurate near noisy traffic.

If you're wondering about the AirPods' size, yes, we worried about losing them. Just one day after we received them, we found their case had slid up and out of a jeans pocket while we were sitting down — and it took someone else to point it out. Blame the smoothness of the Case, which a little rubber strip for added friction would fix.

The bottom line here is that AirPods sound great and are really comfy, but limited controls and mic performance may irk depending on where you use them. ■



## APPLE AIRPODS

\$229

[apple.com/au](https://apple.com/au)

### CRITICAL SPECS

Bluetooth; Apple W1 chip; dual-beamforming microphones; motion- and speech-detecting sensors; AAC audio; Siri integration; five-hour battery plus Charging Case with 24 hours of additional charge; Pods, 1.6 x 1.8 x 4cm; Case, 4.4 x 2.1 x 5.3cm; Pods, 4g each; Case, 38g



# 3,770



## THE AMOUNT OF VEHICLE SALES TESLA FELL SHORT OF DELIVERING ITS TARGET FOR 2016.

Electric car maker Tesla aimed to deliver 80,000 vehicles in 2016 and only missed out on a technicality, with 76,230 delivered but another 6,450 still in transit — the latter will be counted towards Q1 of 2017 instead. Because of this, the company insists it did still technically meet production goals, which was a 64% increase from last year's production, the biggest spike of which was in Q4 last year. With the offer of free charging being dropped from future Tesla sales, can the electric titan maintain its rising sales?

# The news in numbers

## THE KEY FIGURES BEHIND THE LATEST ISSUES AND TRENDS IN TECHNOLOGY.

[HARRY DOMANSKI]



## HOW LONG IT WILL TAKE BEFORE VIRTUAL AND AUGMENTED REALITY REACH MATURITY.

According to the VP of Qualcomm's Product Management, Tim Leland, we are "at the beginning of a 30-year cycle until we get the ultimate VR/AR device". Leland was quick to add that the short term for both realities still holds exciting developments, like high-tier devices going wireless, and the accessibility of mobile alternatives increasing, but he predicts that the end-goal is a single device that runs on a '5G' connection and can handle AR full-time, and VR when you want it.

[WWW.TECHLIFE.NET]



HOTSPOT  
NEWS IN NUMBERS

# ¥700

## HOW MUCH IT COSTS TO BUY A DETAILED DOSSIER ON ALMOST ANYONE IN CHINA.

If you live in China, your data is more than likely up for sale, thanks in part to 'China's Great Firewall' — a term used to describe government legislation that regulates China's internet, often to the detriment of basic liberties. A number of private and state-owned enterprises use this as an avenue for surveillance, then offer up the collected data for sale. Canada's CBCNews found they could purchase data (with documented proof) on their colleagues' bank records, flights, hotel records and more, for only 700 Yuan or around \$130.

# 10%

## REDUCTION IN IPHONE 7 PRODUCTION FOR Q1 2017 DUE TO SLUGGISH SALES.

Apple saw its first revenue decline in 13 years early on in 2016, and now it's reportedly dropping phone production numbers by 10%, with the new iPhone 7 and iPhone 7 Plus the main target. The cut, which will take place in the first quarter of 2017, is due to the phones being sold "more sluggishly than expected", according to a report by Japanese financial newspaper Nikkei. The new phones' production was already sliced by around 20% before release due to accumulated iPhone 6s stock.

# #1

## INTERNET EXPLORER'S MARKET SHARE CRASHES, AS CHROME ROSE TO BECOME 2016'S MOST POPULAR WEB BROWSER.

Throughout the course of 2016, Internet Explorer lost its place as the most commonly used browser, with its usership dropping from 46% of the previous year to 21%. Although this is partly due to Microsoft having halted its development in favour of the Windows 10 exclusive browser, Edge, it's also due in part to Google Chrome seeing a massive popularity surge, going from 32% to 56% of the market.

[013]





[ CROWDFUNDED ]

## Kickstarted!

FROM THE PRACTICAL TO THE QUIRKY TO THE DOWNRIGHT STRANGE, CROWDFUNDING WEBSITES HAVE ALLOWED THE CREATION OF AN AMAZING RANGE OF PRODUCTS. HERE'S A SELECTION OF LATEST PROJECTS THAT PIQUED OUR INTEREST.

### Catspad

#### THE SMART CAT FEEDER

catspad.com/en | Goal: €30,000 | Raised: €68,784 from 281 backers | RRP: €219

They say “a healthy cat is a happy cat” and the Catspad is a smart food and water dispenser for your favourite furry friend designed to that end — encouraging them to eat as they would in the wild, ie. small amounts more frequently, rather than large meals a couple of times a day. By connecting with an app on your phone, you can schedule your Catspad to dish out food for your cat while you're out of the house. But it's not just a remote control. This also lets you monitor your cat's intake of dry food and filtered, running water, so you can make sure your friend is eating and drinking properly. In our opinion, though, we think the smartest thing about the Catspad is its ability to detect individual cats through their microchips and monitor their individual intake.



[ SAD TROMBONE ]

### Failed Crowdfunder of the Month

SOMETIMES, EVEN THE MOST SUCCESSFUL CROWDFUNDED PROJECTS DON'T MAKE IT TO YOUR FRONT DOOR...

#### LILY DRONE

#### THE AIRBORNE CAMERA THAT NEVER QUITE TOOK OFF

www.lily.camera

Despite being named as one of the most transparent crowdfunding campaigns, the Lily drone unfortunately never got to the distribution phase. The Lily journey was not a smooth one, as a fake campaign was created on IndieGoGo in the company's name to scam backers. With worry heightening from supporters regarding the lack of regular demonstration videos, the early signs were there, warning about a company that didn't quite know what it was doing with the US\$34 million that it had raised in pre-orders. In the middle of 2016, the project was suspended and delivery times pushed back. Then eventually, in early January 2017, the team behind the Lily announced to backers that the company had decided to “wind down” and “offer refunds to customers”. While backers will walk away from this hopefully not out of pocket, that fact will be rather bittersweet for most, who had hoped and waited for a fairly cheap flying camera to follow them around and record their activities. This is a sad reminder that even crowdfunding campaigns that far surpass their goals don't always succeed.



#### ONEMICRO

#### SURROUND SOUND WITHOUT WIRES

www.oneaudio.cc | Goal: HK\$100,000

Raised: HK\$752,818 from 177 backers

RRP: ~HK\$2,220

“ONEmicro surround will bring you a listening experience far beyond your imagination.” While this might sound like optimistic sales talk, the company behind this system, ONEaudio, is on its third successful crowdfunding campaign, so it's no stranger to the arena. Coming in a selection of different kits — 2.1, 5.0 and 5.1 — the ONEmicro is a powerful system that is truly wireless and small in form. It boasts 3D surround sound, 20 hours of play on a single charge (and can be charged while playing), utilises digital enhanced cordless telecommunications (DECT) technology, comes with a mini media server and sub, and is capable of playing high-res audio. It can connect to your TV, CD player (what are those, again?), PC or smart device and comes in a variety of colours.



#### ACCESSPORT

#### HIGH-RES AUDIO AMPLIFIER FOR IPHONE 7 + CHARGING

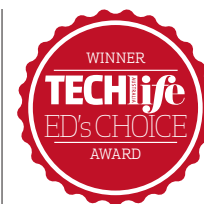
www.adv-sound.com | Goal: US\$10,000

Raised: US\$77,086 from 1,878 backers

RRP: US\$59.99

Advanced Sound is an established company that is super passionate about music. This is one of many crowdfunding solutions to the iPhone 7's lack of audio jack ‘problem’, but this one offers more. Capable of true lossless music playback while also charging your phone — all through a single Lightning port — the Accessport is small but powerful enough to drive headphones with 300ohm impedance. The way it works is that the digital audio signal comes from the iPhone, is decoded inside the digital-to-analog converter onboard the Accessport, and then the analog signal is amplified and delivered to your headset as high-res audio. It features three audio buttons (volume up, volume down and pause), Siri compatibility, and also comes in USB-C and microUSB varieties, so if you don't have an iPhone, you can still enjoy the sound boost.

OUT OF THE BOX, THE AXON 7 CERTAINLY LOOKS AND FEELS ABOUT READY TO COMPETE WITH SAMSUNG, LG AND APPLE, THANKS LARGELY TO AN ALL-ALUMINIUM DESIGN AND PALM-STRETCHING DIMENSIONS.



#### ZTE AXON 7

\$699

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

#### CRITICAL SPECS

Android 6.0.1; 5.5-inch AMOLED display @ 1440p; quad-core 2.2GHz Qualcomm Snapdragon 820 CPU; Adreno 530 GPU; 4GB RAM; 64GB onboard storage; dual-SIM support (or SIM + microSD up to 256GB); 3250mAh battery; 20MP/8MP (rear/front) cameras; 175g

HOTSPOT  
ZTE AXON 7

[ LET ME AXE YOU SOMETHING ]

## Top specs, mid price

ZTE'S AFFORDABLE AXON 7 RECKONS IT'S READY TO TACKLE THE GALAXY S7 AND iPhone 7 — AT A MUCH LOWER PRICE.

[ MATT SWIDER ]

ZTE MIGHT NOT quite be a household name on the Australian Android scene, but anyone who's ever shopped for a lower-priced smartphone will likely have come across the handful of models available locally. With its Axon 7, however, the Chinese phone-maker is venturing out of that entry-level bubble and looking to take on the big boys like the Galaxy S7 and iPhone 7 — albeit still at a more wallet-friendly price point. But does it really have the chops to take on the smartphone kings?

Out of the box, the Axon 7 certainly looks and feels about ready to compete with Samsung, LG and Apple, thanks largely to an all-aluminium design and palm-stretching dimensions. While that finish can make the Axon 7 a little slippery, it ships with an ultra-thin, clear silicon case, which makes the phone grippable without seriously detracting from the style.

With both the easily accessible fingerprint sensor and the company's logo relegated to the back of the device, the front looks incredibly tidy and makes good use of space for its virtually edge-to-edge screen and pair of impressive front-facing speakers.

The ZTE Axon 7's display is 5.5-inches, with a 2,560 x 1,440-pixel (aka QHD) resolution. It's the same resolution as 2015's Axon, but the

important difference here is that it's an AMOLED display instead of an LCD. That may not seem like a big deal at first, but the colours really pop on this screen, and the Axon 7 also has improved battery life as a result of the change.

The Axon 7 has a snappy Qualcomm 820 processor running at 2.2GHz, and 4GB of RAM, matching chip-for-chip what we've seen in the LG G5, HTC 10, Moto Z and even certain regional versions of the Samsung Galaxy S7 and S7 Edge. With 64GB of internal storage and the ability to alternatively use its second SIM slot as an SD card reader, you shouldn't be running out of room any time soon.

What's on the phone right now is extremely close to stock Android Marshmallow (6.0.1) but it will definitely receive the Nougat update (with an announcement expected once in its local testing phase). There is a tidy sum of 12 ZTE apps pre-installed and they're all relatively harmless. You won't find carrier bloatware, either.

With the 3,250mAh battery, we were able to finish each day with anywhere between 15% to 20% juice remaining after 18 hours of mixed use. Our real-life experiences included turning on the screen regularly, snapping dozens of

photos and pumping music through its dual-front-facing speakers for 20 minutes each day.

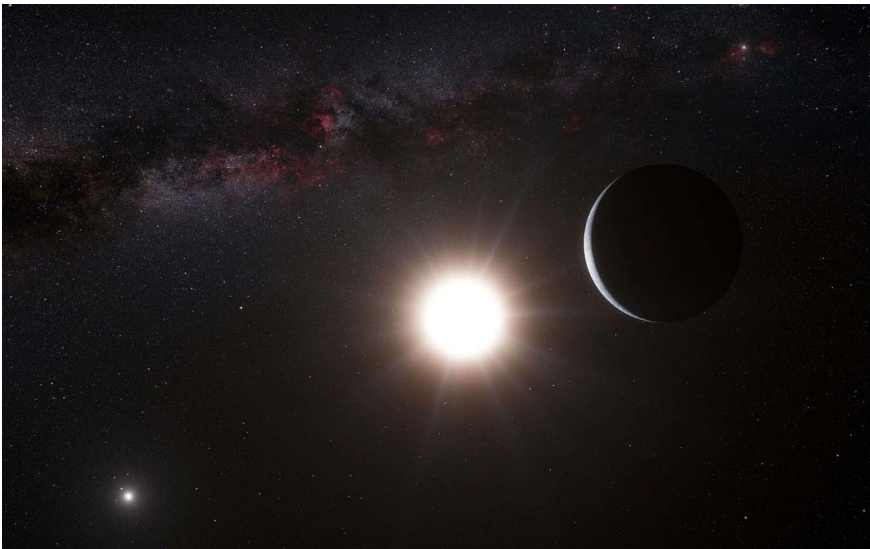
It has a sharp 20MP rear camera, f/1.8 lens and optical image stabilisation (OIS), all of which put it in a class with most early 2017 Android phones, but photos in dimly lit rooms or outdoors tend to be either too dark, or overcompensate for the lack of light by brightening things up way too much.

There's a fix in the form of a manual mode to properly adjust shutter speed, ISO, exposure, white balance and focus. The dual LED flash also helps. It's enough to brighten up dark subjects with some artificial white and amber light.

The ZTE Axon 7 is a beautiful phone at any price. It just happens to also be one of the most affordable top-tier mobile phones that we've ever recommended. It has a minimalist design that places emphasis on the contrast-rich, 5.5-inch AMOLED screen, and has the specs to match almost every existing Android on sale in early 2017.

If you don't care about the very best low-light camera in the world, buy this phone, save your money and take a cheap holiday. It's even dual-SIM compatible, which makes it perfect for traveling overseas... ■





[ I F &amp; % \$ # @ \* LOVE SCIENCE! ]

## Pop science

THE LATEST DISCOVERIES, INVENTIONS AND SCIENCE NEWS THAT'S HELPING SHAPE THE WORLD OF TOMORROW.

[ SHARMISHTA SARKAR ]

### The Very Large Telescope to search for habitable planets in Alpha Centauri

ARE WE ALONE?

The European Southern Observatory (ESO) has teamed up with Breakthrough Starshot to deploy thousands of tiny spacecraft to travel to the Alpha Centauri system to send back images of potentially habitable planets. But before that, the Very Large Telescope — currently under construction in Chile — will be modified to allow it to search for these planets. The modifications will reduce stellar light that drowns out dim planets. Interest in exploring the Alpha Centauri system increased after astronomers announced the discovery of an Earth-sized planet circling Proxima Centauri.



### Monogamy killed the bone in the boner

Every male mammal has a baculum — a penis bone — except homo sapiens. The baculum directs sperm deep into the cervix of female mammals to help ensure insemination — a very important consideration in species with a high level of postcopulatory competition between males (one female for too many males). But as monogamy became the norm in human society, each man in a relationship was fairly certain of his reproductive success, with evolution removing any trace of the bone in a man's boner.



### BREATHALYSERS THAT DO MORE THAN JUST SNIFF OUT ALCOHOL

Turns out a single breath can speak volumes about your insides. For example, foods that disagree with you will ferment in your gut and emit gases. Even diseases release chemical compounds with each breath. And to sort through this breathy smorgasbord are new handheld breathalysers that analyse and identify these chemicals and either help design a suitable diet if there are foods that disagree with you (like gluten or lactose) or diagnose 17 different diseases, from cancers to Parkinson's disease.



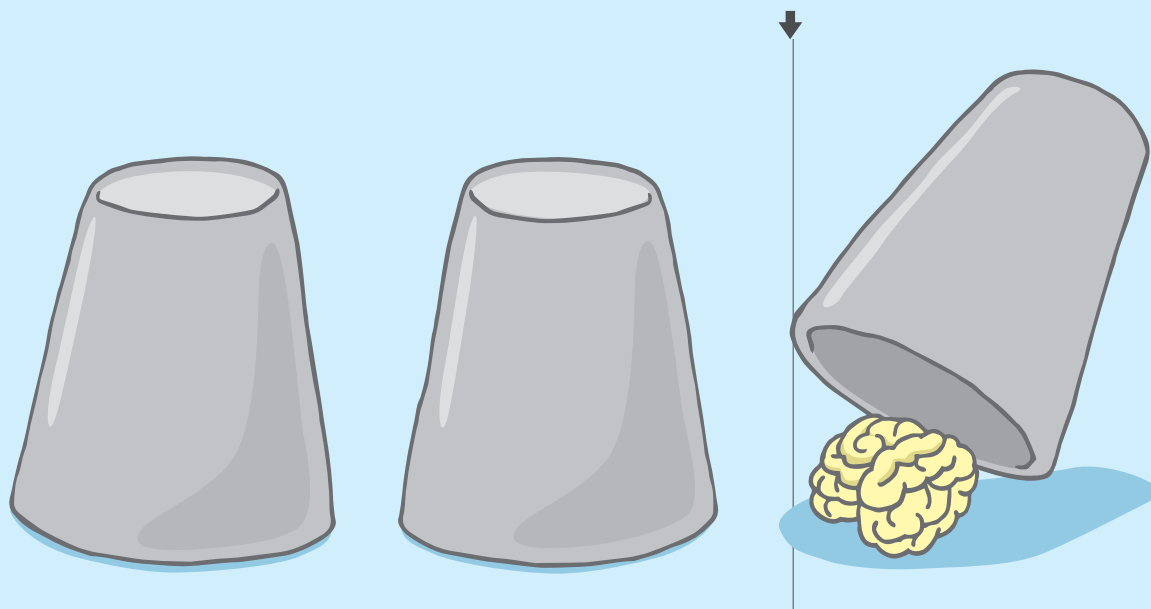
### SIGNS OF AGEING CAN BE REVERSED... IN MICE AT LEAST

The fountain of youth could well be within our grasp, albeit not in liquid form. Scientists at the Salk Institute for Biological Studies in California have managed to reverse ageing in mice by a groundbreaking method that changes adult cells into embryonic ones. This resulted in the mice not just looking younger and living 30% longer, but damaged organ tissue was repaired as well. The news relevant to us is ageing in human skin cells was reversed in a Petri dish.



### LIVING NEAR HEAVY TRAFFIC INCREASES DEMENTIA RISK

A study conducted in Canada has found that people living 50m from high traffic roads are 7% more risk of developing dementia compared to those living 300m away. About one in 10 cases of Alzheimer's could be related to high air pollution. It's been suggested that air pollutants travel to the brain through the bloodstream, leading to neurological problems. This increased risk could also be attributed to the ripple effect of respiratory and cardiac problems caused by the fumes.



[HMM, LET ME THINK...]

# How to beat your cognitive biases

**TRICK YOUR BRAIN INTO MAKING MORE RATIONAL DECISIONS.**

[SHARMISHTA SARKAR]

WE HUMANS ARE rational, thinking beings. Or so we believe. What most of us don't realise is that there are plenty of psychological glitches that make us, well, quite irrational. Cognitive biases — or the involuntary penchant of processing information through the filter of our own feelings, emotions, wants and needs — can often lead us to arrive at decisions drawn in an illogical manner. The good news is that, with a bit of effort, you can get around them — all it takes is a basic understanding and awareness.

## COMMON COGNITIVE BIASES IN DECISION MAKING

There's a handful of biases that impact the decisions we make, but they're by no means the only cognitive biases we suffer from. One of the biggies is the 'anchoring effect', also known as focalism, which is the human tendency to latch on to the first piece of information we receive — the first impression. Anyone who's ever bought a car, house or negotiated a deal will, perhaps subconsciously, know something about this. The initial price set for a house or car will usually have ramifications throughout the negotiations.

For example, people generally react to choices differently depending on how they're presented to them, like how answers can vary depending on the way a question is asked. The framing effect is particularly significant when it comes to making choices involving risk — if the negative aspects of a situation are highlighted, we seem more inclined to take on risks as opposed to when the same situation is described positively. Psychologists attribute this to the fact that the pain of losing is a more powerful motivator than the joy of winning.

Then there's the 'availability heuristic', a mental shortcut that influences decisions by relying on similar concepts or examples that you're already familiar with. To quote the journal *Cognitive Psychology*, "People who read more case studies of successful businesses may judge the probability of running a successful business to be greater," as they can't bring to mind examples of failures.

The often unconscious tendency to deal with information in a manner that reaffirms our preconceptions is called 'confirmation bias'. This makes us want to befriend people who agree with us, or feel uncomfortable around others who make us feel insecure about our views (this often causes 'cognitive dissonance' — aka the discomfort of trying to hold two conflicting ideas in your head). The neurotransmitter oxytocin, the 'love molecule', helps us forge bonds with others, but has the opposite effect with people beyond our group, making us suspicious of outsiders.

Constant negativity also plays a major role in decision-making. When faced with an increasing number of roadblocks, people tend to bulldoze ahead rather than change course, despite that being irrational. The most cited example is financier Robert Campeau's attempted acquisition of luxury New York department store Bloomingdale's in the 1980s after a hostile bidding war. The more heated the negotiations got, the harder Campeau fought to gain control of the company, leading to his eventual bankruptcy.

And lastly, there's 'hindsight bias' — the tendency of people to overestimate their abilities in predicting outcomes of situations that normally can't be predicted. If your friend says the Wallabies will win the Rugby World Cup and they do end up winning, your friend has boasting rights. Also, our mothers have often had 'feelings' that something would come to pass after the fact.

**THE OFTEN UNCONSCIOUS TENDENCY TO DEAL WITH INFORMATION IN A MANNER THAT REAFFIRMS OUR PRECONCEPTIONS IS CALLED 'CONFIRMATION BIAS'.**

## MITIGATING COGNITIVE BIAS

As we mentioned earlier, awareness of your biases is the real key to reducing their influence. Admittedly, staying aware of them can be difficult and, more often than not, we need help. Turn to your best friend or trusted colleague to give you feedback. It might require a certain amount of courage on the part of both of you, but if you can keep an open mind, the feedback can be quite constructive.

While we shouldn't allow negativity to bog us down or lose confidence, a healthy amount of scepticism is always a good thing, as is the ability to admit to your mistakes and take responsibility for failures. Do your best to avoid fads and trends and steer clear of assumptions and, lastly, remember to try to avoid just seeking out confirmation of your current beliefs — instead, look at both sides of the argument and try to objectively weigh the strengths of any disconfirming evidence, too. And hey, you might find that you're still correct — but by using these techniques, you should, at the very least, be a little less biased. ■



Razer's Project Valerie sports three 4K displays, and can now be found on the Chinese version of eBay after being stolen from the floor at CES... Yeah.

## PC GAMING GEAR

### ACER PREDATOR 21 X

US\$8,999 | Available February in the US; AU TBC

In what could only be seen as a show of force from Acer, it has announced the Predator 21 X gaming laptop. It comes with a 21-inch 1080p curved screen (a world first for laptops), two GTX 1080 graphics cards, four 512GB SSD drives and 64GB of memory. Aside from the sheer grunt under the hood, it has premium features like a mechanical keyboard and built-in eye-tracking, as well as four speakers and two subwoofers. As with some of the other excessive gaming laptops we've reviewed over the last six months, it also requires two power supplies to run at full tilt.

### RAZER PROJECT VALERIE

Pricing and availability TBC

Although still a prototype and lacking concrete specs, Razer's bold Project Valerie has one (or three) glaring feature(s). It is essentially a 17.3-inch Razer Blade Pro laptop, but instead of a single 4K display, this thing has three — the other two able to automatically slide out from behind the main display on sets of rails. Despite Razer having a history of its concepts not making it to market (such as last year's 'Project Christine' modular desktop), Valerie was playable at CES 2017 and reportedly ran *Battlefield 1* like a dream, albeit with a lot of noise.

### TPCAST FOR HTC VIVE

US\$249 | Available Q2 2017

HTC's Vive is trying to go wireless, and we've known this for a while as the TPCast has been available for pre-order since November 11, but now the unit has an official price and release date. This adapter should let Vive owners go wire-free for about 90–120 minutes on the standard battery (although an extended 5-hour battery is available), and consists of both a transmitter and receiver, which is how it delivers HD content wirelessly to the headset.

### RAZER PROJECT ARIANA

Pricing and availability TBC

Ariana was another concept-stage prototype from Razer, again focusing on broadening your gaming display, but this time with a projector. Project Ariana will use a fish-eye lens to project your game's display as well as its periphery, better mimicking the natural view of the human eye. It uses 3D cameras to warp the display so it will appear flat no matter what obstacles lie in its way and incorporates Razer's Chroma lighting for further visual

# THE TECH OF 2017

WE ROAMED THE FLOOR AT LAS VEGAS' ANNUAL CONSUMER ELECTRONICS SHOW TO GET A SNEAK PEAK AT THE UPCOMING GADGETS, PCs, WEARABLES AND TRENDS THAT'LL SHAPE THE YEAR IN TECH.



**Above:** The Acer Predator 21 X comes with a 21-inch 1080p curved screen.  
**Above right:** The ASUS VivoPC X can handle VR and lounge room gaming.  
**Right:** The TPCast signals the arrival of a wireless HTC Vive.



Using a fish-eye lens, Razer's Project Ariana is looking to broaden your gaming display to better simulate the human eye.



Perform actions in games using just your eyes — that's the idea behind the Acer PredatorZ301CT curved monitor.



synchronicity. It may seem a bit niche, but Ariana will thankfully also function as a regular 4K projector.

#### ASUS VIVOPC X

US\$799 | Available March in the US; AU TBC

The compact VivoPC X looks to be a VR powerhouse for the lounge room, managing to stuff a 7th-gen Intel Core i5 processor and a GTX 10-series Nvidia GeForce graphics into a 5-litre chassis. This console-esque desktop is aimed at users looking for a PC that can handle the hardware demands of burgeoning VR tech, and as such is compatible with all the latest VR headsets and sports four USB 3.1 and two USB 2.0 ports for plugging in the relevant peripherals.

#### ACER PREDATOR Z301CT

US\$899 | Available February in the US; AU TBC

Acer's 30-inch Predator Z301CT is pitched as "the world's first 21:9 curved monitor with eye-tracking functionality". Along with a 2,560 x 1,080-pixel resolution, the VA panel itself features Nvidia's G-Sync variable-refresh tech and a rate that tops out at 200Hz. The eye-tracking bit comes in via Tobii, a technology which lets you do things in games just by moving your eyes (and is starting to become more useful as the list of supported titles grow), and it also features Acer's ErgoStand which offers plenty of adjustability in positioning for some supreme comfort.



Running both Google Tango and Daydream, the ASUS ZenFone AR has powerful internals and smart camera functionality.

Currently only available in China, the Huawei Honor Magic smartphone boasts some impressive features.

### SMARTPHONES

#### HUAWEI HONOR MAGIC

Pricing and availability TBA

This new Android smartphone might only be available in China (at least for now), but it's been the talk of the town at Las Vegas this year. It boasts a curved AMOLED display, an octacore processor, 4GB RAM and 64GB of internal storage. But that's not what makes this a standout. The front camera uses facial recognition technology to unlock the screen and locks it when you look away, displaying lockscreen notifications only for pre-registered faces. Now, that's magic.

#### CHANGHONG H2

Pricing and availability TBA

For fans of *Star Trek*, the tricorder is just a phone away. The Changhong H2 is a smartphone with a built-in near-infrared spectrometer — technology that shines a light on an object and analyses the unique optical signature of the object. With this tech in the palm of your hand, you can measure body fat, scan nutritional content of food and drink, even detect the authenticity of products. This technology even has the power to detect cancers.

#### BLACKBERRY MERCURY

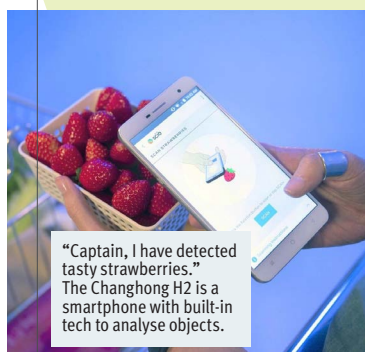
Pricing and availability TBA

There's a new BlackBerry coming in 2017. This as-yet-unnamed phone, dubbed 'BlackBerry Mercury', will be unveiled at the next Mobile World Congress. But what we do know is that it will run Android Nougat and the familiar QWERTY keyboard will still be there, with the ability to scroll through pages by gliding your fingers over the keys. What's new is the fingerprint sensor neatly tucked into the keyboard's space bar.

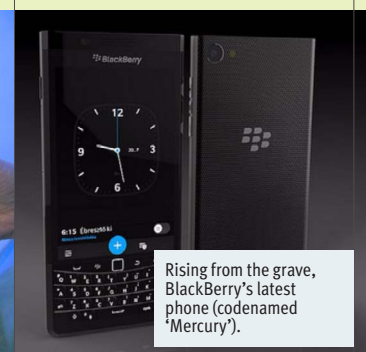
#### ASUS ZENFONE AR

Pricing TBC | Available from June in US; AU TBC

The amazing specs sheet for the ZenFone AR includes a 5.7-inch 2,560 x 1,440 Super AMOLED display, 8GB of RAM, a 23MP motion-and-depth tracking camera system and powerful Snapdragon 821 guts. It's the first phone to run both Google Tango and Google Daydream experiences, making it one of the most futureproof smartphones to hit the market. The ZenFone AR also boasts a Super Resolution in its camera setup that ASUS claims can capture four photos, then stitch them into a single 92MP image.



"Captain, I have detected tasty strawberries." The Changhong H2 is a smartphone with built-in tech to analyse objects.



Rising from the grave, BlackBerry's latest phone (codenamed 'Mercury').



To InfinityEdge and beyond, the Dell XPS 13 2-in-1 hybrid is nicely familiar but with added spice.



## LAPTOPS, PCs & 2-IN-1s

### HP ENVY CURVED ALL-IN-ONE (34-INCH)

From US\$1,729 | Available now in US; AU TBC

There's something quite satisfying about all-in-one computers, and the new HP Envy with a 34-inch curved screen is looking to be a particularly sleek addition to the field. With an elegant flat dock, featuring integrated B&O speakers and a neat radial dial for volume, the Envy seems to land between entertainment centre and PC. The specs will vary, with 7th-gen i5 or i7 processors, up to 2TB HDD storage and other optionals like wireless charging.

### DELL XPS 13 2-IN-1

From \$2,299 | Available now

For the past few years at CES, we've looked to Dell's XPS 13 as one of the darlings of the show, now they finally took the next logical step and went hybrid. The XPS 13 2-in-1 comes in a few different flavours with the top-tier option sporting QHD+ (3,200 x 1,800), 16GB memory and 1TB of SSD storage. Much of the design is carried over from its predecessor, with the welcome addition of sturdy steel hinges and the nearly bezel-free screen. See our full review on page 8 of this issue.

### ASUSPRO B9440 & LG GRAM 14

ASUS US\$1,000; LG TBC | ASUS available mid-2017 in US (AU TBC); LG availability TBA

ASUS and LG have each coughed up new 'lightest in class' 14-inch notebooks, and while they both hover around the 1kg mark, the ASUSPro B9440 technically loses out to the LG Gram 14 by around 80 grams. The ASUS comes in a sleek magnesium alloy frame and sports an impressive Full HD, 14-inch screen given its small 13-inch form factor; however, it is not a touchscreen. The design is quite striking, and as you open the lid of the laptop, an extended section of the lid acts to lift the keyboard, giving it stylish and ergonomic tilt. The LG is actually an improved version of an existing notebook, this time claiming a huge 24-hour battery life (albeit, using decade-old, unreliable benchmarks), as well as Full HD, IPS touchscreen. The Gram's pricing and availability are yet to be announced so it's difficult to comment on value; however, we do know that it will ship in 13-, 14- and 15-inch varieties and offer a range of internal specs.

### LENOVO MIIX 720 2-IN-1

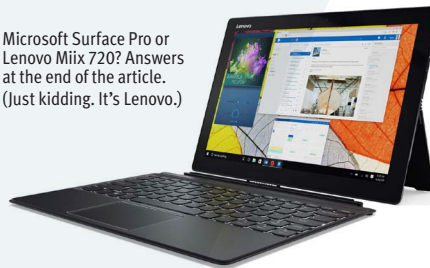
\$1,399 | Available mid-2017

The Lenovo Miix 720 seems to have Microsoft's Surface Pro 2-in-1 squarely in its sights. With a 12-inch QHD+ touchscreen (or 2,880 x 1,920 pixels), up to a 7th-gen Core i7 processor and 16GB of memory, the Miix is plenty powerful. Like the Surface Pro, it can seamlessly morph from notebook to tablet; however, the Lenovo comes bundled with its keyboard and an Active Pen 2 stylus capable of 4,096 levels of pressure sensitivity (four times that of the Surface).



Envious? The HP Envy curved all-in-one PC is highly customisable.

Microsoft Surface Pro or Lenovo Miix 720? Answers at the end of the article. (Just kidding. It's Lenovo.)



The LG Gram 14 'lightest in class' notebook will ship with a wide range of specs and sizes.



## SMART CARS

### FARADAY FUTURE FF91

Production starting in 2018

Faraday Future has finally unveiled something beyond a concept — its first production vehicle, the FF91. It has some amazingly nifty capabilities, such as doors that recognise users/drivers, even adjusting seats to their specifications, and a camera system rather than mirrors. It also claims to accelerate from 0–100 km/h in less than 2.5 seconds, which is faster than any other electric car in production. Although it won't be in production until 2018, the company apparently received over 64,000 global reservations within the first 36 hours of showing it off.



### TOYOTA CONCEPT-I

Pricing and availability TBC

As the name may suggest, the Toyota Concept-i is very much a concept at this point, with no foreseeable production date or price, it's more of an exercise in design than anything. Differing from other smart-cars, The Concept-i is said to focus more on the driver and occupants, with an impressive in-car AI called 'Yui' that learns and adapts to your driving habits. An example given by Toyota was that Yui will offer to take the wheel if it senses you are fatigued from your long drive.



The LG W7 OLED TV is less wall-mounted and more 'wall-stuck', utilising the power of magnets, as well as screws.



The "4K High Res" LG SJ9 soundbar.



Panasonic's Grand Class SL-1200GR.



The Samsung Q Series QLED TV.

## HOME AV

### LG W7 OLED TV

65-inch model US\$8,000 | Available March in US; AU TBC  
The gorgeous W7 OLED TV from LG is designed to stick to your wall, using a series of magnets and screws, and will only protrude 3.85mm. It interfaces via ribbon cable with the included Dolby soundbar, which also houses the TV's connections. The W7 is also packing some seriously pretty punches with Organic LED — the same type of display found in some phones and laptops, but very rarely in screens this size — and naturally they've been improved since LG's previous OLED efforts.

### SAMSUNG Q SERIES QLED TVS

Pricing and availability TBA

Just to add some more confusion to the already misleading acronyms, Samsung has introduced QLED displays, a term which looks an awful lot like 'OLED' when written down. The Q Series uses Quantum Dot technology (hence the 'Q') to accurately display all colours at any level of brightness, and with a wider viewing angle than before. Three options have been announced, with an entry level Q7, a curved Q8 and Samsung's powerful flagship Q9.

### NVIDIA SHIELD (2017)

US\$199 | Availability TBA

Nvidia has already released a few products under the 'Shield' title, none of which have seen official Australian releases, unfortunately. Although there weren't many specs revealed, the latest Shield (below) claims to be a gaming console like its 2015 predecessor, as well as offering streaming of 4K HDR content from Amazon and Netflix, and smart home integration with Google Assistant and a peripheral device dubbed 'Spot'. Let's see if this one will hit Australian shores or not.



### LG SJ9 SOUNDBAR

Pricing and availability TBA

LG tried to sell its latest soundbar as "4K High Resolution", something that doesn't exist in audio. But despite its unfortunate mathematical glitch, this small package packs a massive audio punch. With built-in Dolby Atmos support (two of its myriad drivers are pointed at the ceiling for overhead surround sound), it can up-sample any audio files to 24-bit, while also totally happy to provide an HDMI passthrough option for your games console or UHD Blu-ray deck.

### PANASONIC GRAND CLASS SL-1200GR

Pricing and availability TBA

The revival of the classic SL-1200 turntable continues into 2017. Panasonic brought the Grand Class SL-1200GR to CES this year — a new high-end hi-fi setup with new SB-G90 speakers and a reference-level integrated amp. The SL-1200GR is like its predecessor but with a few tweaks for better performance, the most significant of which is a coreless direct drive system featuring a single surfacing-facing rotor magnet and a 2.5kg platter to help reduce unwanted vibrations.

### SEVENHUGS SMART REMOTE

US\$299 | Available from June 2017 in US & Europe; AU TBC

The Sevenhugs Smart Remote (below) seems like an unremarkable touchscreen device, but it's oh so smart indeed. It's won three CES 2017 awards, including most innovative product in the smart home category, putting the Logitech Harmony range to shame. Point it at any gadget and it calls up the corresponding controls, thanks to three sensors that you place around the house. And because it supports infrared, Bluetooth and Wi-Fi, it can control practically any device in any room.



### [TREND]

#### AMAZON INVADES THE SMART HOME WITH ALEXA

Amazon wasn't a participant at CES this year, but the company's presence was felt everywhere, and felt very strongly indeed — from dishwashers to security systems and even cars, Alexa has been unleashed across the home-front and in the garage. Westinghouse, Element and Seiki are set to launch televisions with the Fire TV software installed and an Alexa voice-controlled remote; LG's added Alexa to a refrigerator and its robot companion called Hub; there are portable speakers and charging docks with Alexa support; and Whirlpool's latest range of home appliances can be controlled (to some degree) with Alexa. Heck, you could even light and heat your home via Alexa. And, not to mention, Ford has partnered with Amazon to make Alexa a driver assistant.

### [TREND]

#### GET USED TO AIRPOD-STYLE 'TRULY' WIRELESS EARPHONES

Truly wireless earphones (i.e. earphones that don't even have a wire connecting one ear to another), have technically been around for over a year, and have been fantasised over long before that. With the recent release of Apple's own AirPods, it's no surprise to see a few hopeful entries into the category at this year's CES. Some, such as the Bodytrak, offer the full "hearable" experience, which integrates smart 'wearable'-style technology like biometric monitoring of multiple vital signs. Affordable options geared more toward pure listening pleasure, often with a fitness slant, were much more prevalent at the summit than the smarter hearable tech — a lot of these being offered around the same \$250–350 price point, hinting at a more consumer-friendly environment for our 'truly wireless' future.



[TREND]  
**MESH WI-FI  
NETWORKING GOES  
MAINSTREAM**

With products like the Linksys Velop and ASUS Hive getting CES announcements, Mesh Wi-Fi networks could become the norm for homes and office networks. Mesh Networking uses a system of nodes that wirelessly and intelligently communicate with each other in order to transmit the signal with minimal loss from one node to another. The parent node is the only device needing to be physically connected to the network source, essentially creating a 'cloud' of connectivity that expands with the amount of slave nodes introduced. The Linksys Velop system allows each of its nodes to act as a router, range extender, access point and bridge, depending on your configuration needs, and claims to dynamically adjust itself for optimal speed. ASUS's offering is rather similar although with two tiers of product, the HiveSpot and slightly toned-down HiveDot, both tiers being able to create a mesh network of 3–5 nodes using its AiRadar beamforming tech.



Roll over, WALL-E, Lego's Boost Robot is going to teach kids how to code.

## SMART HOME & IoT GEAR

### LENOVO SMART ASSISTANT

From US\$130 | Availability TBA

The Lenovo Smart Assistant seems it could be a better version of Amazon's home speakers. It may look like an Echo clone, but there are some differences. Firstly, they come in a variety of colours, and if that isn't important to you, then multiple far-field microphones might be what does it for you — there's seven, as opposed to Echo's six. The premium version of the Smart Assistant comes with Harman Kardon sound, while the regular model is the equivalent of Google Home.

### LG SMART INSTAVIEW AND SAMSUNG FAMILY HUB 2.0

Pricing and availability TBA

Both LG and Samsung have been competing with each other for a long time and the clash of the smart fridges at CES wasn't any different. In terms of features, LG's Smart InstaView and Samsung's Family Hub are quite comparable — touch screens on the front with cameras on the inside that make

shopping a breeze. LG's version runs Amazon's Alexa and has a Windows-based app that taps into Cortana, while the Family Hub taps into Samsung's voice tech. Both fridges are top of the range, with all the bells, whistles and trimmings you could ever need.

### DEFENDING THE SMART HOME

Bitdefender Box, US\$199 | Available now in US (AU TBC); Norton Core, US\$280 | Available Winter 2017 in US (AU TBC)

With IoT devices being hijacked by the likes of DDoS hackers, it wasn't a surprise that protecting a home network was showcased at CES this year. Bitdefender has unveiled the second-generation Bitdefender Box, which makes use of network traffic analysis to maintain your privacy and security. The Box can also notify users how to better secure their smart home and offers access control. And Symantec's first router, Norton Core, has built-in online real-time protection and gives you 20 licences of Norton Core Plus Security Suite.

The Bitdefender Box is a beautiful bit of design.



The LG Smart InstaView fridge sports an internal camera.

## THE WEIRDEST TECH AT CES

NESTLED AMONG THE BIG-NAME STANDS AND 'NEXT BEST THINGS' AT LAS VEGAS' ANNUAL TECH CONVENTION, YOU'LL ALWAYS FIND A WIDE SELECTION OF MORE OFFBEAT PRODUCTS.

CES is a great place for finding the weird and wonderful — things that nobody ever really asked for and that are often, well, unconventional to say the least. Here, we've put together just a small selection of some of our favourite bizarre products from this year's show floor.



### MY SHORTS ARE VIBRATING

What's hotter than hotpants? Well, vibrating ones, of course. The Spinali Design shorts have vibrating sensors on the belt, which connect to the wearer's smartphone via Bluetooth, helping them to navigate busy city streets by buzzing when they need to make a turn. The sensors even buzz for incoming calls and texts — something a smartwatch on your wrist would accomplish just as well, come to think of it.



### BETTER THAN A STICK, WE SUPPOSE

CES has its fair share of oddities every year and this year is no different, with this strangely named connected mini crib. In a bid to transform the way babies sleep, the DockATot Deluxe is touted as a multifunctional dock where the tots can lounge, play, snuggle and rest. But what's a little ominous about this piece of smart furniture is its ability to poke your baby if the crib doesn't detect a heartbeat for more than 12 seconds to make sure bub is OK.



LG's Hub Robot is almost an extension of your arm.

### ROBOT WARS

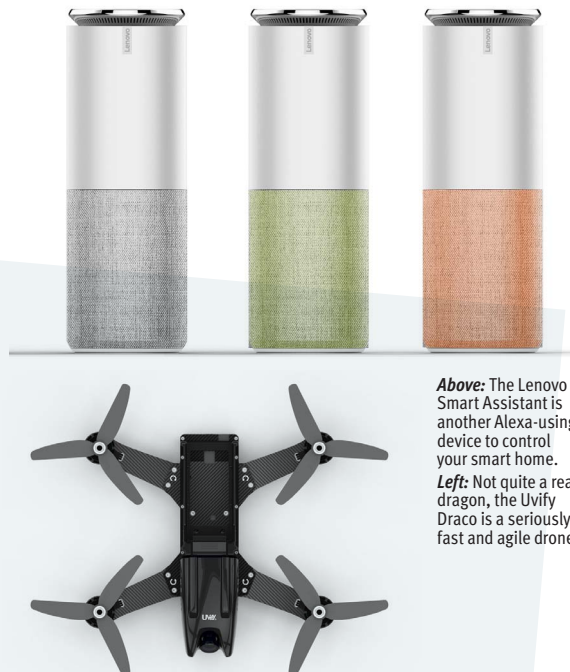
LG pricing and availability TBA; Kuri, US\$699  
Shipping late 2017

It's the year of the robot assistant. LG unveiled Hub Robot, a cute little white blob that can wheel around after you, performing tasks like preheating the oven, initiating the robot vacuum, report the weather, calculate your commute times and play music. And competing with the Hub is Kuri, a robot companion that could well replace a nanny. Kuri can figure out when kids get back from school, then notify parents who could be stuck at work or in traffic. It has the ability to identify individual members of a family and meet-and-greet them differently. It will even play music, read to your kids or record your cat's antics and play back the videos when you get home (the real reason you'd want one).

### LEGO BOOST

Around \$220 | Second half of 2017

Lego is adding another dimension to its familiar building blocks — a coding how-to for kids.



**Above:** The Lenovo Smart Assistant is another Alexa-using device to control your smart home.

**Left:** Not quite a real dragon, the Uvify Draco is a seriously fast and agile drone.

In the hopes that learning to code at an early age could prove useful later in life, Lego has introduced the Lego Boost, a Wi-Fi enabled build set that can interact with motors and both colour and distance sensors to carry out instructions set through a drag-and-drop app. The free app contains tutorials and guidelines on simple coding commands that bring builds to life.

### UVIFY DRACO

From around \$680 | Q2 2017

If you're feeling the need for speed, then the Draco drone will satisfy. This diminutive yet supercharged ready-to-fly racer weighs in at just over a pound when empty and measures only 21.3 x 16.5cm and will zoom up to 160 kilometres per hour. With a full 40-channel FPV (first person view), you can feel the thrill for yourself. With GPS and a 360-degree flip, the Draco is great not just for racing, but even freestyle flight.

### [TREND]

#### SMART CARS BEING ADOPTED BY SMART AUTO-MAKERS

Smart cars are slowly shifting from the realm of futuristic concept to likely reality, and new introductions in the field from several major mainstream car manufacturers have fortified this shift.

Although some of the concepts involve technology such as electric motors and self-driving, the one feature they all seem to share is their integration with AI. Nissan and BMW have both partnered up with Microsoft to integrate Cortana into the dashboards of certain future models, and Nissan also will use Microsoft-powered AI to predict when a transmission failure may occur. Amazon's Alexa will be moving out of her smart home and hopping into a Ford, and Hyundai will be joined by Google Assistant in a similar voice-activated capacity. Toyota's Concept-i stands out, though, with its own digital assistant, Yui, claiming to enhance the relationship between car and driver, bringing the fictitious world of the film *Her* closer to reality.



### SPEAK IN SILENCE (WHILE LOOKING LIKE A BATMAN SUPERVILLAIN)

Ever tempted to get a muzzle for colleagues that constantly chatter away on the phone or to each other? Well, there's an almost Bane-like mask that could be their next Secret Santa gift. The Hushme is a voice mask attached to a pair of Bluetooth earbuds. The mask snaps shut in front of the mouth thanks to strong magnets, but allow calls to be made with conversations shielded, either by muffling or by adding sounds to drown out the speech.



### IS THERE SUCH A THING AS 'TOO LITTLE BASS'?

It's the age of the wearable, so why should your thumping beats be left behind while you're out and about? Now you can snap on this one-of-a-kind watch-size subwoofer onto your wrist — and it's pretty much compatible with any audio device that has a traditional 3.5mm audio-out jack. The Basslet, from German startup Lofelt, is a black box that's... well, just that. Simply plug a dongle into the audio jack of your phone or music player for headphones, play some tunes and the Basslet will gently thump away on your wrist.



### NOT QUITE AS EXCITING AS BEER GOOGLES, BUT CLOSE

Ever wish you had something to tell you when to call it a night before you toppled into a puddle of vomit? The BACTrack Skyn is the world's first wearable that has the potential to provide a detailed assessment on how our bodies handle drinks. It measures a person's transdermal alcohol content (TAC) in near real time without needing to blow into a device, saving you from some rather embarrassing times on your next night out, or the morning after.



## BARGAIN HUNTER

HELPING YOU TRACK DOWN THE BEST TECH FOR LESS

Chinese company Hisense is a lesser-known brand that produces high-quality, stylish TVs at great prices.



[ BARGAIN HUNTER ]

## Snag a bargain telly

HOW TO AVOID THE LEMONS AND SPOT THE DIAMONDS IN THE ROUGH.

[ LINDSAY HANDMER ]

IT'S HARD NOT to be tempted by the now numerous 4K TVs, available in massive sizes for rock bottom prices. But how do you know if they are any good, let alone what features you need? Higher-end expensive models can be bargains, too, but how do you know if it's worth opting for the pricier model? To help out, we have put together a guide to getting the best deal when buying a TV.

## BARGAIN HUNTING

Unfortunately, there is not a single comprehensive go-to resource for comparing TVs sold in Australia, so finding the diamonds in the rough can be tricky. Websites such as **ozbargain.com.au** are an excellent way to find deals on heavily discounted models — though keep in mind that cheap does not always mean good and, thus, a bargain. While many users on OzBargain are knowledgeable enough to give excellent feedback on the specs, it's always worth researching separately to see how a TV stacks up before purchasing. Websites **getprice.com.au** and **staticice.com.au** are also great resources for comparing prices, which can then be used to price match.

## LAST YEAR'S MODELS

Often the best TV bargains can be found by keeping an eye on last year's models

discounted before new stock arrives. With a little luck and a watchful eye, a high-end TV can be picked up for the price of a mid-range one. With the current state of TVs, a year-old model is still quite current, and will still do everything needed.

## WHERE TO BUY

Often big stores (such as JB Hi-Fi, Harvey Norman and various others) will price match, making for an easier and safer purchase than buying online.

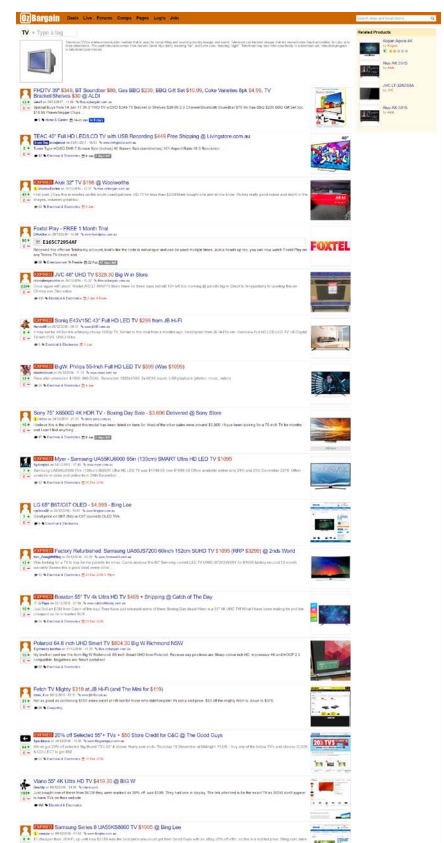
When going to look at TVs in person, keep in mind that the screen settings will be set to look good in a bright store, and won't necessarily reflect what you will see at home.

Other stores, such as 2nds World (**www.2ndsworld.com.au**), can have excellent deals on as new but refurbished models.

## SPECS MATTER

Even the cheapest TV is not a bargain if it doesn't perform well, or does not have the features you need. We have outlined some of the key specs to consider when looking for TV bargains, as well as why they are or are not important.

For most users, 3D support is not needed (but is often included) and curved screens are a personal choice that it's not worth paying much extra for.



OzBargain is our go-to website for deal hunting.



Investing in a surround sound system (even a relatively cheap one) will make your new TV sound a lot better.



## BARGAIN BASEMENT BRANDS

Seeing the latest Aldi specials with a \$499 TV can be very tempting, but is it worth buying? The list of specs might look good, but it's easy to end up with an underperforming model. For a second TV or those who just watch free-to-air, the only deciding factor might be price. But for those who care about getting the best picture quality on a budget, it's worth looking for the gems. Many more affordable TVs use relatively high-quality panels (for the price), but save money on the TV smarts, speakers and enclosure. Our go-to recommendation for a more affordable TV that can still offer some higher-end specs is Hisense ([www.hisense.com.au](http://www.hisense.com.au)). The Chinese company has been stepping it up in the design and quality, without too high a price tag, and can be found at retailers such as JB Hi-Fi. Of course, there are plenty of other great TVs, but make sure you do your research on each specific model.

## OZBARGAIN

Our go-to for deal hunting, OzBargain is a great place to find impressive deals on TVs.

## COMPARE PRICES

Getprice and StaticCE provide an easy way to compare prices for TVs (and other tech) across many websites and stores for price matching.

## CALIBRATION

Follow an online guide to calibrate your screen and get the best image quality from that bargain panel.

## CHROMECAST

For a cheaper TV with basic inbuilt smarts, consider using an external media player, such as a Chromecast.

## AUDIO

Inbuilt TV audio can be of low quality — invest in a separate surround sound system and even a bargain model will sound good.

## HISENSE

For those considering some of the more affordable but lesser known brands, Hisense is one of our top picks.

Make sure to calibrate the TV for your viewing environment and, for many models, detailed guides can be found online. Try Googling it, or checking out websites such as [www.flatpanelshd.com](http://www.flatpanelshd.com).

## PANEL TYPES

Most TVs (especially more affordable models) use LCD screens, and are either edge or backlit. Backlit TVs typically have better contrast ratios, but can be more expensive, and thicker. OLED TVs are much more expensive, yet give the best colours and contrast, and have wider viewing angles.

## SIZE DOES MATTER

Picking the right sized TV for your space is very important, but often it's better to go a little larger, rather than smaller. A good rule of thumb for size is half the viewing distance. So if you sit 3m back from the TV, then a 55-inch to 65-inch model (140–165cm) is a good place to start.

4K TVs (using high-res content) are usually a bit more forgiving to larger sizes up close, and curved TVs can look larger than they really are.

## RESOLUTION

Even quite affordable TVs now sport 4K resolutions, but the extra pixels are wasted unless you have a high-resolution source. In Australia, even HD free-to-air channels are not 1080p, and aside from a few streaming services such as Netflix, or Ultra HD Blu-rays, it's hard to find 4K content. Many TVs can upscale lower-resolution video sources, but on cheaper models, the processing is not always very effective.

While a 4K TV is a good future-proof purchase, don't rule out features or well-priced 1080p models.

## HIGH DYNAMIC RANGE

Only available on quite new (and often higher-end) TVs, HDR means the TV can display a wider range of colours, brighter whites and deeper blacks — in other words, a much higher-quality image, and the difference is very noticeable.

The problem is that, for now, there are few HDR content sources — especially for streaming services.

OFTEN THE BEST TV BARGAINS CAN BE FOUND BY KEEPING AN EYE ON LAST YEAR'S MODELS DISCOUNTED BEFORE NEW STOCK ARRIVES. WITH A LITTLE LUCK, AND A WATCHFUL EYE, A HIGH-END TV CAN BE PICKED UP FOR THE PRICE OF A MID-RANGE ONE.

## SMARTS AND AUDIO

Having a TV with a built-in Netflix app, and the ability to load other apps, is super handy. The problem is that many basic TVs have fairly poor 'smart' systems, and can be slow and frustrating to use. Instead, consider an external media player. Google's

Chromecast ([www.google.com/intl/en\\_au/chromecast](http://www.google.com/intl/en_au/chromecast)) is an excellent choice from around \$50, and uses your smartphone as a remote. More fully featured media players cost \$200 or more, but offer a better-than-built-in 'smart' TV experience.

The same goes for audio — invest in a decent external setup rather than using the inbuilt speakers.

## REFRESH RATES

Given in Hz, a higher refresh rate gives a smoother picture. For normal watching, it's not a big issue, but a refresh rate of 120Hz or higher can help avoid blur or juddering during fast action, especially when watching sports. ■



[ BUDGET SCREENS ]

# Pocket-money monitors

NOT EVERYONE NEEDS A HIGH-END MONITOR, SO FOR THOSE ON A BUDGET OR WHO JUST NEED A BASIC SCREEN, WE'VE COMPARED THE MOST AFFORDABLE OPTIONS.

[ LINDSAY HANDMER ]

TO HELP SCOPE out what was available when it comes to low-cost screens, this month we've put 10 models to the test, with all models priced under \$300. Of course, at this pricepoint, monitors tend towards simpler models, but there are plenty of smaller panels with higher-end features. It's also possible to buy quite competent gaming models, with functionality such as AMD FreeSync and higher refresh rates. While many cheaper screens use basic TN panels, some step up the quality with VA or even IPS displays.

Other affordable productivity-focused monitors include adjustable stands, or have increased power efficiency.

While it's possible to buy affordable LCDs under 20-inches, 27-inches is about as big as you will find without blowing out the budget and going above \$300.

As always, make sure you shop around for the best price — our sister site [www.getprice.com.au](http://www.getprice.com.au) is a great place to start. But don't shy away from big name stores such as JB Hi-Fi or OfficeWorks either, who often have some surprisingly-great discounts and special offers.



## ViewSonic VX2457-mhd

BUDGET AMD GAMERS REJOICE.

FOR THOSE WANTING a better-than-basic gaming experience for as few coins as possible, the ViewSonic VX series is a must see. It comes in three sizes — the 22-inch VX2257-mhd (\$169), the 24-inch VX2457-mhd (also \$169), and the larger 27-inch VX2757-mhd for just \$249. At first glance, the VX screens may seem like run-of-the-mill offerings, with 1,920 x 1,080 resolutions and a TN panel. But going beyond the nice low 1ms response time, the ViewSonic monitors include FreeSync support, and have a 75Hz refresh rate. The tech operates from 47–75Hz, so is well suited to those with mid-range AMD cards who want a buttery smooth gaming experience, but are not chasing super-high frame rates.

The monitor responds well to some OSD tweaks, but considering the price and spec, offers quite decent image quality and a uniform backlight. In testing, FreeSync did an excellent job of eliminating any tearing or stuttering. The VX2457-mhd has HDMI, DisplayPort and VGA inputs, but frustratingly does not include a DisplayPort cable, which is needed to actually use FreeSync.



## ASUS VX239H

AFFORDABLE, YET WELL EQUIPPED.

FOR AS LITTLE as \$230, the 23-inch ASUS VX239H is well suited as an everyday monitor. For those who want the extra quality, it uses an AH-IPS panel, with a 1,920 x 1,080 resolution, wide 178-degree viewing angles, 80 million to 1 smart contrast ratio and an ultra-low blue light production backlight.

The VX239H looks great on the desk, with thin (but not quite frameless) bezels and a minimalistic stand with basic tilt adjustment. We did not experience any ghosting at all, thanks to the 5ms response time, and while not really aimed at gamers, the monitor does have gamer modes.

The monitor is quite bright (250cd/m<sup>2</sup>), with an even backlight and vibrant, accurate colours. The screen has dual HDMI and VGA inputs, with the former MHL compatible for connecting (and charging) mobile devices.

Frustratingly, only an VGA cable is included (not HDMI), and the speakers are expectably tinny.

For those who need a quality 23-inch screen with a few handy extra features, you can't go wrong with the ASUS VX239H.

10

POCKET MONEY  
MONITORS ON TEST

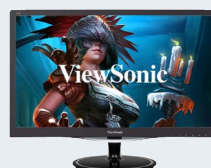
### HOW WE TESTED

Each was tested in a range of scenarios at its native resolution, including gaming, productivity, media playback and web surfing. OSD settings were adjusted for best image quality. FreeSync was tested using an AMD Radeon RX 480.



**VIEWSONIC VX2457-MHD**  
\$170  
[www.viewsonic.com.au](http://www.viewsonic.com.au)

**CRITICAL SPECS**  
24-inches; TN panel; 1,920 x 1,080 resolution;  
HDMI; DisplayPort; VGA



**ASUS VX239H**  
\$230  
[www.asus.com/au](http://www.asus.com/au)

**CRITICAL SPECS**  
23-inches; AH-IPS panel; 1,920 x 1,080 resolution;  
dual HDMI; VGA





## AOC G2778VQ

AN AFFORDABLE GAMING MONITOR.

AT 27 INCHES, the AOC G2778VQ is a decent step up from a 23-inch screen, without too much of a price bump. It features a 1,920 x 1,080 resolution, and has a simple but stylish red and black colour scheme with internal PSU. The G2778VQ is aimed at gamers, with a low 1ms response time and gaming modes such as FPS, racing and RTS.

More importantly, though, the monitor supports AMD FreeSync, and has a 75Hz refresh rate. The screen also has shadow control, which allows the user to improve detail in dark areas without blowing out the whites.

The AOC gives a great image for gaming, but the TN panel doesn't have the colour accuracy or viewing angles of its IPS brethren. The backlight is bright (300cd/m<sup>2</sup>) and quite even, and overall contrast is decent and colours vibrant. We experienced no visible ghosting and FreeSync does an excellent job of eliminating any tearing or stuttering.

Round the back, the AOC has HDMI, DisplayPort and VGA inputs. The inbuilt 2W speakers are nothing special, but handy as a backup.



**AOC G2778VQ**

\$285  
[www.aocmonitorap.com/au](http://www.aocmonitorap.com/au)

### CRITICAL SPECS

27-inches; TN panel; 1,920 x 1,080 resolution; HDMI; DisplayPort; VGA



## Samsung LC24F390FHE

IS IT TIME FOR A CURVED UPGRADE?

FOR THOSE WANTING a better-than-basic gaming experience for as few coins as possible, the ViewSonic VX series is a must-see.

It comes in three sizes — the 22-inch VX2257-mhd (\$169), the 24-inch VX2457-mhd (also \$169) and the larger 27-inch VX2757-mhd for just \$249.

At first glance, the VX screens may seem like run of the mill offerings, with 1,920 x 1,080 resolutions and a TN panel. But going beyond the nice low 1ms response time, the ViewSonic monitors include FreeSync support and have a 75Hz refresh rate. The tech operates from 47–75Hz, so is well suited to those with mid-range AMD cards who want a buttery smooth gaming experience, but are not chasing super high frame rates.

The monitor responds well to some OSD tweaks, but considering the price and spec, offers quite decent image quality and a uniform backlight. In testing, FreeSync did an excellent job of eliminating any tearing or stuttering. The VX2457-mhd has HDMI, DisplayPort and VGA inputs, but frustratingly does not include a DisplayPort cable, which is needed to actually use FreeSync.



**SAMSUNG LC24F390FHE**

\$290  
[www.samsung.com](http://www.samsung.com)

### CRITICAL SPECS

23.5-inches; VA curved panel; 1,920 x 1,080 resolution; HDMI; VGA

## LOW-COST MONITORS BUYER'S GUIDE

WHAT TO LOOK FOR WHEN BUYING  
A BUDGET MONITOR.

### RESOLUTION

Don't accept anything under 1,920 x 1,080, but at the same time, it's hard to find higher on a budget.

### INPUTS

HDMI is best for easy connection, but sometimes DVI or even legacy VGA ports are useful for connecting to older PCs.

### STAND

Even the cheapest screens can be tilted, but for productivity use, look for height and pivot adjustments.

### PANEL TYPE

IPS is the best quality, but VA panels are almost as good, and are usually cheaper with better contrast.

### SIZE

24-inch (often 23.5-inch) is the sweet spot, but a 27-inch screen is worth considering for those who game or just sit a bit further back.

### RESPONSE TIME

Gamers should look for the lowest response time to avoid ghosting, but for day-to-day tasks, higher is not a problem.

### REFRESH RATE

Gamers should look for 75Hz or higher, but most affordable monitors have a 60Hz refresh rate.

### GAMING

Look for extra technologies such as game modes, as well as technologies such as FreeSync which can help eliminate tearing.







## LG 27MP48HQ

27-INCHES OF IPS SCREEN.

AVAILABLE FOR JUST \$250, the LG 27MP48HQ is a remarkably affordable way to upgrade from a smaller monitor. It's not just available from little computer stores either — big retailers such as Harvey Norman stock the screen. The LG offers a 1,920 x 1,080 resolution, with a high-quality IPS panel and a 16:9 aspect ratio. At 250cd/m<sup>2</sup>, it's quite bright, but can be overpowered by high-glare situations.

The 27MP48HQ has wide 178-degree viewing angles, a pretty normal 1,000:1 contrast ratio and includes a splitscreen utility for up to four views at once. The response time is a gamer-unfriendly 14ms (GTG) but it doesn't create any ghosting issues in normal use, or even fast paced video. The panel colours are great, though there is some very mild unevenness to the backlighting.

The LG monitor has a single HDMI input, as well as a legacy VGA connection — though annoyingly only includes a cable for the latter. The screen itself has basic tilt adjustment, and a sleek if somewhat thick bezeled look.



## BenQ GW2270H

A COMPACT OPTION.

MEASURING IN AT 21.5 inches, the little BenQ GW2270H is great for smaller desks or as an affordable second screen. Even better, it costs just \$150, despite using a higher-quality VA panel with a 1,920 x 1,080 resolution.

Sure, it's not quite IPS territory, but the GW2270H offers true 8-bit colour and wide 178-degree viewing angles. VA panels also give great contrast, and the BenQ screen exploits that with a high 3,000:1 native contrast ratio.

The refresh rate is quite good at 5ms GTG, and we did not experience any ghosting in normal use, including light gaming. The screen is rated to display 72% of the NTSC colour gamut, and gives a noticeably better image than a TN screen. The GW2270H looks great on a desk, but only has basic tilt adjustment.

Connectivity falls a little short as well, with DVI and VGA, but no HDMI or DisplayPort.

For those who want a larger screen, an extra \$50 gets the GW2470, with the same specs but a 23.8-inch panel.



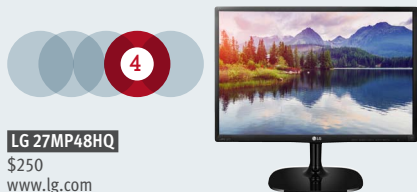
## Dell SE2417HG

GET YOUR GAME ON.

SELLING FOR JUST \$200, the Dell SE2417HG is aimed at gamers on a budget. The 23.6-inch panel has a full HD 1,920 x 1,080 resolution, as well as a 2ms response time. It's a TN panel, of course, with the usual 160 vertical, 170 horizontal viewing angles and an anti-glare coating. As a more affordable screen, it does not have the full Dell stand — just basic tilt adjustment. Round the back, it has dual HDMI, which is handy for plugging in a console and PC, plus a legacy VGA connection.

The SE2417HG is fairly understated compared to some gaming monitors, with the classic Dell style. The image quality is quite good, all things considered, with bright but not over-the-top colours and an even backlight with no real bleed. In our testing, we did not experience any ghosting, and gaming was excellent, but the Dell doesn't have any of the adaptive sync features of its pricier competition.

At the time of writing, the SE2417HG isn't actually available through the Dell website, but is stocked at JB Hi-Fi.



**LG 27MP48HQ**

\$250  
www.lg.com

### CRITICAL SPECS

27 inches; IPS panel; 1,920 x 1,080 resolution; HDMI; VGA



**BENQ GW2270H**

\$150  
www.benq.com.au

### CRITICAL SPECS

21.5 inches; VA panel; 1,920 x 1,080 resolution; DVI; VGA



**DELL SE2417HG**

\$199  
www.dell.com.au

### CRITICAL SPECS

23.6 inches; TN panel; 1,920 x 1,080 resolution; dual HDMI; VGA



## HP EliteDisplay E240

A HIGH QUALITY PANEL.

AIMED AT PROFESSIONALS or those who want top-notch visuals, the HP EliteDisplay E240 provides quality at a decent price. Sure, it's not bargain basement, and you will need to shop around to find the monitor under \$300. But the E240 makes up for it with a 23.8-inch IPS panel with a 1,920 x 1,080 resolution and wide 178-degree viewing angles. Just as importantly, it has an ergonomic stand with a large 150mm height adjustment, as well as tilt and swivel options.

The monitor includes HDMI, DisplayPort and VGA inputs (though only comes with a DisplayPort and VGA cable), plus a two-port USB hub. It's also designed for power efficiency (using 31W) and can have an HP mini PC mounted on the rear for a slim AIO build.

The image quality on the E240 is top notch, with great colours, contrast and even backlighting, though the higher 7ms response time is not suited to gaming. For those who like to tweak their screen experience, the monitor comes with HP's Display Assistant Software.



## Acer G246HL

A SIMPLE 24-INCH MONITOR.

GOING WITHOUT ALL the extra bells and whistles, the Acer G246HL aims to provide plenty of screen real-estate without a high price tag. The monitor is available as a 24-inch model for \$200, or \$265 for the 27-inch version. Both use a TN panel, with the standard 1,920 x 1,080 resolution. It's also got a 5ms response time, 60Hz refresh rate, 100 million to 1 adaptive contrast ratio and a 250cd/m<sup>2</sup> brightness.

While the Acer stand itself looks great on a desk, it only has tilt adjustment — no height or pivot. As expected from a TN panel, the viewing angles are a bit lower than an IPS screen, at 170-degrees horizontal, and 160-degrees vertical.

Colours are fairly vibrant and a bit more accurate after some tweaking, and picture quality is reasonable. The backlight is quite even, though there is a touch of light bleed on the edges.

The G246HL has HDMI, DVI and VGA inputs, but only includes cables for the latter two. While the Acer G246HL is a competent monitor, there are better options for similar amounts of money.



## Philips 241S6QYMB

A PRODUCTIVITY MONITOR.

FOR THOSE LOOKING for a high-quality panel for work or home, the Philips 241S6QYMB has a lot to offer. Rather than a TN panel, the 23.8-inch monitor uses an AH-IPS panel, with wide 178-degree viewing angles. The Philips offers the usual 1,920 x 1,080 resolution, with a 60Hz refresh rate and 250cd/m<sup>2</sup> brightness.

The 5ms GTG response time isn't aimed at gamers, but is still good enough to avoid ghosting during some casual play. The monitor also has a 1,000:1 contrast ratio, which boosts to 20 million to 1 using Philips SmartContrast.

The 241S6QYMB also makes it easy to get the perfect viewing experience, with a fully ergonomic base offering height (110mm down to almost desk level), swivel, tilt and rotation adjustments.

We found the panel needed some minor colour adjustments out of the box, but overall gives a vibrant image with very even backlighting. The inbuilt speakers are a little tinny, but perfectly fine for watching that funny YouTube video. The 241S6QYMB has DisplayPort, DVI and VGA inputs, but no HDMI.



### HP ELITEDISPLAY E240

\$289  
www.hp.com

#### CRITICAL SPECS

23.8 inches; IPS panel; 1,920 x 1,080 resolution; HDMI; DisplayPort; VGA



### ACER G246HL

\$200  
www.acer.com

#### CRITICAL SPECS

24 inches; TN panel; 1,920 x 1,080 resolution; HDMI; DVI; VGA



### PHILIPS 241S6QYMB

\$250  
www.philips.com

#### CRITICAL SPECS

23.8 inches; AH-IPS panel; 1,920 x 1,080 resolution; DisplayPort; DVI; VGA





## DISCOVER

ESSENTIAL APPS, TOOLS AND ENTERTAINMENT

[ STOP IT! ]

# Apps for breaking bad habits (and creating positive new ones)

GET GOAL-SETTING TO THE MAX WITH THESE CLEVER SELF-HELP APPS FOR ANDROID AND IOS SMARTPHONES.

[ TIM BOTHWELL ]

EVERYONE HAS HABITS they wish they didn't. Nail biting, smoking, excuses for avoiding physical exercise — behaviours that often prevent us from being the best we can be. While the new year is perhaps the most common time of year for goal setting, the likelihood of actually achieving those goals is highly dependent on the level of drive we have to succeed in them.

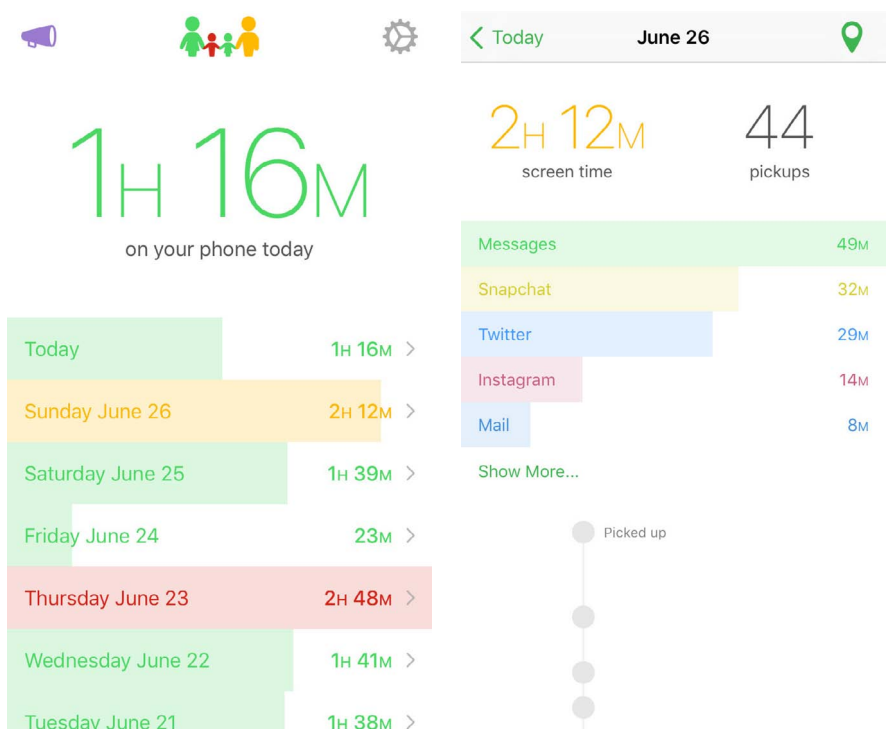
If you've fallen off the new-year resolutions wagon, don't fret, because help can be just a tap away. With smartphones usually within an arm's reach, our portable computers can offer an easy and reliable way of tracking and monitoring our attempts towards living a better lifestyle — acting as a source of motivation for breaking bad habits and setting better ones. Here we've looked at a range of apps designed to help establish long-term change, as well as ones designed to strengthen important life skills like budgeting and improved mental health.



**Moment**  
Free with IAP  
inthemoment.io

Smartphone addiction is becoming more and more of a problem in today's digitally-connected society. Many of us seem glued to our smartphones for the majority of the day. Go to any cafe and you'll see couples sitting in silence as they browse Facebook, check their emails and post fancy food photos to Instagram. Moment tracks your usage to show just how much you actually interact with your smartphone throughout the day, with the results likely to surprise you.

Follow the instructions to be provided with a list of apps you use most and for how long over a 24-hour period. While the app is free, more advanced features like usage restrictions requires a paid subscription.





**PACT**  
Free  
www.pactapp.com

Countless times I've set an alarm with the intention of hitting the gym before work, only to repeatedly tap the snooze button until it's too late. A more attractive option is Pact — an app that offers a financial incentive for your exercising efforts. Simply select a health goal for the week, whether it's to go running, visit the gym or eat healthier foods — along with how much money you're willing to put on the line. Throughout the week, you'll log your activities — checking into the gym using GPS, tracking walks using your phone's accelerometer, or taking photos of meals that will be verified by other users. If you manage to achieve your goal at the end of the week, you'll receive a financial incentive sourced from those failing to meet their target.



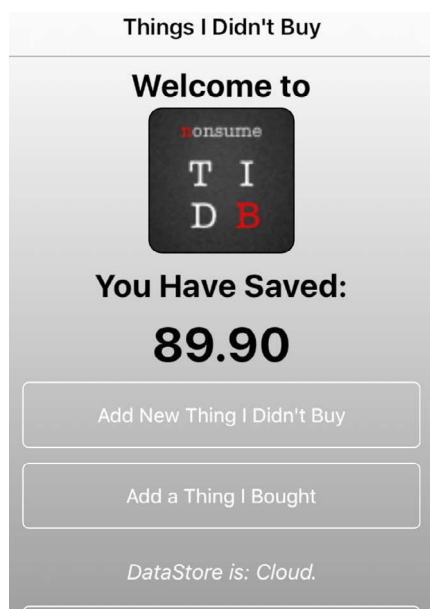
**DAYBREAK**  
Free with IAP  
www.hellosundaymorning.org

Alcohol is a major part of the Australian way. While there's nothing wrong with having a glass after a long day at work, it's the tendency to consume excessive amounts on a daily basis that can have a detrimental impact on one's health. This subscription-based app attempts to change the negative relationship you might have with alcohol. Begin by answering a few simple questions about your drinking behaviour and what you wish to change. Daybreak will then provide guidance and motivation to help change your drinking habits for the long-term. Using a community-based approach, you're able to share any thoughts and feelings experienced during the journey to better health.



**WAY OF LIFE**  
Free with IAP  
wayoflifeapp.com

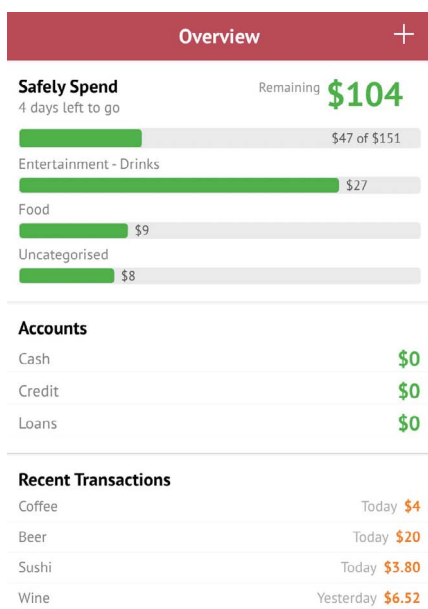
Another habit-setting app, Way of Life makes recording and tracking as simple as responding 'yes' or 'no'. With days marked as either green or red, you can quickly see how you're going for the week. Notes can be added to explain why you didn't attend the gym today (or any other day of that week). This app's real strength comes in its long-term tracking abilities. As you continue to add data, graphs and charts show your progress for up to two years in the past — helping to recognise meaningful trends around your performance. While the free version allows monitoring of up to three tasks, a one-time fee gives you unlimited goals, cloud backup and the option to set multiple reminders.



**Things I Didn't Buy**  
Free  
nonsume.com/tidb

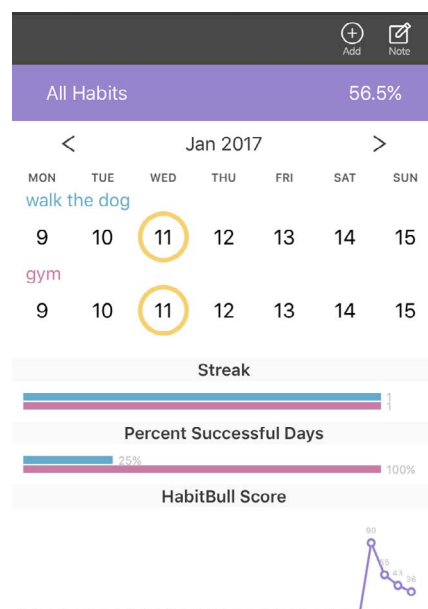
The internet is home to a global marketplace of products available for purchase at a mere minute's notice. Glancing around my room, I see the many things I've previously bought online — rollerskates, Nickelback vinyls, white-coloured fedora... While they might've seemed like great bargains at the time, I now realise how much money I've wasted on things I simply didn't need.

This app keeps tally of the money you've saved by NOT buying meaningless crap. Along with an item's price, you can add a photo, description and how desperate you were to buy it. The list is synced to the cloud, with the app categorising and presenting products visually in a handy graph and pie chart.



**Pocketbook**  
Free  
getpocketbook.com

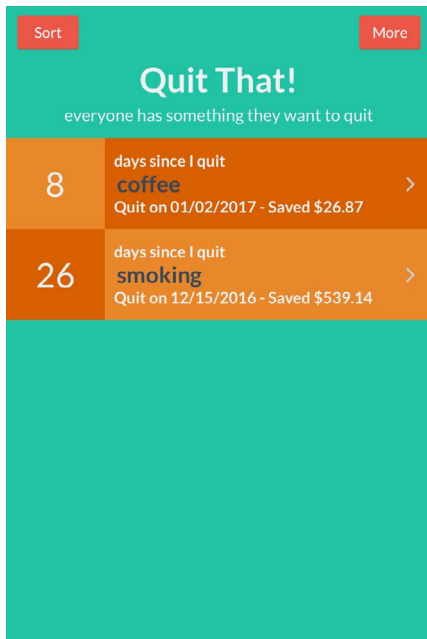
After reviewing my spending over the festive season, I now have a strong inclination to get better at budgeting. While I appreciate friends willing to provide money for the charity of 'me', it is in the days following when they ask for it back that I'm forced to awkwardly explain that I took their cash as a gift with a no-returns policy. The Australian-made Pocketbook attempts to track your spending to help you save money. Set a spending limit based on the amount you wish to keep each week. By securely linking directly to your various bank accounts, Pocketbook monitors your numerous sources of income and expenses, with transactions automatically categorised. The app can even detect ongoing bills and notify you when they're due.



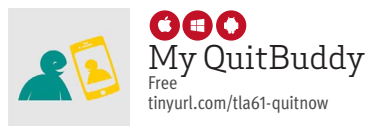
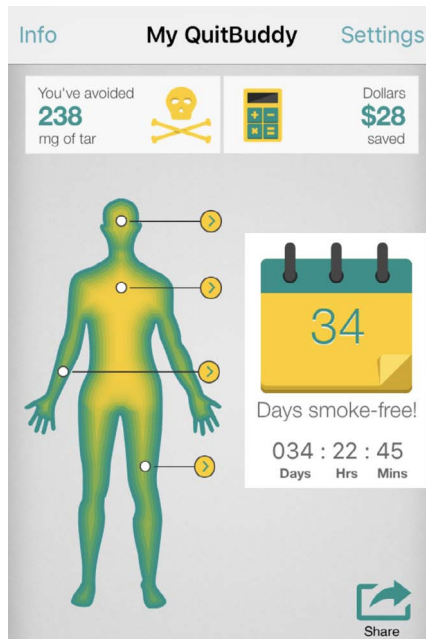
**Habitbull**  
Free  
www.habitbull.com

While starting a new habit might seem easy at first, actually sticking to it long-term is another story entirely. In fact, this app claims it takes over 60 days for changes to become permanent. Habitbull allows you to track and monitor almost any task, whether it's related to health and fitness or a little bit of spring cleaning. Habits can be tracked either by responding yes/no (Did I go to the gym?) or using numbers (How many minutes did I meditate for?). You can also customise tasks to be completed on certain days or number of times each week. The app provides a percentage score for days you're successful, as well as presents progress in chart-form.

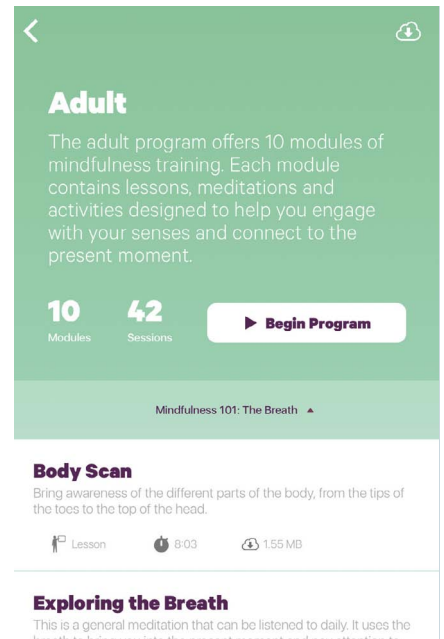




There's something truly satisfying about seeing how ending bad habits can positively impact your day-to-day life, namely your financial ability. For example, the amount of money I spent on coffee last year was enough to buy a new iPhone. Quit That is an app that allows you to see just how much you're saving by kicking a bad habit. Just enter the amount you'd normally spend on something (such as alcohol or cigarettes) in a typical day, and you'll be provided with a running total of how much money you've accumulated by quitting. You can also see and share how many days, hours and minutes it's been since you stopped the bad habit.



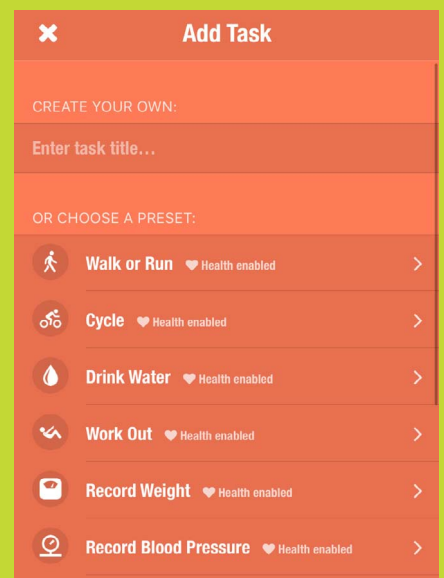
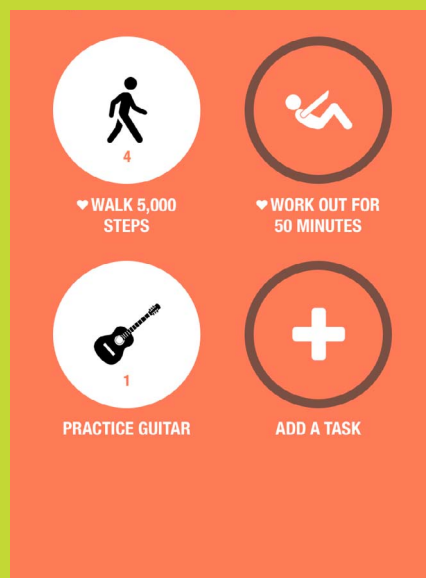
Ask anyone who's attempted to quit and they'll tell you just how difficult it is. My QuitBuddy attempts to offer a source of motivation and guidance. Begin by choosing whether you want to quit now or later, along with some basic details about yourself and the amount you tend to smoke. The app will then provide daily tips and support to help you stay on track. As the days accumulate, you'll see how much money you've saved, as well as how your decision to quit is improving your health. If you find yourself craving, the app features the ability to set goals featuring photos, text and voice to help remind you why you've decided to quit.



While many of us tend to set goals focused on the physical aspects of our lives, it's also important to take a step back and think about the state of your mental health. Meditation is a scientifically proven way to help reduce stress, increase mindfulness and make us more conscious of the thoughts and feelings experienced during our day-to-day lives. Smiling Mind is an Australian app designed to help people of all ages. Included are programs for both kids and adults, with sessions varying both in style and duration. The app also asks you to 'check-in' with yourself before and after your meditation — useful to determine how it's improving your mental health.



Breaking bad habits and setting better ones should be as hassle-free as possible. This app makes tracking your progress extremely easy. Streaks allows you to track up to six different tasks, whether it's finishing a book, going to the gym or taking the dog for a walk. The app even talks directly with Apple's Healthkit to automatically monitor and check off fitness-related tasks such as walking or climbing flights of stairs. Tasks can be assigned to certain days of the week, along with colour and icon tagging. Reminders can be set to help you stick to your guns, while statistics of your best streaks indicate how you're progressing.





[ TALK THE TALK ]

# Podcasts that have a story to tell

WHY READ WHEN YOU CAN HAVE STORIES VOICED FOR YOU?

[ CARMEL SEALEY ]

DINNER NEEDS PREPPING, the clothes need putting away, the floor needs vacuuming, the kitty litter needs emptying... when am I going to have time to start on my pile of shame? Does this sound like you? At *TechLife*, we love podcasts, and one of the most obvious angles to take a production is along the winding, treacherous, exciting, romantic, adventurous, scary, jaw-dropping, shocking and heart-wrenching road that is the radio drama. A quick search online will reveal a glorious number of potential tales waiting for your eager ears so, once again, we've realised we're going to have to cover this topic across multiple issues. Humans have been telling each other stories since the dawn of our era, so plug in your headphones or turn up the volume on your stereo and continue that great tradition.



**Limetown**  
www.limetownstories.com

This production is masterful to say the least. Fans of *Serial* and *Criminal* (issue 54, page 27) will immediately appreciate the style of this podcast, as rather than adopting a normal narrative form to tell this thrilling story (like the other examples here), this is a fictional investigation. Through snippets of recorded interviews and narration, the character Lia Haddock delves into the mystery of Limetown and its missing citizens. It's gripping from the get-go and may even bring you to tears.

[ WWW.TECHLIFE.NET ]



**Sherlock Holmes Adventures Podcast**  
tinyurl.com/tla61-sherlock

This one is old, really old. These episodes have been digitised from the original radio plays from the '40s, '50s and '60s. While the quality of the audio is a bit shaky, there's a definite charm to this production, and the pomposity of Sherlock is hilarious. Episodes are either an hour or half an hour long, so getting through them is a breeze. If you're a fan of Sherlock Holmes (either from the books or the latest BBC production with Eggs Benedict Cabbage Patch), then you'll enjoy this one.



**HOME FRONT**

TINYURL.COM/TLA61-HOMEFRONT

Back in 2014, the BBC released a short podcast episode each day covering a story happening on that date back in 1914 for their WWI special coverage. Each episode follows a different person in the UK during the Great War attempting to maintain some sense of normality in their lives — farmers, policemen, widows left behind... Familiar characters pop up from time to time, but it's more about developing the overall country's story rather than huge sweeping narratives about individuals.



**TRACKS**

TINYURL.COM/TLA61-TRACKS

This second BBC production we're featuring this month is a well-crafted thriller. The story revolves around a doctor who witnesses a terrible plane crash. She begins to investigate why the accident occurred and gets caught up in a conspiracy involving her estranged father and the mysterious information he wanted to tell her. Starring Romola Garai, it's a gripping story and to say anything more about it would be to venture into spoiler territory. The BBC truly is a playground for podcast-lovers, and we'd highly recommend frequenting the site.



**WORMWOOD**

WORMWOODSHOW.COM

Dr Xander Crowe is quite the character and you'll want to follow him on his strange journey to Wormwood, driven by a vision he had of a murder. What appears to be a peaceful and idyllic town soon evolves into a complex web of mystery with a touch of horror and the supernatural. Currently in its third and final season, this is a nicely long story for you to get your teeth into. ■



[ TECH OF TOMORROW ]

# Get hands on with emerging tech

**TECHLIFE'S PRACTICAL MONTHLY ROUNDUP OF ALL THE LATEST VIRTUAL REALITY AND AUGMENTED REALITY APPS AND EXPERIENCES, ALONGSIDE AI-DRIVEN BOTS AND OTHER USEFUL TOOLS.**

[ JOEL BURGESS ]

WITH RUMOURS BUBBLING that Apple may be releasing its own HoloLens-like AR headset in 2017, it might be the year the neglected sibling of alternate technological realities becomes a thing to really get behind. Or rather, it would have been, if tech website The Information hadn't recently revealed that much of the technology underpinning the \$1.4 billion venture-capitalist-backed Magic Leap headset is still nothing more than a concept...

Never to be overshadowed, virtual reality is pushing ahead with announcements of massive improvements in smartphone VR thanks to Qualcomm's upcoming high-end Snapdragon 835 chips, which include notably better position and orientation tracking. Add to this a partnership between Oculus and the BBC Earth team to create immersive nature documentaries, alongside the Vive's addition of an 'any object' VR remote attachment and there'll be plenty to suck you into VR this year.

Finally, AI chatbots are infiltrating and succeeding in areas that you would never expect them to, whether that's standing-in as the man of your dreams, or providing genuine psychological evaluation and treatment to vulnerable individuals — as we've found this month, there is a number of surprisingly practical applications for the chatty software.

## VIRTUAL-REALITY APPS & GAMES



[GEARVR, OCULUS, VIVE]  
**Chernobyl VR Project**  
\$7.99 GearVR, US\$9.99 Steam, \$10.49 G2A | [www.chernobylvrproject.com/en](http://www.chernobylvrproject.com/en)

Ground zero of a nuclear reaction isn't a place you want to go traipsing around — even 30 years after the massive Chernobyl disaster, the employees maintaining the site's concrete radiation sarcophagus have specifically choreographed work shifts to avoid a nasty bout of radiation poisoning. It's good news, then, that Polish 3D graphics design company Reality 51, decided to recreate the irradiated Chernobyl landscape so you can see it without risking any side effects. The team have even reintroduced some frightening historical elements and a revealing narrative to give you a more visceral and haunting experience.



[HTC VIVE]  
**VR Alzheimer's therapy App**  
Free  
[tinyurl.com/TLA-61-Alzhe](http://tinyurl.com/TLA-61-Alzhe)

It seems that VR may be the unwitting foundation for some advanced medical tools. Following the release of a research paper late last year that uncovered an inhibitive effect of flashing lights on the progression of Alzheimer's disease in mice, a young redditior pleaded with the online community for an analogous human solution. In response to this request, Samuel Sekandagu, a developer from the Vive software studio Overflow Games, created and uploaded to GitHub, a working open-source software prototype for the experimental therapy.



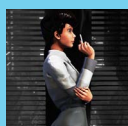
[GEAR VR]  
**Wheel Rush**  
Free  
[tinyurl.com/TLA61-WRush](http://tinyurl.com/TLA61-WRush)

This is one of the first titles we've played to have emerged from Oculus' Gallery Apps, a more experimental, slightly less refined marketplace for new VR titles. *Wheel Rush* is an on-rails platformer that you play as a supercharged unicycle segway, collecting coins and avoiding obstacles for as long as you can. Unfortunately, it's a little too jittery for VR and you have to use the head-mounted controller if playing on the Gear VR, but this free game is fun enough to persist, despite these limitations.



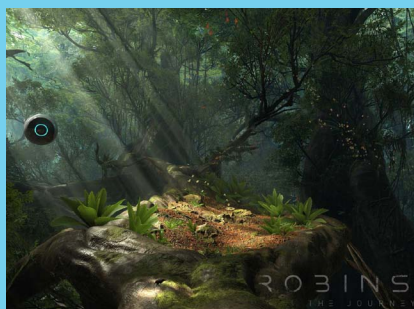
[PSVR]  
**The Martian VR Experience**  
\$14.95  
[tinyurl.com/TLA61-TheM](http://tinyurl.com/TLA61-TheM)

Ever since we followed Mark Watney's deranged but logical argument — that since Mars falls under the legal jurisdiction of international waters, *The Martian* protagonist's commandeering of a Mars Rover makes him a space pirate — we've wanted to be space pirates, too. What better way to experience the existential reality of being trapped, alone and over 300,000km from civilisation, than the immersion of VR? The reviews of this title are mixed and we're yet to test it for ourselves, but if you're fond of the book (or the film), then you'll appreciate it more than a freeze dried bag of faecal matter...



[TBA]  
**Blade Runner  
9732**  
\$TBA  
[www.br9732.com](http://www.br9732.com)

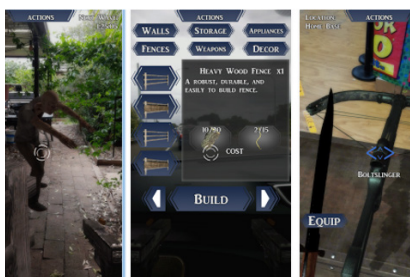
Creative software engineer Quentin Lengele wouldn't be the first to have been intrigued by the meticulously designed sets of Ridley Scott's Sci-Fi sensation *Blade Runner*, but he's certainly the first to recreate an immersive VR environment from it. Thanks to the dedicated solo project, you'll be able to actually walk around Dekhard's precisely recreated apartment from the 1982 classic in 3D space. There still isn't a finite release date on this one but the real-time gameplay footage revealed in a developer blog post shows that, when it does, it'll be an exceptionally detailed experience.



[PSVR]  
**Robinson:  
The Journey**  
\$84.95  
[store.playstation.com](http://store.playstation.com)

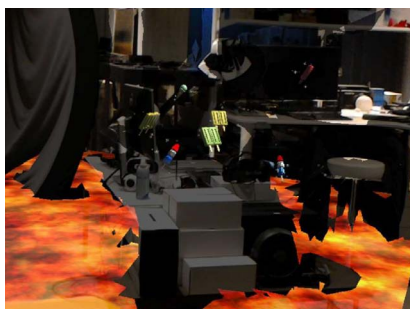
There aren't many full-sized games available on any of the VR platforms, which is enough to make you intrigued about *Robinson: The Journey* on its own. But waking up on a foreign planet, in a foreign solar system (with dinosaurs) is not something many of us will get to do otherwise. Led by an endearing floating AI unit called HIGS, this first-person narrative-heavy puzzler looks like a title that is poised to show off some of the more virtuous aspects of the new VR medium.

## AUGMENTED-REALITY APPS & EXPERIENCES



[ANDROID]  
**SLAYERS OF THE DEAD AR**  
Free  
[tinyurl.com/TLA61-Dsday](http://tinyurl.com/TLA61-Dsday)

If you thought the PvP gyms and AI interface of *Pokémon GO!* were good features, but that the game overall lacked a wave-based onslaught of mangled zombies; then you seem to be on the same deranged wavelength as the creators of *Slayers of the Dead*. Unresponsive guns and the flagrant repetition of the single superimposed zombie animation will leave you more frustrated than frightened during your daily commute. You'll even get to look like a sociopath to any onlookers by; appearing as though you're filming random passers by or, alternatively, if your screen is visible, looking to be pointing AR shotguns at the general public.



[HOLOLENS]  
**THE FLOOR IS LAVA**  
Free  
[tinyurl.com/TLA61-LavAR](http://tinyurl.com/TLA61-LavAR)

Once you've had more than a few years on the ground, traversing from the bed to the bathroom, it's far too boring without imagining that the floor has inexplicably been transformed into a sea of molten magma. But as with most things in this millennia, you no longer need an imagination to understand the dire consequences of over-jumping the futon, as the honestly named free-to-play Hololens app *The Floor is Lava* will splice this critical landscape into your living room for you.

## AI BOTS & TOOLS



[SMS]  
**INVISIBLE BOYFRIEND**  
US\$24.99 per month  
[invisibleboyfriend.com](http://invisibleboyfriend.com)

\$24.99 a month is a considerable investment, but if it's for a subscription to the man of your dreams, then it's a steal, right? *Invisible Boyfriend* (or *Invisible Girlfriend*) is more than a bot-SMS messaging service, it's a customisable counterpart that'll let you plug in the age, photo and backstory of your new "better half". With a social media profile, which lets you shoot down any naysayers, this comes with everything you could ever want from a fake relationship.



[MESSENGER]  
**AINSTEIN**  
Free  
[www.facebook.com/ainsteinio](http://www.facebook.com/ainsteinio)

Apart from having a 'punny' name that is basically as good as the universal law of matter and energy equivalence ( $E=mc^2$ ), Ainstein is a useful robotic resource for anyone trying to decipher the complicated languages of computer programming. Including beginning, intermediate and advanced courses for 18 languages from Javascript to WebGL.js, Ainstein will keep you on track by regularly prompting and quizzing you on software engineering lectures.



[NA]  
**NHS 111 CHATBOT**  
Free  
[www.babylonhealth.com](http://www.babylonhealth.com)

If you live in a select few suburbs of London and plan to use the non-emergency national medical helpline (111), you might find yourself dealing with a chatbot. The National Health service plans to test an AI chatbot app on 1.2 million London residents in order to see if the bot can work out what might be wrong with the callers. It will ask for symptoms and cross reference them against a database to hopefully categorise the urgency of the ailment and advise callers how to proceed.



[NA]  
**KARIM**  
\$1 per month per patient  
x2.ai

A robot psychologist seems like it would be doomed to resistance. Despite there being aspects of the job that require abstract human association or reasoning, most sessions follow a formulaic structure. This is likely why the AI psychologist Karim, built by the Silicone Valley medical AI startup X2AI, is achieving such positive results working with the vulnerable communities that can not access human psychological treatment.



[ QWERTY ]

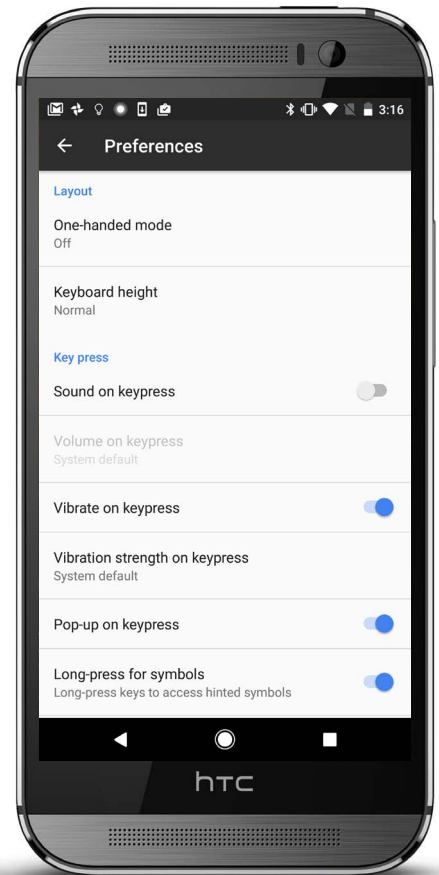
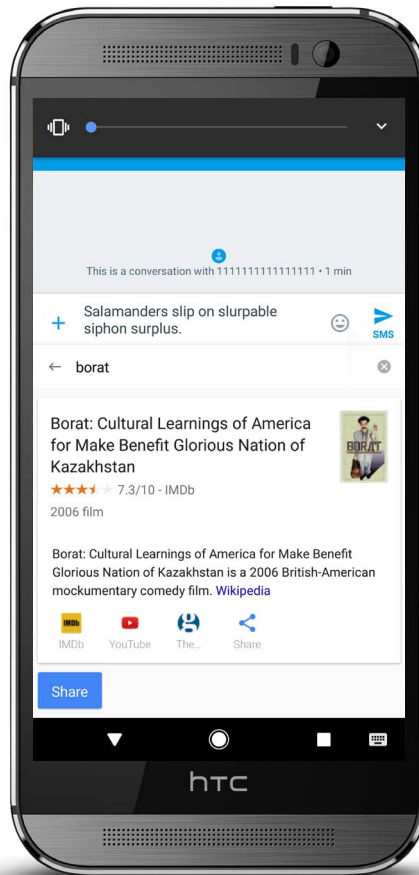
# App showdown: The best smartphone keyboard

THE KEYBOARD APPS THAT  
WILL SHOW YOU WHAT YOU'VE  
BEEN MISSING OUT ON.

[ JOEL BURGESS ]



**Gboard**  
SPRINGBOARD TO A NEW TYPE  
OF KEYBOARD.  
Free | [tinyurl.com/TLA61-Gbrd](http://tinyurl.com/TLA61-Gbrd)



WHEN YOU CONSIDER you use your keyboard for SMS, instant messaging, email, web searches and, well, most other apps too, it's perhaps a little perplexing that we don't take much notice of the keyboard app we're using — because there's a mass of time-saving advantages you can get from switching to a third-party app.

What does a third-party keyboard really have to offer over? Swipe typing, gesture-based corrections, text prediction and customisable shortcut keys are just a few of

the many features you can expect from your keyboard app.

There are various offerings available that'll combine a unique selection of these traits, but each app chooses to focus on developing a couple of core features to get ahead of apps taking a more generalist approach, so you'll be forced into prioritising your favourite elements when picking your app.

If anything got close to having the full suite of advanced keyboard features, it'd have to be Gboard. Google's smartphone keyboard was originally pitched for iOS users, but after conquering this landscape, it finally made it back onto its mother platform. What sets

Gboard apart is its in app web search bubble, allowing you to look up that accommodation, band, recipe or any other useful reference you want to share without leaving the message screen. This feature might sound simple, but it's easy to

get used to and if you ever have to go back to flicking between apps to copy and paste web links you'll quickly see the value in it.

Settings are generally pretty important for an app, but when you're given the option to switch off the safeguard for offensive word prompts, you know you've hit on the kind of keyboard you could get used to typing on. In addition to letting you 'adult' your word

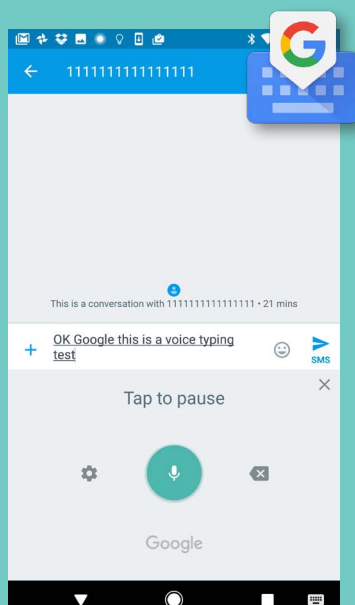
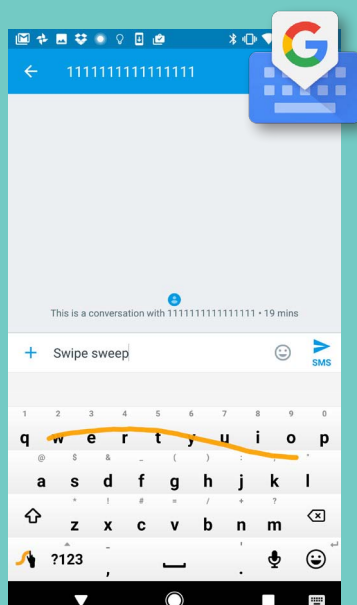
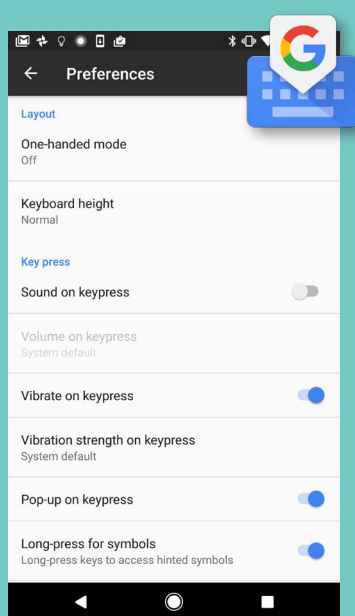
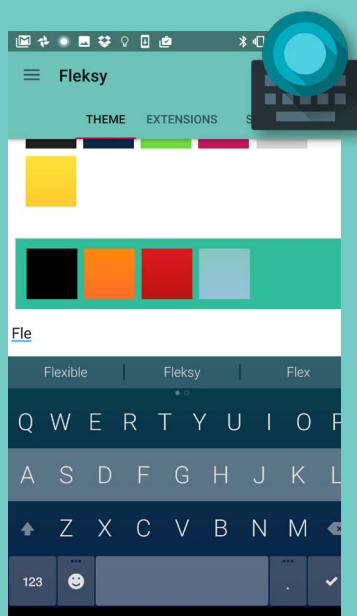
prompts, you can also toggle contact name suggestions, auto-correction, recapitalisation and Google will even draw on its wealth of data about you to create tailored suggestions for your particular style of phrase turning.

If you happen to be looking at Gboard for iOS, there is the added bonus of being able to draw on Google's voice-to-text functionality, something that we still feel is far more accurate than Apple and Siri's collective effort at voice recognition software.

If you want to get further into the nitty gritty, Gboard is relatively speedy, has a broad selection of emojis, emoticons and even GIFs (where applications permit them). If you have got used to swipe typing, where you drag your finger from one letter to the next without lifting it, then Google's keyboard is more than adequate at deciphering these slippery patterns. Multilingual users can also rejoice (in all languages) with the simple integration of multiple language keyboards that can be easily toggled.

Gboard might not have editing gestures down yet and could benefit from a shortcut bar, but as a free all-in-one keyboard, it's hard to pass up.

IF YOU HAVE GOT USED TO  
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SLIPPERY PATTERNS.

**ALSO CONSIDER...**

THESE RUNNERS UP ARE STILL LEAGUES AHEAD OF MOST STOCK KEYBOARD APPS.



**SWIFTKEY**  
Free  
swiftkey.com/en

All the alternate keyboards we've tested seem bent on challenging traditional customs, but SwiftKey's unashamedly millennial approach to privacy takes the cake. Since the keyboard is probably the weakest link in your security anyway, what's the big deal with giving a third-party app access to read all of your emails and text messages? We can think of a few, but if you're willing to neglect the potential side effects of having your correspondence read (and potentially stored), then you'll get the benefit of personalised word predictions.



**SWYPE**  
Android \$1.39, iOS \$1.49  
www.swype.com

If you have tested the waters with swipe typing and you're ready to take your relationship to the next level then the original is still probably the best candidate for the job. Similar to Swiftkey, Swype will let you plug in your Google account info so you can get a personalised list of word recommendations. In addition to a superior glide keyboard, Swype also prides itself on facilitating a seamless transition between when alternating to tap typing, voice typing or swapping languages.



**FLEKSY**  
Free with IAP  
fleksy.com

This app was the keyboard of choice for the two-time world record holder of the fastest 160 character SMS message, Marcel Fernandes Filho. So there is something to be said for this app if you are really looking to push your speed typing to the next level. Fleksy, much like the phonetically-spelled app title suggests, is a highly flexible keyboard that will let you customise everything from tweakable shortcuts to additional abbreviation dictionaries that act like the modern equivalent of shorthand.

**HOW TO TYPE FASTER**

THESE ARE THE FEATURES AND SETTINGS THAT'LL HELP YOU REV UP YOUR SMARTPHONE TEXTING ABILITIES.

**SWIPE TYPING**

If you haven't learnt to swipe type yet, it might be worth taking a weekend to learn the craft. Yes, it is a craft. Despite what you might think before trying it, swipe typing is counterintuitive and fundamentally different to any typing method that has come before it. It's also undoubtedly easier and faster with one handed typing, as there is no need for lifting your thumb, adding spaces or bothering with any form of punctuation. It's basically the millennial dream in keyboard form.

**PREDICTIVE TEXT**

Some typing apps have been imbued with tech that'll telepathically know the word you want to use next and will display it in a prompting bar to save you from typing. Obviously, this is achieved via a number-crunching algorithm, rather than conventional telepathy, but having your next words predicted is unsettling, regardless of the method. Using predictive text prompts regularly

will both hone its predictive abilities and save you a heap of time in the long run.

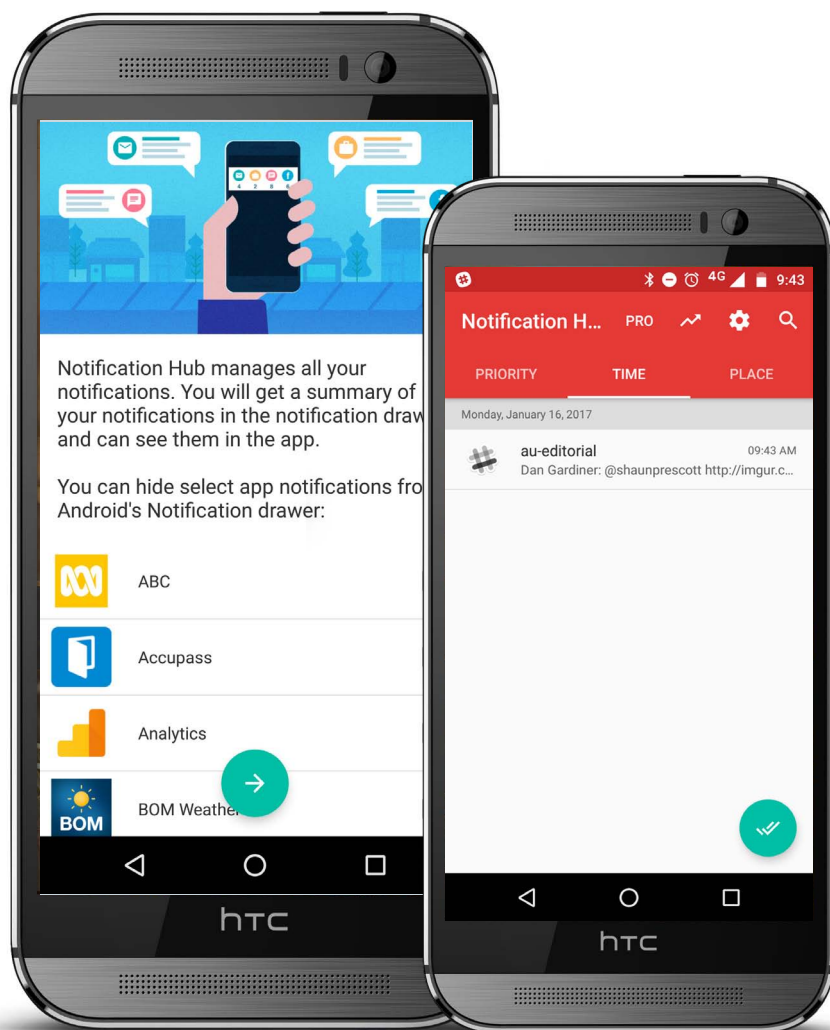
**VOICE TYPING**

Oxymoronic as it is, if you're comfortable organising all your thoughts into prefabricated sentences and then regurgitating them into your phone, voice typing can be notably faster than defaulting to your opposable thumbs. 'Speech to text' is at a point where (at least on Google Now and Cortana) it'll only occasionally make mistakes, which makes it a useful feature especially in situations where you have to be hands free.

**SINGLE HANDED MODE**

Some of the keyboard apps will allow you to change the positioning of the keyboard to make typing on larger phablets and tablets a little easier. Gboard has a 'tingle touch' toggle that will let you reduce your keyboard size and position it to accommodate left or right handed typing.





[ LATEST APPS ]

## Best new apps

THE **TECHLIFE** TEAM REVIEWS THE MOST INTERESTING NEW APPS FOR IOS, ANDROID AND WINDOWS MOBILE.



### Notification Hub

A NEAT, WIDGET-ORIENTED APPROACH TO NOTIFICATIONS.  
Free | [www.emberify.com](http://www.emberify.com)

If for some reason you're unhappy with your Android phone's in-built notification management, this new app provides a pretty good alternative.

Once installed, you can choose from any app on your phone which supports notifications, and have them register with this app's quite stylish and discreet front-page widget. This comes in the form of a bar which appears at the top of the phone screen, or else you can open the Notification Hub app and see each notification in the order they arrived.

It's possible to upgrade to a Pro version of the app, which allows Notifications Analytics (who wants this?) and notifications based on your location (could be useful), among other things. Notification Hub does what it says on the tin, but few Android users will desperately seek an alternative to the default.

Still, there must be a niche of users who do want something better, and this is a worthy (and free) way to go about that.

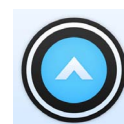
[ SHAUN PRESCOTT ]



A POLISHED AND EASY-TO-USE BOOKMARKING AND ARCHIVING APP.  
Free | [stash.ai](http://stash.ai)

Before you go ahead and install Stash, be aware that there's currently a waiting list to actually use it. In other words, you'll need to register your interest and wait for an invite to access this bookmarking app. Once in, you'll find a smart-looking and relatively easy-to-use interface which syncs with a Chrome extension on your desktop. From the extension, you can categorise bookmarked pages from a long list (article, book, forum and so on) and then access it from the corresponding section in the app. You can also search and bookmark pages, companies, map coordinates and more from within the app itself, though this is not very intuitive — the auto-search function would often not show the results that I was after. It's possible to save pages for offline viewing, and everything can be tagged for easy access within the app itself. It's pretty and functional — perhaps a little confusing at first — but if you're the type of person who uses bookmarking a lot, this is a good tool.

[ SHAUN PRESCOTT ]

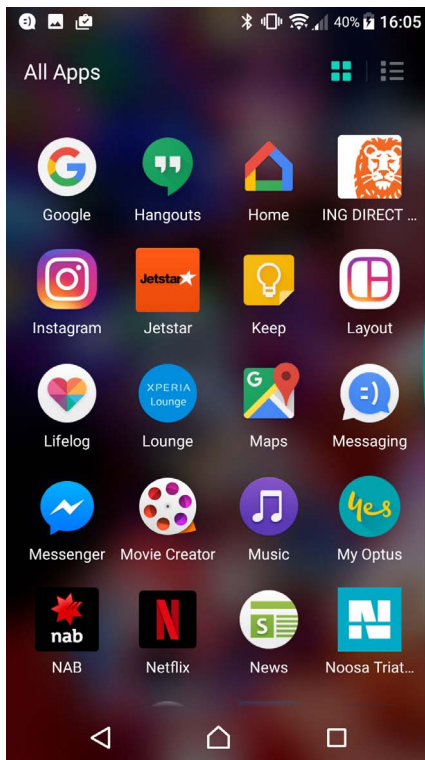


GREETINGS, LAZY HUMANS.  
I HAVE RECEIVED AN UPDATE.  
\$4.49 with IAP | [www.meetcarrot.com](http://www.meetcarrot.com)

I don't know if I'd really want a to-do list with a personality... She's rather cranky, uttering phrases such as: "Honestly, I'm not that impressed," and "I'd rather watch paint dry," when you complete a task. The UI is a piece of cake. Pull down on the to-do list to create a new item, then swipe right to complete it. Swiping left brings up a menu that includes Unlockables, Challenges, Customizer and other settings, which is quite simplistic.

The somewhat baffling thing about Carrot is that you are drip-fed abilities in a pretty counter-productive fashion. If you make a spelling mistake on your list item, you can't edit it until you gain Level 8 status. However, if you just delete it and write it again, the app rewards you for 'completing' an item. This is a fairly significant flaw in its design. You can essentially cheat your way to the glorious heights of Level 10 when Cat Cam is unlocked. Likewise, you can't change the order of your list until Level 3, so if you want something on top, your only way to achieve that is to delete the item, then recreate it up top (the default 'new item' position). Other fairly essential things you have to unlock through use are Reminders, Repeating Tasks and Petfood — sorry, that's, uh... not essential. Also, you can't set a time by which an item must be completed. Baffling!

On top of the fairly expensive up-front price for this app, you can purchase fluff add-ons such as cheat codes (for \$5.99) and mood themes and icon packs (for \$2.99). It admits that "the more you use me, the better the task master I become" but you're not the teacher, you're not supposed to be helping IT to perform well, it's supposed to be helping YOU. The update hasn't solved that problem, unfortunately... [ CARMEL SEALEY ]



**Evie Launcher**  
SWIPE AND SEARCH  
Free | evie.com

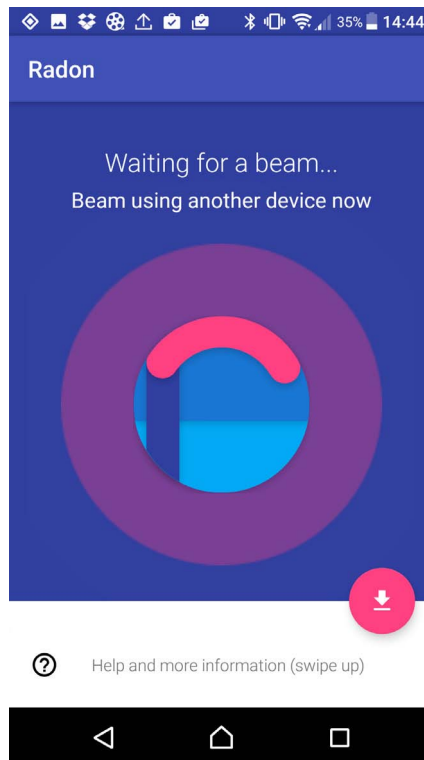
Upgrading your Android home launcher often makes you feel like you're using an entirely new phone, as it can drastically change the way you interact with your device.

The Evie launcher knows you primarily use your phone for searching, whether that's contacts, directions, apps or *Star Wars* trivia when piecing together plotlines from spin off movies (just us?), and speeds up this instinctual desire dramatically compared to regular Android.

A search bar sits prominently across all of your home screens, though it's a little redundant as you can swipe down from just below the notification zone to bring up the same function. From here, you plug what you're looking for, and the launcher scours your phone and online to provide results based on multiple contexts. If you're looking for a band, you'll get options to listen to their music via streaming services or YouTube. Searching for a movie, there's its Rotten Tomatoes and Metacritic ranking.

Some searches (such as contacts) can be saved as shortcuts to your home screen via a long press. Fast and intuitive.

[ PAUL TAYLOR ]



**Radon**  
BEAM IT UP  
Free | tinyurl.com/tla61-radon

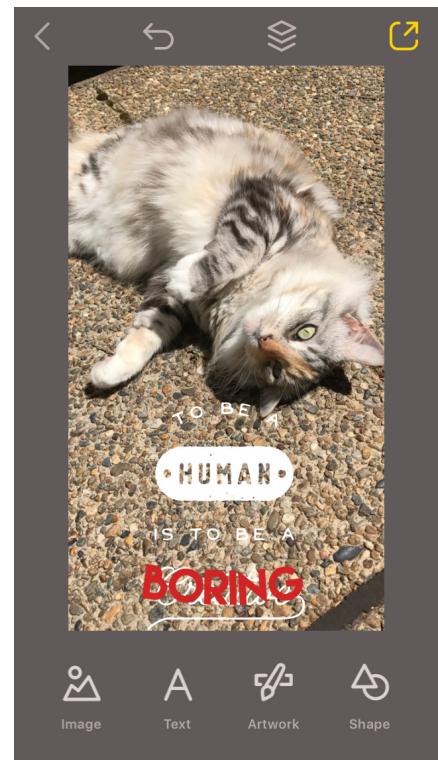
Depending on the hardware you use, there's a feature on your phone that you might not even know about.

Android Beam is a method for sharing links, notes and contacts with other Android users — useful for instantly passing on data (from simple text to data-hungry images), though the drawbacks are that it requires an NFC chip and for your recipient to physically tap your phone.

Radon takes that concept of sharing, but opens it up to everyone who uses the app and can offer a bit of distance. What's clever is that you don't have to be on the same Wi-Fi network, or even have to be using your mobile data to actually send data, as Radon also employs ultrasonic sound waves. These frequencies are beyond your ear's normal range of hearing, but they may make your dog look at you funny.

Right now, though, Radon is as limited as it is simple. Only tiny packets of data, such as contacts or notes, can be pinged across to a recipient who also has to have the app installed and open, but the tech is definitely something to keep an eye on.

[ PAUL TAYLOR ]



**Over**  
MEME-IFY YOUR PHOTO COLLECTION.  
Free with IAP | madewithover.com

This app has had an update! To say it's a free app with in-app purchases seems a little untrue. Yes, you can create images like the above without paying a cent, but to unlock the true potential of this app, you'll have to reach into your wallet. One-off payments for extra fonts, drop shadow effects or graphics range from \$2.99 to \$4.49, but to unlock the full pro version, you'll have to fork out \$11.49 per month. The extra tools on offer are quite good, though, such as more templates, the ability to use shapes, more fonts and word art, online source material, the ability to place projects on hold and start a new one, and so on, but if you're just looking for a quick meme creator, the free version will be more than enough.

The interface is super simple. After asking for permission to peer into your phone's photo collection, you can select a picture as the background (or use the default), then set about laying over text, shape and art elements. You can easily resize and rotate everything, plus there's a handy 'undo' button at the top, too.

So whether you're looking to use this app for just a bit of fun, for designing birthday invites or business cards, or even mocking something up for the boss, it will likely be able to help.

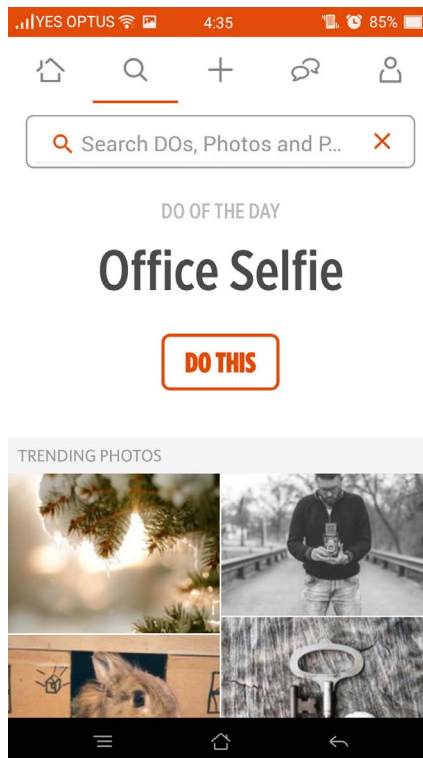
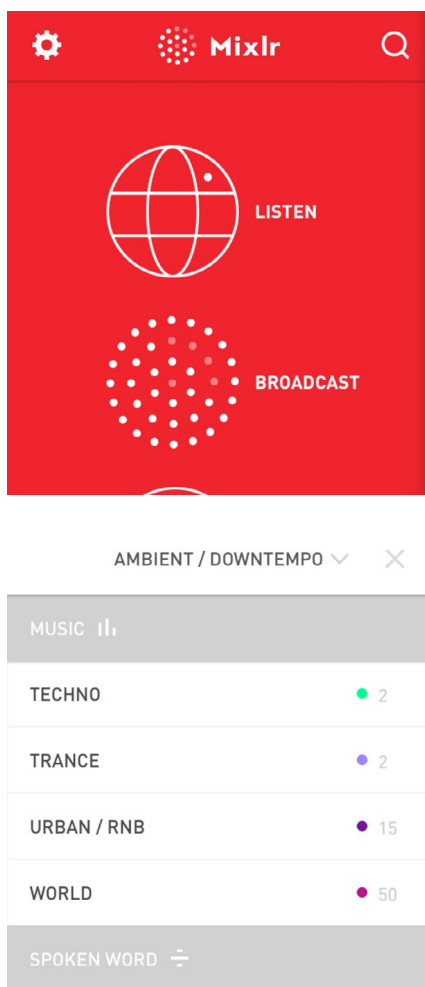
[ CARMEL SEALEY ]





**MIXLR**  
WE'LL DO IT LIVE.  
Free, with subscription  
www.mixlr.com

Mixlr is a comprehensive live audio broadcast app, designed to broadcast anything you want — podcasts, music, chatter — to your friends, fans or even your own website. It doubles as a listening service, too, with the ability to search music or spoken content in different genres and follow the streamers or stations that you particularly dig. When you're done with your broadcast, you can upload a high-quality recording to SoundCloud, Mixcloud or Dropbox, rolling several different processes into the one smooth operation. Although the app features its own chat, comments and 'likes', you can still share the stream on all the regular social networks to get your sounds heard. The service allows you to stream one hour a day for free, or you can subscribe to one of three price tiers, giving you 3, 12, or 24 hours along with some other perks. While this app is available for both Android and iOS, the interface is considerably better on iOS and runs smoothly; the Android version still seems to have some teething issues (such as when tapping on a specific genre to listen to, it will seemingly select one at random). [HARRY DOMANSKI]

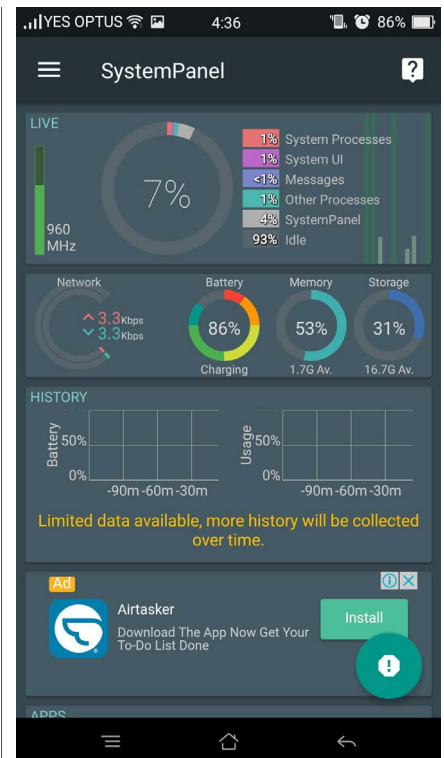


There are plenty of inspiration-based apps on the market brimming with generic advice, but OKDOTHIS intends to motivate you to achieve very specific tasks, aiming for the very real goal of improving your photography chops. The premise is simple — each day when you open the app, you will get a new 'DO' (the app's own vocabulary for 'goal') which will give you a particular challenge ranging from 'office selfie' to 'Tenebrism: Violent contrasts of light and dark, where darkness dominates the image'.

The social component of the app is pivotal to its success, as the DOs are actually suggested by the community itself, and the photos you eventually upload can be discussed and voted on by the same community. As a result of this, you'll see an Instagram-esque home feed, as well as the ability to search through past photos or DOs, and of course, an integrated chat and profile page.

This app will flourish or fail based on the strength of its community; we hope it gets what it needs, so we can see some decent photos flooding our feeds.

[HARRY DOMANSKI]

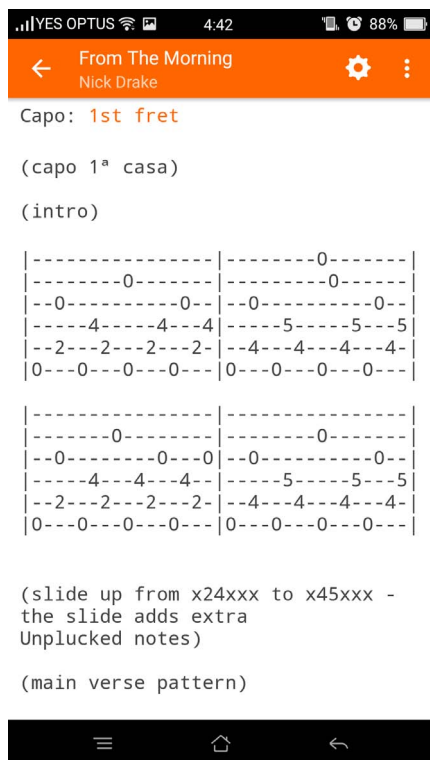


Although still in early access at the time of writing, SystemPanel 2 is an amazing utility app for Android that covers a lot of ground. This app gives you an incredibly in-depth analysis of your current and past activity, allowing you to monitor and manage all your phone's applications, both user- and system-installed.

There are several levels of detail available, with the overview tab presenting a neat summary of the core sections — Live, History, Apps and Device — and each of these sections offering more specific details, right down to the performance of each of your processor's individual cores. There's an ever-present floating 'Stop' button that will kill all non-critical processes if you feel like a quick clean.

The UI is very neat and easy to read, with enough detail to be useful, but organised in such a way as to avoid an overwhelming wall of numbers. You can pay a small amount to remove the ads, although this is some of the least offensive advertising we've ever seen, otherwise the app is completely free.

[HARRY DOMANSKI]



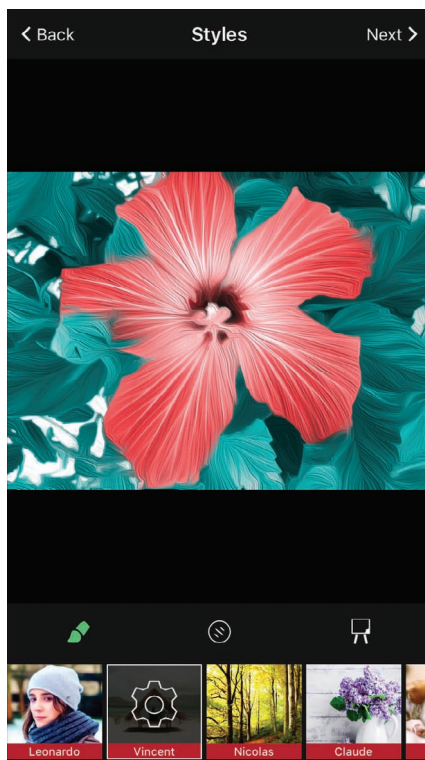
This app from Brazilian developer Studio Sol aims to be the guitarist's ultimate companion, with a suite of clever features that address problems with existing guitar-centric apps.

The main component of this app is your tablature (tab) 'Songbook' which you can add to from a vast library, and while you'll notice most of the top lists are Portuguese or Spanish, there's an extensive English-language selection available via the search.

One of the neatest features of the tab reader is its auto-scrolling, with variable speed and pause, so you can keep your eyes on the screen and your fingers on the strings.

You can quickly and simply search for the current song on YouTube, SoundCloud or your own local MP3s, and while none of the video lessons yet seem to be in English, there is a tab that displays along with the song so it still has its benefits. There are also links to Cifra Club's own metronome and tuner app, which is a surprisingly convenient shortcut, although you will have to install both apps in order to use them.

[ HARRY DOMANSKI ]



You may not be a digital artist, but that doesn't mean you can't experiment with digital art. BeCasso is designed to create startlingly realistic digital art from any pictures you take or save on your iPhone. You choose an image, select a couple of filters and the app does all the heavy lifting. You can simulate watercolour, oil or acrylic painting styles with BeCasso, and we had fun trying out all of them.

We do have a few tips for you, though. If you're going to take any of BeCasso, it seems to favour images that have decent saturation and a somewhat high contrast — that is to say, colourful images with a big difference between bright and dark areas. While you can use images that are somewhat more muted, you'll get the best effect with more vibrant images. We also suggest using bigger images, as BeCasso is capable of spitting out high-resolution artwork with no problem.

If you've ever wanted to take a shot at altering photos to look like digital artwork, we highly suggest that you check out BeCasso. It's a great app that we think most people will be able to create very cool images with.

It's definitely one of the better photo-to-painting apps we've checked out.

[ AMBER NEELY ]



Blocs Wave is designed for fast music composition and recording, and it delivers: with two taps, we had a fantastic EDM tune playing. The app is deceptively simple. You start with six hexagonal pads, each with a different kind of instrument — drums, melody, FX, vocal, percussion and bass — and if you tap on the pad, it'll play a loop. Tap again for a different one; tap a different pad for another instrument.

You create your song as individual sections and move between them without duplicating, so instead of having the chorus in there twice, you just create it once and tap it when you want it. The app has room for six different sections, each of which can have eight instruments, and you switch between them with a tap. It rewards experimentation. Tap the tuning fork icon and you can pitch-shift in real time; do the same with the dial icon and you can change the tempo. You can change the volume and pan of each track, as well as cutting up sounds. You can also record your own audio.

Blocs Wave plays well with others, too. It supports Ableton Link so you can jam in time with Ableton users on the same network, and it also supports hardware input, Audiobus and AudioCopy/AudioShare. You can export as AAC or WAV and specify how many bars the song should run for, and input your own sounds via iCloud Drive or Dropbox, as well as from Novation's Launchpad app. Best of all, you can export it as an Ableton Live project.

If the measure of a music app is how quickly you can make something you like, then Blocs Wave scores very highly: our productivity has plummeted as we've been engrossed in the app. It's enormous fun for amateurs and pros alike.

[ GARY MARSHALL ]





[ EXTENSIONS TO ENHANCE YOUR WEB EXPERIENCE ]

# Browse better

THE **TECHLIFE** TEAM DIGS UP THE BEST NEW BROWSER EXTENSIONS FOR CHROME, FIREFOX AND MICROSOFT EDGE.

[ SHARMISHTA SARKAR ]

[ STAND 'N' STUFF? ]

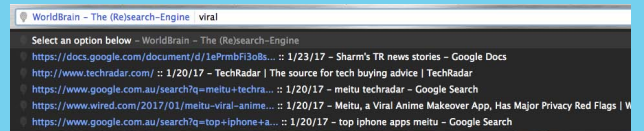
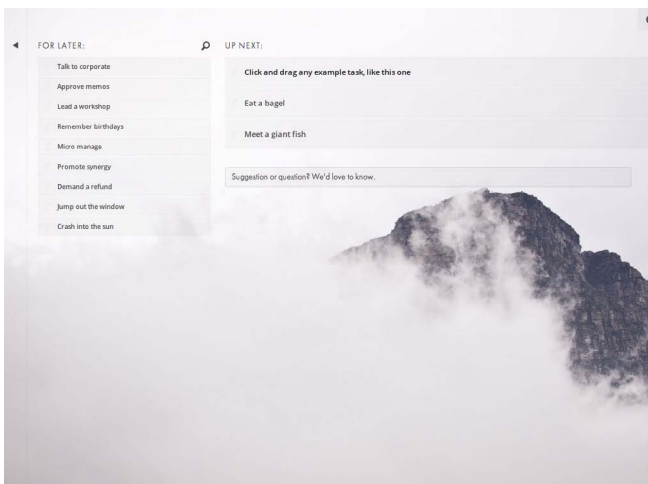
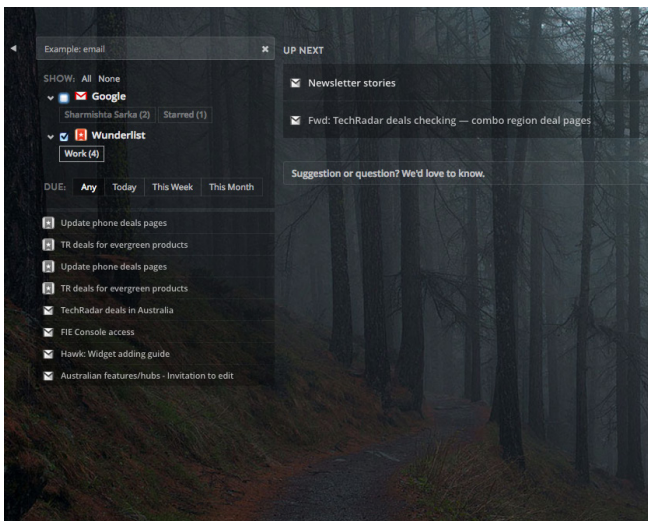
## Taco

AGGREGATE YOUR PROJECTS.

Free | [tacoapp.com](http://tacoapp.com)

IF YOU'RE HAVING trouble keeping on top of all your tasks and projects, Taco might be able to help. It's a gorgeous task list manager for Chrome that consolidates lists from nearly 40 other services, like Gmail, Wunderlist and Evernote, in a single tab.

Once installed, open a new Chrome tab, sign up with an email address and password, then Taco loads automatically — and lightning quick, too! Once connected to the different services you use, Taco pulls together all the tasks you've accumulated into a single dashboard displayed against a beautiful theme, which you can choose from a list. It lets you prioritise the order of your tasks, hide the not-so-important ones and tick off those you've completed. It's clutter-free and well designed with features that prove useful — a search button helps you find items in a jiffy, a refresh button to import any new tasks and you can print or email your task list. Taco will even send you automated reminders to get on with your projects.



[ LOOK INTO THE PAST ]

## WorldBrain

INDEX YOUR BROWSING HISTORY.

Free | [www.worldbrain.iox](http://www.worldbrain.iox)

Browsers are capable of indexing webpage URLs and page titles, but what if you want to revisit a page you can't remember the title or URL for? With WordBrain installed, your days of re-Googleing keywords and opening multiple tabs are over.

This free, easy-to-use open-source browser extension indexes not just the URL and page title, but even the textual content of pages you've bookmarked or visited, no matter how briefly, after its been installed. Browsing history prior to installation can also be imported, which is super helpful.

When you'd like to find a previously visited page, just type 'W-space' followed by a keyword and options are presented in the dropdown of the browser bar.

The extension stores and processes data locally, so nothing leaves your computer without your permission or knowledge. A metadata share option is in the cards, but the developers promise that it will be completely optional — claims which can be verified by the source code published on Github, so privacy will be assured.

WordBrain is currently only available for Chrome, but a Firefox version is not too far away.

[ TAKE ME BACK IN TIME ]

## Wayback Machine

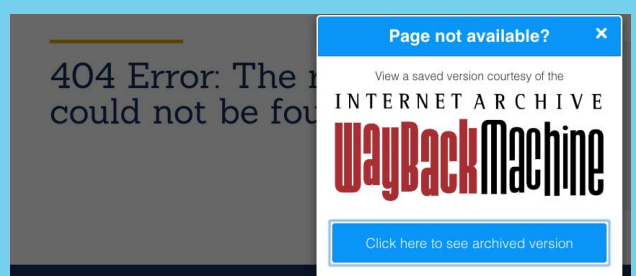
ELIMINATING LINK ROT.

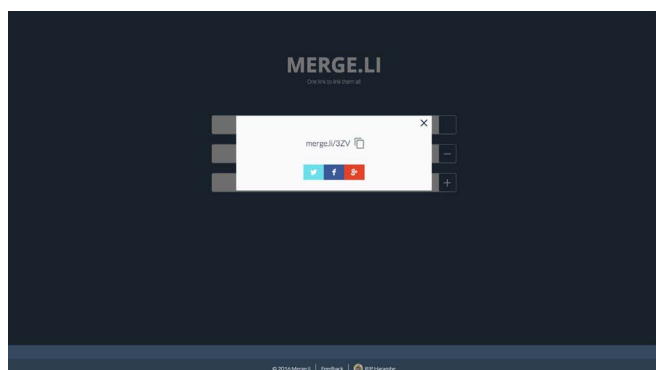
Free | [archive.org/web](http://archive.org/web)

The internet is an ephemeral, ever-changing entity. Information you found yesterday (or last week) could be a dead webpage today. To ensure tons of information isn't lost this way, the Internet Archive — a non-profit organisation in California — has undertaken the monumental task of saving as many webpages as they can in their digital vault. More than three billion pages have been saved over the years, pages which return a 404 'page not found' error if opened otherwise. When using Internet Archive's Wayback Machine Chrome extension, users are automatically offered the option of viewing an archived copy of the page if one has been saved, often including cached images, CSS and JavaScript.

And 404 is not the only error Wayback Machine can detect. 408 request timeout and 410 'gone' (permanently removed) errors are picked up, along with a host of server errors.

But in some countries, the Wayback Machine is interpreted as violating copyright laws — only owners have the authority to decide how their content is treated, so some pages have been deleted by request of the content creators. ■





[ COOL STUFF FROM AROUND THE WEB ]

## Site insight

OUR MONTHLY SELECTION OF THE WEB'S MOST REVEALING, USEFUL OR ILLUMINATING NEW SITES.

[ HARRY DOMANSKI ]

[ ASH NAZG DURBATULÖK ]

### MERGE.LI

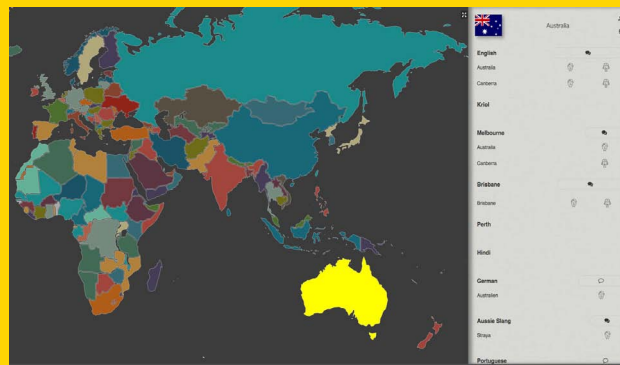
WILL IT BLEND?  
merge.li

This site has to be on par with URL-shortener bit.ly for simplicity and utility, and it's kind of amazing that it's only just coming out now while the latter has been around for close to a decade — but we guess 'now' is always as good a time as any to simplify things.

The premise of MERGE.LI is spelled out in its slogan “one link to link them all”, which is the only text to appear on the website itself (well, apart from the website's name, an email contact and a cheeky Harambe link). Put simply, this site allows you to merge as many URLs as you'd like into a single, short URL.

Enter your links into the two fields, click the plus button to add and fill more fields to your liking, and then hit Enter. After allowing pop-ups on the page, a box will appear and give you your shortened link, a button to copy it to your clipboard, as well as a Twitter, Facebook and Google+ share link. Apart from its usefulness in simultaneously sharing several webpages in a character-restricted environment like Twitter, it's also very useful for tidy bookmarking without the use of macros, or even setting up multiple homepages.

[ WWW.TECHLIFE.NET ]



[ STRAYA, MATE ]

### Localingual

BABY BABYLON  
localingual.com

Localingual is bringing crowd-sourcing to the world of language with this interactive map-based website. Clicking on one of the colourful countries brings up a list of the languages spoken in the country, and clicking again will allow you to further zoom into districts and cities, looking at the local languages and dialects of each. Eventually, each of these locations will have a list of words and phrases which have been spoken and recorded by people from that area, meaning you can hear a region's very-specific language, accent, and popular sayings.

This could be an amazing educational tool at some point down the road — however, at present, it seems that a good amount of the recordings are jokes, usually in a self-deprecating way (Australia is an excellent example of this), which may indicate more about a country's humour than it does about its language.

Regardless of the internet being the internet, this is still a great concept and does well to bring together a range of informative tools in an interesting and simple manner. If you're going to let the kids use it, we'd suggest making sure you watch over their shoulder when they're clicking around, especially in Australian cities.

The UI could do with a bit of tweaking, however, as we couldn't find a way of zooming back out to the world map.

[ XXX ]

### IKnowWhatYouDownloaded.com

AS CREEPY AS IT SOUNDS  
iknowwhatyoudownloaded.com

This (possibly Russian) website's name says it all really: it knows what you downloaded and it can prove it. Specifically, when visiting this website, it will list everything your IP address has downloaded via BitTorrent, highlighting XXX material in particular as it does so, and claims to be able to show you a similar list for any specific IP address you enter. Furthermore, the website has a super-dodgy “trick URL” feature that lets you send an unassuming link to a ‘friend’ which will come through fine on their end — puppies and such — but will give you, the sender, a list of their torrents. Did someone say blackmail? This is not a website we recommend you visit without protection (its dodgyness makes us think it might even start serving malware at some point), but it does serve as a pretty poignant lesson on the insecurity of downloading torrents. We used a VPN in order to access this site, which meant the IP address was a generic shared one. ■

DISCOVER  
SITE INSIGHT





In *RE7*, you meet this family, who offer a beautiful feast of... is it kangaroo meat?

[PC AND CONSOLE GAMES]

# Resident Evil reborn

WE REVIEW THE LATEST BIG-RELEASE AND INDIE GAMES ON PC AND CONSOLES, STARTING WITH THE HAIR-RAISING *RESIDENT EVIL 7*.

## Resident Evil 7: Biohazard

PC, PS4, Xbox One | \$99.95 | [residentevil7.com](http://residentevil7.com)  
THE FAMED SERIES RETURNS TO BRUTAL AND BLOODY SURVIVAL HORROR.

ABOUT FOUR YEARS ago, the survival horror genre was pretty much dead, and no one really expected it to come back. It was the era of big-budget war shooters, after all — all catharsis and beefed-up military bros. Perhaps the industry thought we no longer had the patience: even the last two *Resident Evil* games were basically third-person shooters.

Now, after the genre's unlikely resurgence thanks to *Alien: Isolation*, *Outlast*, the *Amnesia* series and *P.T.*, Capcom feels comfortable enough to take *Resident Evil 7* back to its roots — and with a first-person perspective as well. Call it cynical, but when the outcome is as good as this, I suppose it doesn't matter. *Resident Evil 7* doesn't stand out among the resurgence pack, but it marries tradition with modern design, meaning its heritage comes as a huge advantage.

The protagonist of *RE7* is some guy who's received a video message from his girlfriend, who warns for him to stay away from the creepy mansion in which she's been imprisoned for three years. Naturally enough, he goes along anyway. Any more details and we're entering spoiler territory, but just know this one thing: *Resident Evil 7* isn't a subtle horror game. In fact, it's probably among the most grotesque on the market. Proceed as you will based on that information, but I found it

Given Sydney's property crisis, I'd rent here in a jiffy.



quite refreshing, that a horror game would avoid the in-vogue psychological tack and go full-innards-on-the-screen gross out.

Despite a thick and ugly mood, *RE7* will undoubtedly come across as predictable to anyone well-studied in the genre, though as the game proceeds, the encounters are harder to anticipate. The move to first-person is wise, as it provides a more claustrophobic mood, while making the shooting a little less cumbersome. Still, don't come in expecting to mow down enemies ala *DOOM*: you play as a regular nobody, and ammunition is as scant as your shooting skills are bad.

The usual cycle of puzzle-solving and monstrosity-evading is in tact here, often at

the same time. If you're the type unwilling to die and respawn more than a couple of times, either stay away from horror games or, at least, play on easy mode. The environment — while quite small by modern video game standards — is increasingly labyrinthine and strange, and you'd be well advised to pay close attention to each of the paintings on the walls.

*Resident Evil 7* is a huge return to form for the series, and while it doesn't bend any conventions like *Alien: Isolation*, a good survival horror game doesn't really need to.

[SHAUN PRESCOTT]







One moment, you're foraging frogs to boost your HP; the next, you're tossing explosive 'shrooms at foes with suitcases for heads.

## Let It Die

RIOTOUS ROGUELIKE OFFERS SILLY SLASHING... AT A PRICE.

PS4 | Free | [www.letitdiethgame.com](http://www.letitdiethgame.com)

*LET IT DIE* is an uber violent, strangely sexualised hack-and-slash that owes much to *Dark Souls*. You strafe around increasingly odd enemies, pummel them with weighty attacks, then loot their corpses for weapons and currency. This is also the most 'Suda51' game you'll ever see.

Combatants are forced to fight wearing nothing but their Y-fronts and a Bane mask, and you're revived by a skateboard-riding grim reaper called Uncle Death. The combat really is cumbersome. *Let It Die* doubles down on a brand of bulky slashing. As you climb floor after floor of the Tower of Barbs, attempting to reach and slay four overlords, both fisticuffs and the odd firefight feel sluggish.

At least the weapons are fun. Whether incinerating ghouls with a fireworks launcher or teaching a flabby mid-boss a laundry lesson, the array of killing tools on display could scarcely take themselves less seriously. Couple this with special 'goretastic' finishers that mimic spine-snapping wrestling moves and you're left with a game that absolutely revels in overtly silly spectacle.

It's just a pity that it's so ruddy complicated. The game throws so many tutorials and info screens into the first half hour that you'd think you were studying for a master's degree. The menus don't help, either.

Death is a frequent occurrence, and sends you right back to the start. Want to get that deceased character back? You'll either have to pay handsomely (in in-game currency) for their return, or fight your way back to that floor and defeat a hostile, zombified version of them. If you can't bear to let a killer run end, you can pop to the PlayStation Store and spend real money to revive your fighter in the exact spot they died without losing any items.

Haters are the reanimated versions of your (and other players') deceased fighters, and can provide one hell of an unexpected challenge.

Infuriating, abrasive, yet against all odds strangely lovable, there's really nothing else on PS4 quite like *Let It Die*.

[ DAVE MEIKLEHEIM ]



It's every bit as deliciously daft as *Lollipop Chainsaw*, *Killer 7* or *No More Heroes*.



The hand-to-hand combat can be switched between a heavy and slow affair, or else a lightning quick combo-based melee.

## YAKUZA 0

A BIT NICHE, BUT ONE OF THE BEST OPEN-WORLD CRIME RPGS YOU CAN PLAY.

PS4, PS3 | \$79.95 | [yakuza.sega.com/yakuza0](http://yakuza.sega.com/yakuza0)

*Yakuza* is an enduring open-world crime series much loved in its native Japan, and with a steadily increasing cult following in the West. It's not hard to see why the latter audience is merely 'cult': these games have their charm, but despite being 'open-world crime' games, they are a far cry from *GTA* and *Watch Dogs*.

This isn't to the series' detriment. *Yakuza 0* is a prequel to the five previous instalments and it showcases what the series does best — immersive-yet-small urban environments packed with detail and distractions. You won't be smashing your vehicle through the rural outskirts of these neon-lit cityscapes (you won't be driving cars at all), but you will be privy to a seemingly endless array of diverting mini-games and spontaneous street fights.

*Yakuza 0* weaves a gripping yarn as well, so long as you're happy with subtitles and long dialogue sequences. In fact, while the character development might be a little thin compared to the likes of a *Tales Of* game, *Yakuza 0* is basically an RPG, which lends it a greater sense of number-crunching depth than most of its Western parallels.

Action is straightforward enough: you can choose to button mash your way through most encounters, but if you want to earn more money, you'll need to finesse the various 'heat'-oriented combat manoeuvres instead. It's satisfying and fun, but arguably the biggest drawcard is its surprisingly nuanced script and character development.

Videogame villains have a tendency to all look the same — to all provide an 'evil' binary to the player-character's 'good', but meeting various chapters of the *Yakuza* is a delight. They're gripping characters, and while the face animations aren't top-of-class, the fact these complicated villains can still be so magnetic is testament to the writing.

And while it's a niche, RPG-centric game, those looking for story and something a little left of centre are well-advised to give this series a go, once and for all. There's nothing else quite like it on the market. [ SHAUN PRESCOTT ]





**THE WALKING DEAD: A NEW FRONTIER**

WE GRIT OUR TEETH AND GET STUCK INTO THE TRAUMATIC FIRST TWO EPISODES OF THE NEW SEASON.

PS4, XO, PC, Mobile | US\$24.99 | telltale.com

As disgraced baseball star Javier García, the rapidly spreading viral outbreak forces you to shift priorities fast and shoulder new burdens just as quickly, making you responsible for two young lives. With our setting transferred to Virginia and the introduction of a cast of original characters, *A New Frontier* is a fresh start. The only constant in this ever-surprising world is Clementine, the hardy teenage heroine who we met as a vulnerable eight-year-old.

Clem's fate is intertwined with that of Javier, though you actually spend more time playing as him than as her. His story begins with the death of his father and brother. The world is blissfully unaware of 'walkers' at this point. Flash forward four years and Javier's predicament has grown complicated. He's in a car with his niece Mariana, his nephew Gabe and his brother's wife, Kate.

The battered station wagon turned moving fortress is their only defence against a thousand-strong herd of walkers marching their way.

That title of 'parent' is one Javier takes on reluctantly. The classic parenting dilemma is ever-present — the choice between keeping your family happy, or safe. Even if those choices are illusory in retrospect, they feel real enough.

The pacing is consistent with previous seasons. Typically, there's a lull while you poke around a hub of life — a gas station, a makeshift town — then havoc erupts and you use QTEs to dodge, shoot and stab. This is now a finely honed model, each episode given a carefully judged proportion of tender moments, scintillating set-pieces, tough choices and painful cliffhangers. The writing here is, as always, superb.

Although it sticks doggedly to a tried-and-tested format, *A New Frontier* takes a successful first (and second) step into the series' new season, rewarding those who've been there from the start and newcomers alike. [BEN GRIFFIN]

4

WINNER  
**TECHlife**  
APPROVED  
AWARD

But who are the real monsters, eh? No, yeah... actually we're pretty sure it's the flesh-eating, shambling corpses.



Deathwing is a lot more fun when played with friends, and in the online multiplayer, a balanced team is essential.

## Space Hulk: Deathwing

SPACE MARINES AND ALIEN HORDES DON'T SEE EYE TO EYE.

PC; PS4, XO coming soon | US\$39.99 | www.spacehulk-deathwing.com

AT ITS BEST, *Space Hulk: Deathwing* is a heart-pounding shooter that pits you against endless hordes of enemies, pushing you past any reasonable limit and forcing you to rely on teammates. But these high moments are linked by repetitive missions, a lack of progression and, frustratingly, bugs.

*Deathwing* is split into two modes: a campaign that sees you stomp around as a Librarian — a Space Marine with psychic powers; and an online multiplayer. Both use the same nine intertwining maps, which look great — half Alcatraz, half St Peter's Basilica in space. Both modes follow the same formula, sending you to various waypoints for generic objectives — escort robots, fetch an item, find a fallen comrade — while purging periodic waves of enemies. These frantic gun fights are the stars of the show. There's a good variety of weapons to master, including a pure melee option, and while enemies aren't smart, their sheer numbers necessitate teamwork and make success feel brilliantly satisfying.

The tight corridors are punctuated by vast openings of bare stone and metal, gothic architecture and 41st-millennium technology blending to create something otherworldly. Battered monitors flicker beneath stone pillars as 30ft statues of ancient Space Marines loom, illuminated through stained-glass windows. You can't help but stop and stare in awe.

The sense of atmosphere is helped by strong sound design. The Space Hulk creaks and moans, warning you to stay away. Long-dormant machinery churns into life with an industrial boom, and your giant guns pack a satisfying punch.

Away from the setpieces, though, the game just doesn't offer enough. You have to do a lot of backtracking through the same rooms and corridors. The game touts the campaign as its main feature, but playing alone is so much less

fun. The joy of *Space Hulk: Deathwing* comes in the gritted teeth of fighting back-to-back with comrades. So it's odd that the multiplayer actually has less content; some of the best guns are single-player only.

There's no reason to stick around once you've seen all the levels. The single-player has permanent unlocks, with better guns and powers at your disposal, but you'll be bored by the fourth or fifth level. Yes, the setting looks great, but it all plays largely the same, and only the most ardent *Warhammer 40K* fanatic will feel motivated by the generic story.

The multiplayer also suffers from repetition. You can either have all the weapons and powers from the start of each mission or you can level up as you go, but the unlocks reset after every map, so there's no progression system to pull you back for one more game. There are also no checkpoints, so if you die near the end of a mission, you go back to the start. You can skip to the next level if you like, and pick levels out of order, but this is a game to dip in and out of with friends.

The sour cherry is the game's performance. It takes little provocation to make it crash. Objectives fail to trigger, leaving you wandering the ship's corridors aimlessly, and on multiple occasions, one of our party's attacks stops working altogether, turning them into a rather large, metallic, sitting duck.

We'd be on the fence about *Deathwing* if it weren't for these problems, but until they're resolved, it's impossible to recommend without all those huge caveats. We love playing it in patches, and we'll likely jump in for the occasional hour of battle. But beyond that, it's not worth the frustration. The Emperor of Mankind will not be pleased.

[SAMUEL HORTI]

3



## Dragon Quest VIII: Journey of the Cursed King

YANGUS BEJOKING?

3DS | \$59.95 | [dragonquest.nintendo.com](http://dragonquest.nintendo.com)

LIKE A FAVOURITE book or film, this remake offers a friendly arm around the shoulder during a walk down memory lane. It's not that it's safe or boring — it's simply a reminder that the best things are timeless, and that while JRPGs are becoming more Westernised, sometimes, the best way to go forward is by looking back.

Remarkably, despite being a PS2 game from 2004 re-imagined for 3DS, it still feels fresh. We're left longing for the turn-based RPGs of old, with their interesting enemies that run the gamut between silly and intimidating.

This is a game that requires planning, and it can punish players who don't prepare properly, though not as much as it used to. In the original game, if you had been foolish enough not to save your progress for a few hours, a party wipe in one of the many dungeons could see you lose everything. This version thankfully has a quick-save option which means you're never too far from safety. Although you can eventually warp to a church to save your game properly anyway, it makes for a nice concession towards the current gaming era and more modern (and forgiving) styles of play.

Make no mistake, though — this is still a tough experience. Even the first boss battle will take time, and you might well lose a character in the process. Given that the game is more than ten years old, you can sometimes expect to have to grind a level, too, so you can be sure you're not going to end up facing extreme odds when challenging your foes.

The battle system is rewarding, allowing you to plan paths for your party. Your main fighter is the all-rounder, as you'd expect, but you can spec in any way you see fit, using points to slowly climb a rudimentary skill tree (though initially it's probably best to

ensure you have the ability to heal at any turn).

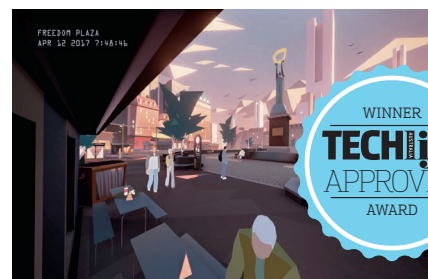
The opportunity to 'psyche up' your characters instead of directly attacking adds yet more to the systems. It allows for one of your party to pump their attack strength up continually before unleashing a powerful strike, while other members spend that time blocking or using magic.

It may seem basic by today's standards, but this is a deep system that rewards your time investment, and it's backed up by excellent characters. The star of the show, for us, is Yangus, played by Ricky Grover — yes, he of *Eastenders* fame. Yangus is a heavy-set chap with a thick London accent, and it never gets old hearing him calling us "guv'nor". It's hard to tell whether he's actually supposed to be providing the comic relief or not, but his character adds extra flavour and colour to a game already bursting with both. That said, the story itself is the fairly standard tale of a cursed king and princess who've been transformed into a troll and a horse, respectively (as you do), and your quest to cure them.

This may not look or play like a modern game, but that's not a negative. *Dragon Quest VIII* offers a lengthy story to uncover, plenty of challenge, a terrific battle system and charming characters.

If you've never played it before but you love JRPGs, this will be an absolute treat. And if you're nostalgic for the original, it's a big, warm hug in game form.

[ ADAM COOK ]



## ORWELL

WATCH OVER THE LIVES OF OTHERS.  
PC | US\$9.99 | [www.orwellgame.com](http://www.orwellgame.com)

The government is spying on its citizens. This is the set up to Orwell, a five-part episodic adventure about the tension between privacy and national security. Set in The Nation, Orwell is a visual novel in which you voyeuristically watch over a group of activists, trying to determine who is responsible for a series of bombings.

You're an investigator, and your job is to analyse the digital footprint of citizens The Party has marked as a potential threat. At first, you're scouring public and state records — newspapers, websites and police databases. Soon, the intrusion deepens. You read emails and chat logs, listen in on phone calls and, in extreme cases, dig into your target's PC.

Orwell is the software that highlights relevant passages of text as data chunks for you. It's incredibly literal, unable to distinguish nuances of language. That's why you're there. You're the brains of the operation, and a big part of the challenge is knowing what to upload. Sometimes, that's easy. The tricky part is when you have conflicting information. There can only be one truth, but which one is it? And therein lies the drama. Is your target a naive activist or a terrorist? Were they once unfairly arrested for a crime they didn't commit, or did their corporate parents pay to have the charges dropped? Orwell's subversive twist is that, while state surveillance is often shown as dispassionate and unthinking, I find myself earnestly trying to discern the truth. I want to do a good job.

Your ability to control and shape the situation comes from the data you do or, often more crucially, don't upload. Some decisions can have a profound effect on the story. Doing what seems to be the noble thing doesn't always lead to the best outcome. It's complicated and messy, which feels right. Often, the drama hangs on you making a gut instinct guess.

It's an enjoyable way to interact with a world. It's not subtle (it's called Orwell, after all), but it's a well told mystery framed by a captivating storytelling device. [ PHIL SAVAGE ]





The greatest trick the devil ever pulled was convincing the world he was an egg on sale in Woolies. (*Hitman*)



NICH  
RICHARDSON

Bajo is currently on hiatus, so this month, his *Good Game* compatriot Nich Richardson has stepped in to fill his shoes. Nich hosts *Good Game Pocket*, and when he's not at work playing video games, he's at home losing at *Dota 2* and buying *Hearthstone* packs.

[ IDES OF MARCH ]

# Right game, wrong time

SOMETIMES, YOU DON'T CHOOSE THE GAMES, THE GAMES CHOOSE YOU.

[ NICH "NICHBOY" RICHARDSON ]

BACK IN MARCH last year, I played 38 minutes of *Hitman*. I called the game "frustrating because I have to keep doing the same mission again in different ways" and didn't continue past the first tutorial.

## BACK IN MARCH, I WAS AN IDIOT

I've played 21 hours of *Hitman* in the last three days, and I think it's probably one of the best games of 2016. It's a Rube Goldberg machine starring a bald barcode, a masterpiece of level construction, satirical writing and blackly comedic murder. The very thing I didn't like back in March — having to repeat the same mission over and over again to complete seemingly pointless challenges, approach missions in different ways to set into motion different, horrible events — is now the very thing that has drawn me back over and over again this last week.

What was different about me in March? March Nich was a little heavier. Was it the love handles? Can fat blind you to brilliant game design? I was a little tired because I'd just got back from the Game Developers Conference in San Francisco — maybe being around Americans makes you ignorant to one of the deepest game packages of 2016.

I was also busy in March, maybe that was it. I was playing *The Division*, *Salt & Sanctuary* and *Far Cry Primal*, I moved house and I rewatched the entire series of *The Shield*. So maybe my glamorous schedule was to blame.

But these last few weeks, I've been in a holiday haze. The most hectic my day has

been is I've needed to somehow fit a nap betwixt my morning beach trip and an afternoon screening of *La La Land*.

So in between my beachings and nappings and Goslings, I've had time to really lose myself in some games. And when so many people at the end of last year were mentioning how much they loved *Hitman*, I asked myself, "What have I been missing?" Could March Nich really have been that wrong? The answer, as we know, was yes. But it wasn't March Nich's fault. March Nich just wasn't ready to

appreciate it. Much like Emma Stone and Ryan Gosling in *La La Land*, *Hitman* and I found each other at the wrong time.

And this isn't the first time this has happened. This isn't even the first time this has happened this month. I've played 37 hours of *The Witcher 3* in the last two weeks, which is 32 hours more than I played when it came out two years ago.

Because games are like a partner. They ask for our attention. They ask for our time. And the really serious ones, they want you





After 37 hours, I think I'm finally ready to start *Witcher 3*'s main quest.

BECAUSE GAMES ARE LIKE A PARTNER. THEY ASK FOR OUR ATTENTION. THEY ASK FOR OUR TIME. AND THE REALLY SERIOUS ONES, THEY WANT YOU EXCLUSIVELY.

DISCOVER  
RIGHT GAME, WRONG TIME

exclusively. Sure you can go watch other games online, maybe spend an hour or two alone on Twitch, but at the end of the day, you're committed to the one you love. And like a relationship, timing is everything.

Maybe you don't have the time to spend in an open-world right now. Maybe the learning curve of that MOBA is too steep to squeeze in this weekend, or the mechanics of 2016's finest assassination simulator seem 'repetitive' or 'a waste of my time' or other stupid things an ignorant person would say.

So if a game comes out and you're not entirely ready to give it your everything, to make it your one, it can sadly slip through the cracks. Then, in a year's time, you'll see it on the street with another gamer and only be able to think of what could have been, rather than what did.

### I'VE LOST CONTROL OF THIS METAPHOR

But like dating, first impressions don't always have to last. If I had stuck with my first impression of *Dota 2* — obtuse, dense and vile — then I never would have lost 900 hours of my life. I despised the *Dark Souls* series until a friend literally sat me down and made me beat the first boss, and suddenly it clicked. The stars have yet to align for me and *EVE Online*, but I know it'll happen one day. I've checked in every six months since launch to see if my heart has grown fonder for the space MMO — it hasn't happened yet, but the course of true love never did run smooth.

Now, of course, this doesn't apply to all games. Some games stay bad no matter how many times you play them. No one will convince me that the *Ghostbusters* game that came out last year is good for anything other than distracting a child you hate. And there some games will never click with you. As hard as I might try, I know that

*Ghostbusters*. An hour I'll never get back.

*Dota 2*. After 900 hours, you're bordering on an abusive relationship.

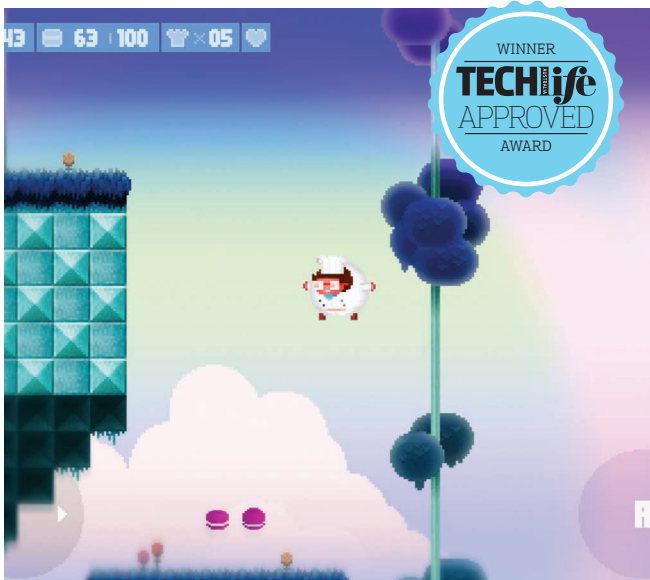
*Street Fighter* is a game I will have to appreciate from a distance. I'm a hitman, not a fighter.

But I'm learning to open my heart back up to titles I've been previously cool on, to games that a younger, more March-y version of myself would call "repetitive to the point of being insulting to the player". But I've grown a little since then. I've lost the love handles and expanded my palette. So my gaming

New Year's Resolution is this — be open to second chances.

Because you never know, your favourite game of 2016 could have been something you called back in March: "a game I will never play again. Ever." Back when you were an idiot. I blame the love handles. ■





[ MOBILE GAMES ]

## Whisked away

TECHLIFE'S TEAM REVIEWS THE LATEST GAMES FOR ANDROID & iOS SMARTPHONES & TABLETS.



### Le Parker: Sous Chef Extraordinaire

IF YOU CAN'T STAND THE HEAT, GET OFF THE PLATFORM.  
\$2.99 | [playpretend.com](http://playpretend.com)

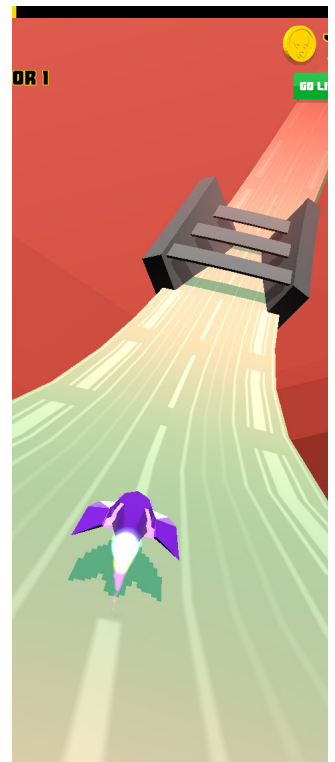
WE'RE JEALOUS OF this titular sous chef. Sure, he's been banished from the kingdom, separated from his one true love and — horror of horrors, as any baker reading will appreciate — lost his recipe for a lighter-than-air meringue. But if he guzzles down macaroons in excessive numbers, he's gifted with an extra life rather than medical problems. Lucky jerk.

*Le Parker* is a relatively simple outing that's clearly indebted to genre greats such as *Mario* and *Sonic*. You gambol and jump through deliberately tricky levels more than slightly reminiscent of the blue hedgehog's first outing, hoovering up sugary treats and exploring to find the pieces of kitchen equipment that will enable you to rebuild your career. They're well hidden, so you're unlikely to find everything on your first run-through. Levels have multiple labyrinthine paths to follow, so this exploration fuels repeated plays.

If we could tweak one element of the dish, it would be the jumping, which is occasionally clumsy. You tap for a small hop, press and hold for a longer jump; plus, of course, you're able to double-jump. It's not quite as easy to control as we'd have liked, and we found it a bit more of an annoyance than simply having one flavour of leap available. The balance of the recipe isn't always spot-on, but there's plenty to recommend *Le Parker*, especially if you're a fan of old-school platforming.

At the end of the day, if you're after something to soak up a bit of time, whether on public transport or sneakily when you're at work, this is a solid choice that's simple in setup, yet demands precision from you to hop from platform to platform.

[ EMMA DAVIES ]



### Hovercrash

MORE CRASHING THAN HOVERING...  
Free with IAP | [kiemura.com/en/games/hovercrash](http://kiemura.com/en/games/hovercrash)

AVAILABLE FOR BOTH iPhone and iPad, *Hovercrash* places the player in control of a hovercraft-cum-spaceship that races along a never-ending fluorescent course reminiscent of the 'Rainbow Road' level from *Mario Kart 64*. Using just one finger, you can move the craft left and right and then lift your finger to engage your score multiplier. Sounds simple, right?

Unfortunately, controlling the craft through the oncoming obstacles isn't actually that easy. Some shift from side to side, others rotate, and some obscure your view of what's ahead, meaning you have to rely heavily on your powers of reaction and foresight.

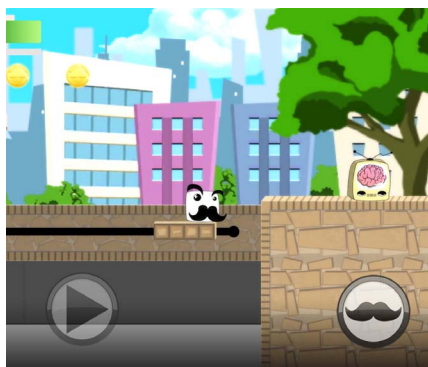
You will crash a lot, you will restart the game a lot, you will get frustrated a lot, and you will most probably watch a lot of ads if you don't fork out the \$2.99 to get rid of them.

We would recommend playing this on iPad, as you have a finer degree of control over your craft, due to the bigger screen. It's colourful and fast, there are coins to collect and we can feel the tendrils of addictiveness beginning to work their evil charms on us. "Just one more go. I didn't do well on that last one, I'll just try again."

However, after a while, it feels samey. Yes, you get a rush when you push past your previous high score, but the obstacles are familiar, the course tilts back and forth in the same slightly annoying manner and the fast-paced music will start to grate on you, especially after you've been squashed by that wheel AGAIN. Fasten your seat belts, because we're going careening into an oncoming wall at great speed.

[ CARMEL SEALEY ]





## The Adventures of Tacheman

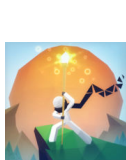
FAUX MO.  
\$0.99 Android, \$1.49 iOS  
[tinyurl.com/tla61-tacheman](http://tinyurl.com/tla61-tacheman)

DON'T LET THE cartoony hook get you. While your protagonist may be a cartoonish lip tickler, there's little whimsy in this irritating platformer, which stars a quartet of moustaches as they bound from left to right across your screen, firing projectiles and double-jumping as they go. You and your companions are tasked with saving the city of Motropolis from the evil King OneTooth, who, as well as letting loose his minions, is stealing moustaches.

Blame the controls (we certainly are), as well as the confounding level design that apes ancient conventions but offers little flow. *Mario* — *Tacheman*'s north star — operates on pixel-perfect timing and a sense of rhythm, plus joyful exploration to tease you in for more. *Tacheman* stutters and operates with an iron rod, throwing up surprises that can only be bested (as opposed to perfected) by trial and error.

While it looks reasonably pretty and there are plenty of collectibles to encourage multiple playthroughs with other unlockable characters, we really don't think you should bother. Direct your moustache-based obsession elsewhere, *Tacheman*'s a bit of a turd.

[ PAUL TAYLOR ]



## The Path to Luma

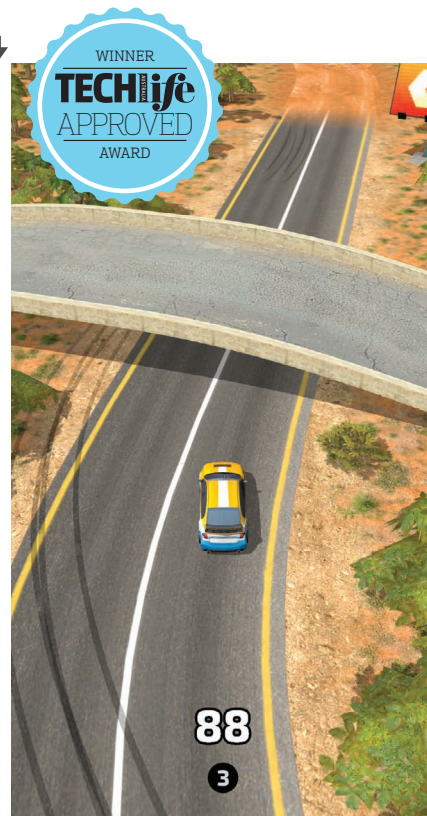
PAVED WITH GOOD INTENTIONS... MAYBE.  
Free | [www.thepathtoluma.com](http://www.thepathtoluma.com)

*THE PATH TO Luma* was dreamt up by NRG, which claims to be "the leading integrated power company in the US" and was created in partnership with indie dev Phosphor Game Studios. The direction of this puzzler is immediately obvious, as you navigate the protagonist through a series of 23 levels (or planets), utilising various forms of sustainably-sourced energy (largely solar, hydro and wind) to open gates, move bridges, power houses and generally clean up the area.

The art-style is cute and polygonal, and the soundtrack is suitably pretty and melancholic, but the spherical level designs sometimes grow tedious and turn out to be more challenging than the puzzles themselves, which aren't particularly difficult. With that said, it's hard to tell whom the game is aimed at — with a somewhat patronising guide and rather generic sustainability information, *Luma* seems to be for younger audiences, yet it's also a strange combination of art project and brand awareness strategy.

Utterly or confused motives aside, it is a very pretty and often satisfying romp through some moderately puzzling eye-candy that may just plant a small seed of environmental awareness as you play.

[ HARRY DOMANSKI ]



## Go Rally

IF RACING GAMES HAD TRAINING WHEELS  
\$7.99 | [www.gorallygame.com](http://www.gorallygame.com)

*GO RALLY* OFFERS simple, accessible racing. Using the recommended control scheme, you turn and brake using buttons either side of the screen, and the game takes care of everything else.

The length of each stage is well judged; long enough that you'll probably need a few tries to finish in a good position, short enough that you can tackle one while waiting for the coffee to percolate.

Unfortunately, it's lacking any real sense of balls-to-the-wall speed — perhaps due to the third-person viewpoint. As a result, you might be speeding along at a thrilling number of kays per hour, but it feels like a safe 60.

Think you could do better? Get stuck into the surprisingly immediate track editor. The interface makes smart use of the touchscreen, allowing you to draw out your track layout using one finger as a pencil. From there, you can then drag to amend corners, place signs and other amenities, and even alter the angle of the sunlight. Sadly, you still can't create unskiddable corners...

This game is a somewhat shallow but enjoyable racer, enhanced by an intuitive track-editing mode. [ EMMA DAVIES ]





# TEST BENCH

THE HOTTEST GEAR PRESSURE-TESTED



## Synology RT2600ac

WHAT WOULD YOU GET IF A ROUTER AND A NAS HAD A BABY?

DESPITE NO LACK of attempts, relatively few outsiders have been able to break into the broadband router market — a space that, for the last decade, has largely dominated by big players like Netgear, Linksys, D-Link and TP-Link.

Synology has been fighting a bit of an uphill battle since it introduced its first router, the RT1900ac, last year — but it's one that's at least partially fuelled by the good will flowing on from its well-received and feature-packed NAS boxes. The company has now followed up that first attempt with this theoretically faster AC2600 successor, which upgrades the internal hardware to 512GB RAM and dual-core 1.7GHz ARM Qualcomm IPQ8065 CPU, and increases the Wi-Fi chops to 1,733Mbps on 5GHz and 800Mbps on 2.4GHz (that's compared to the previous 1,300Mbps and 600Mbps, respectively).

That said, speed and specs aren't really Synology's main selling point — it's the software running under the hood that's the really unique element. The company's SRM (aka 'Synology Router Manager') interface works just like the one on its NAS products — it's accessed through a web browser and gives you a virtual desktop environment, complete with icons to launch apps and access settings menus, which all open in 'windows' that you can drag around and rearrange within the

browser interface. This can make it a bit easier to grasp for complete router newbies, but the real reason you'd choose a Synology router is the ability to download NAS-grade apps to extend functionality. That includes the likes of Download Station, a sophisticated program that supports not just HTTP and FTP-based downloading, but BitTorrent and usenet, too; Cloud Station, which lets you host your own cloud-storage server (a-la Dropbox or Google Drive) and remotely sync files to Windows, Mac, Linux, iOS and Android devices; and File Station, a Windows Explorer-style file manager that lets you access the contents of any USB-connected drives from within the SRM web interface.

There's a heap of higher-end features, too, like VPN client and server features, a DLNA media server and per-device parental controls with two preset blocklists (either 'malicious' or 'malicious and adult' sites) and the ability to either black- or whitelist additional domains. You can also set a schedule to allow or deny devices internet access at certain times of day and there's even Apple Time Machine support for backup up Macs.

Synology's main problem is that the default selection of apps is fairly limited; there were eight at the time we tested. Despite Synology's NAS boxes having a wide selection of third-party and open-source

offerings, there hasn't (so far) been much interest in replicating that for the company's routers...

Still, the RT2600ac is a joy to use and while it doesn't quite make setting up more complex networking/NAS features idiot-proof, it does go some way to making the process more straightforward than on other routers. The Wi-Fi performance was quite adequate in testing, too, with good coverage (thanks in part to the four large detachable antennae) and speeds that largely matched other AC2600 devices we've tested.

You'll pay more for the extra features on offer, but if you can genuinely use them, the RT2600ac is a top little router.

[ DAN GARDINER ]

**SYNOLOGY RT2600AC**  
\$390  
[www.synology.com](http://www.synology.com)

**CRITICAL SPECS**  
1733Mbps 802.11ac with beamforming; dual-core 1.7GHz ARM Qualcomm IPQ8065 CPU; 512GB RAM; VPN features; DLNA media server; parental controls; Apple Time Machine support; detachable omnidirectional antennae; 7.7 x 2.8 x 16.9cm; 0.7kg; 2-year warranty



## MSI Trident 3

IS IT GETTING HOT IN HERE?

NO BIGGER THAN a PS4 Pro or an Xbox One, MSI's lounge-room-friendly Trident 3 is one of the most svelte mini gaming PCs we've ever tested. Its compact parallel-gram-shaped chassis means it'll easily fit on a shelf in your TV cabinet, but the included stand (which is less stable than we would have liked) gives you the option of flying it vertically as a tower. And considering how nicely the angular lines, black metal-mesh fan vents and the single crystal-looking RGB lighted corner of this come together, we'd be surprised if you didn't want to stand it up and show it off.

Spearheading the Trident 3's list of specs is a 7th-gen Intel Core i7-7700 CPU, although that's running on a slightly older 6th-gen entry-level H110 chipset-based motherboard. It's uncommon to see mixed-generation pairings like this, and the Frankensteinian component arrangement will mean that some of the additional features and upgrades offered by that newer i7 chip will be unavailable.

Adding fuel to this fire, the CPU cooler doesn't seem up to effectively cooling that CPU, regularly maxing out HWMonitor's temperature gauges with readings of 100°C, even when only under partial load — these temperatures sit at the upper limit of what CPUs can handle. The result is that the CPU will automatically be throttled down to let

that excess heat dissipate. But in the long run, CPUs regularly operating at the top of their temperature range can suffer from a decrease in lifespan and the heat they put out can even damage surrounding components.

If you can look past that perplexing flaw, there's a lot to like about the Trident 3. Leveraging the performance and efficiency boosts of Nvidia's latest Pascal GPU architecture, the Trident 3 is fitted with a VR-ready GeForce GTX 1060. This GPU is supported by a slightly low but acceptable 8GB of RAM, a 256GB SATA-3 SSD and a 1TB HDD, so its raw processing-power easily puts Sony and Microsoft's current gaming consoles to shame. The cutting edge components of the Trident 3 are even a generation ahead of Dell's \$1,500 Alienware Alpha, but we can't help but feel like MSI has tried to beat square components into round holes.

In testing, the Trident 3 dominated the Alpha and its GTX 960 GPU across older titles on 1080p Ultra settings, churning out 133, 114 and 87.5fps across our *Tomb Raider*, *GRID 2* and *Bioshock Infinite* benchmarks, compared to the latter's 84, 87 and 70 respective scores. And even on current titles like *The Division* and *Far Cry: Primal*, the distinction was significant, with the Trident 3 respectively firing out 49.8 and 42 frames per second on

1080p Ultra settings, to the Alpha's curbed clip of only 32.4 and 34 fps.

Despite the hot CPU, the Trident 3 managed to pin benchmark scores of 19.9 and 849 on the CPU-focused HWBOT x265 1080p media encoding and Cinebench R15 multi-threaded CPU benchmarks. The Trident 3's scores are reflective of some CPU throttling, when compared against the scores of the Alienware Alpha's Core i7-6700T CPU scores of 14.5 and 650 on the same tests — but the end result was pretty negligible overall.

We feel a bit like rehabilitating drug addicts weighing up the desirable but potentially tragic component mix inside the Trident 3. If that CPU didn't get so hot, we'd already be mentally rearranging our own TV cabinet to fit in this \$1,799 unit (which includes an accompanying Stratus XL controller and *For Honor* game code). But the potential long-term consequences of that hot-running CPU are enough to make us reconsider — and wishing for a slightly cooler-running Core i5 version. [JOEL BURGESS]

**MSI TRIDENT 3**  
\$1,799  
au.msi.com

**CRITICAL SPECS**  
Windows 10 Home; Intel Core i7-7700 CPU; Nvidia GeForce GTX 1060 GPU; 8GB DDR4 RAM; 256GB Kingston SATA-3 SSD; 1TB Hitachi HDD; 35.4 x 25.1 x 9.8cm (4.7 Litre); 3.46kg

| GENERAL PERFORMANCE           | GENERAL PERFORMANCE                          | GENERAL PERFORMANCE                           | GAMING PERFORMANCE                   | GAMING PERFORMANCE                              | GAMING PERFORMANCE                              |
|-------------------------------|--|---|--------------------------------------|---|---|
| PCMARK 8 - HOME (ACCELERATED) | CRYSTAL DISKMARK 5 - SEQUENTIAL READ (Q32T1) | CRYSTAL DISKMARK 5 - SEQUENTIAL WRITE (Q32T1) | CINEBENCH R15 - CPU (MULTI-THREADED) | METRO: LAST LIGHT - 1080P, VERY HIGH (AVG FPS)* | METRO: LAST LIGHT - 1080P, VERY HIGH (LOW FPS)* |
| 4,893                         | 559  | 338   | 849                                  | 74  | 12.16   |





IF YOU REALLY DON'T LIKE THE WHOLE 'FLYING' ASPECT OF DRONES AND JUST AIM TO USE THEM TO FILM, THEN THE GHOSTDRONE'S RAFT OF SEMI-AUTOMATIC SHOOTING MODES WILL LIKELY APPEAL.

## EHang GhostDrone 2.0 VR

A DRONE ANY VIDEOGRAPHER CAN HANG THEIR HAT ON.

A SET OF VR goggles might not be considered a core ingredient for a consumer drone, but the GhostDrone 2.0's inclusion of a headset has given EHang a novel tool. The headset acts as an intermediary Wi-Fi signal forwarder for the drone, so you can get a more stable and responsive connection while using the eHang Play smartphone control app. A 5GHz Wi-Fi transmitter delivers the 480p image to the headset while a second 2.4GHz transmitter pushes around the control and sensory data. This setup is powered by a generous 1,700mAh battery with around 60 minutes of juice — far outlasting the flight time of the drone and saving your phone from battery-draining video transmission. The other main feature of the headset is an inbuilt gyroscope that allows the drone's vertical gimbal to be controlled simply by tilting your head, making vertical shot tracking a particularly intuitive process.

The simple smartphone-based control scheme makes this one less intimidating for a beginner, although for anyone accustomed to the controls and range of drones with dedicated controllers, manoeuvring the GhostDrone can feel a little imprecise and constrained.

Fortunately, because of the Wi-Fi forwarder, there aren't any of the range issues that generally accompany direct phone-to-drone connections and you'll get a stable connection up to the maximum recommended working distance of 500m. Using the eHang Play app in

'Avatar' mode, the drone is controlled by the gyroscopes in your phone. Holding your phone flat with the screen up will keep the drone hovering in the one spot, while tilting it causes the drone to accelerate in that direction. Altitude is adjusted by swiping the screen up to climb and pulling down to drop.

If you really don't like the whole 'flying' aspect of drones and just aim to use them to film, then the GhostDrone's raft of semi-automatic shooting modes will likely appeal. The drone will take off and land on its own, but it'll also move using map pin drops that can be chained into waypoints and can even utilise the smarts of your phone to automatically perform camera shots, from vertically panning to fully autonomous orbital tracking.

The drone uses one of the more interesting batteries we've seen, featuring an inbuilt display that gives you real-time information on the energy levels of each cell, the overall power percentage and even an estimated remaining flight time. Despite all that, this 4,500mAh powerpack will still only keep the drone in the air for a standard max flight-time of 25 minutes. Another trick the GhostDrone has up its sleeve is a spherical camera with a 93° field of view and an aperture of f/2.8, which can capture 4K video at 30fps. If you prefer the silky smooth viewing of 60fps, then you'll have to pair back the resolution to 2,716 x 1,524. The image quality produced by the camera's sensor and

lens is excellent. The crisp, well-lit and naturally coloured images and video show no sign of barreling or distortion, despite the generous lens angle, making it one of the only options at this price that we'd comfortably say could produce video quality at a professional level.

Still, the option to include a VR headset rather than a dedicated controller feels like a bit of a mistake, especially when you consider that the outstanding video quality produced by this unit is more than enough to distinguish it from the competition. That said, the GhostDrone 2.0 VR is very reasonably priced, has an excellent camera and even comes with a 12 month replacement warranty (that includes accidental crashes), so if you're looking at drones for cinematic purposes, then it's arguably the best-value proposition out there. [JOEL BURGESS]



### EHANG GHOSTDRONE 2.0 VR

\$1,199  
ehangdrones.com.au

#### CRITICAL SPECS

12MP camera with F/2.8 aperture and 93° lens (4K@30fps max video resolution); max horizontal speed 70km/h (40km/h in GPS mode); max vertical speed 9km/h; 500m recommended max range; 4,500mAh battery (25 min flight time); 1.15 kg



## Transcend JetDrive Lite 130

A CHEAP ALTERNATIVE TO THE TARDISK PEAR?

AT A GLANCE, the JetDrive Lite 130 bears more than a passing resemblance to the TarDisk Pear we looked at last month (see *TechLife* #60, page 61) — a specially designed SD Card for MacBooks that's meant to be plugged in and then stay there, acting as a permanent addition to your overall storage. The JetDrive Lite, on the other hand, is essentially just an extra removable drive that shows up in your Finder menu, onto which you can manually save any files you desire.

Transcend's devices, however, have one particular advantage — they're around half the price. And in terms of performance, they're actually about the same, with sustained read and write speeds of around 90 and 40MB/s, respectively.

There's little risk of the JetDrive coming loose — we had one installed in our 13-inch MacBook Air for over two weeks, with the laptop being throw into and pulled out of a bag at least twice per day. That being said, it can be unplugged any time you want, just like other external drives or cards.

If you're running out of storage on your MacBook, then this is an adequate option that won't break the bank. [DAN GARDINER]



**TRANSCEND JETDRIVE LITE 130**  
From \$67 (64GB)  
www.ramcity.com.au

### CRITICAL SPECS

Available in 64, 128 and 256GB capacities; uses MLC NAND flash; size varies depending on model of MacBook



## Oral-B Genius 9000

A GENIUS THAT'S NOT ACTUALLY A LOT SMARTER THAN ITS FOREBEAR.

ORAL-B'S BEEN TOOLING AROUND with this 'smart-toothbrush' concept for a couple of years now, with many of its models now offering built-in Bluetooth and the ability to connect to an app to track brushing statistics, as well as how often you floss, brush your tongue and/or rinse with mouthwash. The Genius 9000 is the latest flagship in this smart range, although in terms of actually 'new' features, it's not particularly ambitious.

It offers the same six brushing modes (which change the speed and oscillations of the head to focus on specific cleaning techniques) alongside the Android and iOS app that times your brush sessions and, while it does so, displays weather, news headlines and calendar appointments, presumably to keep you entertained for the two minutes it takes to clean your teeth.

The headline new feature is 'position detection' (something that's proudly touted on the front of the box), but this is actually mostly enabled by software — to use it, you need to stick an included bulky plastic phone-holder onto your bathroom mirror at head height (a bit like a car windscreen mount, just with the added excitement of potentially dropping

your phone in the sink) and then insert your phone, with the device's camera pointed at your face while you brush. Oh, and you have to confirm your camera's positioned correctly every time you use Position Detection — and refrain from moving your head too much while you do so.

In testing, moreover, the app's ability to actually detect brush position wasn't great. At best, it was a little bit laggy to recognise when we'd moved the brush — particularly when we were brushing the front area — which often led to us having to brush for prolonged periods until the app actually decided we were done.

There's seemingly a good reason the designers haven't made this the default mode, then — most people will find it just too inconvenient to be useful. Moreover, it's arguably not a huge improvement over the regular brushing timer, which can be paired with a visual aid to prompt you to brush four specific sections for a proscribed time period.

What's actually more useful in this Genius 9000 pack is that the included carry case, which has its own secondary-battery and doubles as a charger, so it'll re-juice your brush while it's packed away. That adds to the weight, but if you're going on a prolonged trip, it'll save you from having to take a charger (although that's admittedly quite compact).

The shortcomings we've highlighted don't make this a bad electric toothbrush — it's just not a particularly smart or insightful one. You'll need to be a brushing obsessive to bother sticking with certain features, but either way, it still gives a nicely refreshing clean. [DAN GARDINER]



**ORAL-B GENIUS 9000**  
\$250  
www.oralb.com.au

### CRITICAL SPECS

Bluetooth 4.0; Android & iOS apps; six brushing modes; four brush heads; charging case included







## Belkin Lightning Audio + Charge RockStar

COMPLICATED NAME, SIMPLE ACCESSORY.

APPLE HAS ALWAYS thought differently, and the arguments over the lack of a 3.5mm headphone jack still rage on. We think most people will have forgotten about that clumsy old port before too long, but we accept the difficulties presented by having just one port for charging and audio output.

Up steps Belkin with one solution to that conundrum. It looks just like an official Apple cable, which is nice, but it's also a little inelegant by that very design. Lightning ports are tiny, yet this white block is 3.5cm wide to fit in two Lightning ports side by side horizontally. Something a little less Apple-like might have yielded a more efficient, better-looking design, as it does look pretty odd plugged into your slender iPhone. Functionally, it addresses the charge/play issue well enough, though if it's a 3.5mm set of headphones you want to plug in, you'll need the Lightning-to-3.5mm adapter plugged in instead. It's also very Apple-priced at \$60.

All in all, it's not a cheap or particularly attractive option for charging and listening to your iPhone or iPad, but it does what it aims to do.

[ CHRISTIAN HALL ]



### BELKIN LIGHTNING AUDIO + CHARGE ROCKSTAR

\$60  
belkin.com

#### CRITICAL SPECS

Lightning connector; 2x Lightning ports;  
3.5 x 2.6 x 0.9cm (14.5cm long including cable)



### BROTHER PT-P300BT

\$79  
www.brother.com.au

#### CRITICAL SPECS

Direct thermal printing (180dpi); supports TZe tape up to 12mm; 115 x 115 x 61cm; 380g (without tape or batteries)



## Brother PT-P300BT

A BLUETOOTH SMARTPHONE-CONNECTED LABELLER, SO YOU CAN BRAND THINGS ANYWHERE, ANY TIME.

Organisation junkies rejoice! Brother's latest labeller eschews the need to detangle any cables and hook it up to your computer — the PT-P300BT is a labeller that connects to your smartphone over Bluetooth. Powered by six AAA batteries (DC power is optional; you'll need to purchase the power brick separately), with those installed the overall weight pitches towards 500g, but it's still portable enough to hold the labeller in one hand and your phone in the other.

We tested using the Android app (P-Touch Design&Print) which connects quickly and then offers up plenty of templates to steer you towards organisation glory. With a bit more effort, you can go through further customisation options — font face, alignment, borders and icons can all be changed to suit your whim. There are some limitations to your creativity, however — only faux versions of mainstream fonts are available (there's really no acceptable substitute for Arial, Times New Roman or Open Sans), the included 4m starter tape is plain black on white and emojis are a no-go. That said, it's a zippy little number that spits out reasonably crisp, 180dpi labels in two to three seconds, and it's child's play to use — it won't be long until you're labelling like there's no tomorrow, whether at home or in the office.

Labels are reasonably priced, too — an 8m roll costs around \$20 online, so you can label to your heart's content without worrying about breaking the bank.

The PT-P300BT is a well-priced device, and despite a few minor failings, this is a well-rounded basic labeller that's worth considering for simple to moderate labelling needs. But buyer beware: labelling does get addictive. [ RAH GARDINER ]





## ↓ ExoLens with Optics by Zeiss

LIFE THROUGH AN EXPENSIVE LENS.

ZEISS IS WORLD-REKNOWNED for making amazing lenses for the high-end camera market, but the iPhone... really? So far, lens-boosting accessories for the iPhone have been dominated by manufacturers that don't necessarily make SLR equivalents. So when big manufacturers get in on the act, are they really worth the extra premium on price?

Here, Zeiss has gone for a one-lens solution rather than a complete lens studio of the sort you can get for a similar price from the likes of Manfrotto and Olloclip. Note that ExoLens has a non-Zeiss lens kit for a similar price to Olloclip/Manfrotto multilens systems. So for just one lens — in this case, a wide-angle one (0.6x) — what do you get for the cash? Well, images are crisp, just wide enough to make landscape shots really pop, and though the case system looks odd, it excels with a tight rubber grip that can be slid off your iPhone in seconds.

We have found other wide-angle iPhone lenses tend to suffer from a degree of horizon curvature. The same artefact is found here, but it's less noticeable than on most lenses. This is a lovely add-on for an iPhone snapper but, in terms of price and flexibility, a multilens system will suit most people better.

The bottom line is that, while this will definitely hurt your wallet, we simply can't argue with the images or the great case.

[ CHRISTIAN HALL ]



### EXOLENS WITH OPTICS BY ZEISS

\$300  
exoLens.com

#### CRITICAL SPECS

18mm focal length, lens hood, rubber grips for iPhone 6/6s



[ WWW.TECHLIFE.NET ]



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## Fujifilm X-T2

CAN A MIRRORLESS CAMERA REALLY KEEP UP IN THE WORLD OF FAST-ACTION PHOTOGRAPHY?

WITH THE X-T2 sitting alongside the X-Pro2 as the joint flagship camera of the brand, Fujifilm believes it now offers two distinct options for photographers. The X-Pro2, with its rangefinder design, is less obtrusive and suited to Fujifilm's range of prime lenses, while the more SLR-like X-T2 is designed with the brand's growing range of fast zoom lenses in mind.

It's no great surprise to see that the 24.3MP APS-C X-Trans III CMOS sensor that we first saw in the X-Pro2 is now in the X-T2. Fujifilm's latest sensor, with its clever filter designed to eke out even more detail compared to conventional designs, has delivered some impressive results.

The sensitivity range covers a modest ISO200-12,800, but can be expanded to ISO100-51,200 — and the good news is that, unlike the X-T1, this extended range doesn't force you to shoot in JPEG-only, with raw capture now possible as well.

The X-T2's electronic viewfinder has also come in for some attention, and while the 2.36-million-dot OLED display with 0.77x magnification remains the same, there are

numerous improvements over the one used in the X-T1 — not least improved brightness.

Meanwhile, the new double-jointed articulated display makes it possible to pull the screen outwards and away from the body when the camera is tilted on its side. Interestingly, though, Fujifilm has opted to omit a touchscreen from the X-T2.

The X-T2 is the first Fujifilm X-series camera to offer 4K UHD (3,840 x 2,160) video recording, with a bit rate of 100Mbps (compared to 34Mbps on the X-T1) at 30, 25 or 24fps. Finally, the X-T2 now features dual SD card slots and, unlike the X-Pro2, both are UHS-II compatible.

Autofocusing is nice and quick, while the level of sophistication when it comes to tracking is impressive, making the X-T1 look very pedestrian indeed. We trialled it on fast-moving cars using the in-built Preset 3 (accelerating/decelerating subjects). Coupled with the improved frequency of the autofocus search timing — reduced from 280ms on the X-T1 to just 114ms on the X-T2 — it rarely missed a beat when taking a shot. The unchanged TTL 256-zone metering system

performs very well, especially when challenged by high-contrast scenes; indeed, if anything, it tended to underexpose. Raw files deliver very pleasing colour, while those shooting in JPEG have Fuji's excellent set of Film Simulation modes on tap as well.

There's still a bit of room for improvement here (isn't there always?), but the improved AF performance and the new sensor that delivers pin-sharp results makes the X-T2 one of the most desirable cameras available right now.

[ PHIL HALL ]

**FUJIFILM X-T2**  
\$2,190  
[www.fujifilm.com.au](http://www.fujifilm.com.au)

**CRITICAL SPECS**  
APS-C X-Trans III CMOS sensor at 24.3MP; 3-inch tilt-angle screen; 1,040,000 dots; 4K video capture; 2 x SD card slots; geotagging; HDMI output; 13.2 x 9.2 x 4.9cm; 507g



# DON'T DELAY: BACK UP TODAY

DON'T WAIT FOR DISASTER TO STRIKE: GET YOUR PC BACKUPS & STORAGE SORTED NOW WITH OUR ANNUAL SUPERGUIDE

60

## TAKE IT ALL WITH YOU

Portable hard drives are the most popular way to get more digital storage and their compact size means they're easy to take with you. We test 12.

70

## MAKE YOUR HARD DRIVE MORE MANAGEABLE

Discover how to bring order back to your chaotic hard drive.

78

## SMARTPHONE-READY USB FLASH DRIVES

Dual-plug expansion drives are a handy way to plug some extra storage space into your phone.

66

## WHY YOU NEED A NAS BOX

A network-attached storage device is basically essential — and they can do so much more than just store files. We test six mainstream four-bay models.

72

## FULLY BACK-UP YOUR WINDOWS 10 PC

Protect your precious data from any disaster with our essential advice.

81

## MOBILE WIRELESS NAS DRIVES

Need a shared storage space that can be accessed by multiple devices wirelessly? These Wi-Fi drives offer the perfect solution.



[ PORTABLE HARD DRIVES ]

# Take it all with you

PORTABLE HARD DRIVES ARE THE MOST POPULAR WAY TO GET MORE DIGITAL STORAGE AND THEIR COMPACT SIZE MEANS THEY'RE EASY TO TAKE WITH YOU. WE TEST 12.

[ JOEL BURGESS & PAUL TAYLOR ]



DESPITE MANY OF us relying heavily on the cloud these days, if you're one to keep a lot of videos, photos and music, a hard drive is an indispensable piece of kit. For professional photographers, that hard drive might be a My Passport Wireless Pro that'll wirelessly sync with a camera to store photos as they're taken. For cinematographers who want to work directly off the drive, a portable SSD is probably going to be the best bet. But for most, the affordability and large capacity of portable hard disk drives is hard to pass up.

Following the integration of USB Type-C into the latest high-end ultrabooks, the new

cabling standard has finally started to trickle down into external hard drive ranges. USB 3.1 (Type-C) is theoretically capable of carrying twice the data of USB 3.0, but when the older standard is capable of transferring data at 5Gbps, the upgrade is purely for compatibility and perception, offering no real technical boosts to a portable hard drive. Yet, despite the lack of usefulness to this category, many of the pricier models have started including the Type-C connection in their devices. Seagate did manage to put the extra current carrying capacity of the USB Type-C connection to good use, creating the first 3.5-inch external

## PORTABLE HARD DRIVE TEST RESULTS

| PRODUCT NAME                           | SUSTAINED READ SPEED (MB/S) | SUSTAINED WRITE SPEED (MB/S) | SMALL FILES READ SPEED (MB/S) | SMALL FILES WRITE SPEED (MB/S) | COST PER GB |
|--|-----------------------------|------------------------------|-------------------------------|--------------------------------|-------------|
| G-Drive ev ATC (1T) *                  | 136.1                       | 130.4                        | N/A                           | N/A                            | \$0.320     |
| G-Drive Mobile USB-C (1T) *            | 135.4                       | 128                          | N/A                           | N/A                            | \$0.190     |
| G-Drive Mobile USB / Firewire (1T) *   | 104.7                       | 102.3                        | N/A                           | N/A                            | \$0.150     |
| LaCie Porche Design Mobile Drive (4TB) | 137.7                       | 134                          | 45.21                         | 98.53                          | \$0.0975    |
| Seagate Backup Plus Ultra Slim (2T)    | 129                         | 128.2                        | 44.69                         | 87.73                          | \$0.078     |
| Seagate Backup plus portable (5TB)     | 143                         | 134                          | 44                            | 70                             | \$0.062     |
| Seagate Backup Plus Fast (4TB)         | 250.4                       | 249.5                        | 42.78                         | 88.85                          | \$0.097     |
| Toshiba Canvio Basics (2TB)            | 116.4                       | 114.2                        | 42.21                         | 47.27                          | \$0.065     |
| Toshiba Canvio Slim II (1TB)           | 111.8                       | 111                          | 42                            | 48.52                          | \$0.130     |
| Toshiba Canvio Connect II (1TB)        | 115.9                       | 115.5                        | 41.15                         | 49.32                          | \$0.088     |
| WD My Passport Pro (2TB)*              | 206                         | 210                          | N/A                           | N/A                            | \$0.200     |
| WD My Passport Ultra (3TB)             | 124.5                       | 123                          | 45.2                          | 79.2                           | \$0.094     |

\* Tested on Mac with Blackmagic Disk Speed Test



hard drive unit that doesn't require its own power adapter, but in the portable drive space, it seems more of a status symbol still.

With a few new drives in the mix and the landscape changing alongside the decline in price of SSDs, *TechLife* takes another look at the best portable drives, for keeping your data safe when you're out and about.

#### BUNDLED SOFTWARE COMPARED

First up, though, most external storage devices you'll buy today come bundled with some kind of software, be it backup software, remote access, encryption or drive utilities. If you're going to buy an external drive, it's absolutely worth knowing what you're going to get on the software front. It can make all the difference.

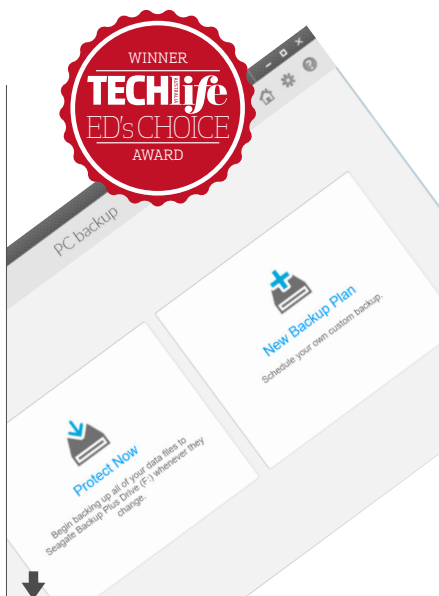
Typically, drive makers have a standard bundle that they provide with most, if not all, of their external products. Over the next two pages, we thought we'd go ahead and give you an overview of what those bundles are, broken down by vendor.

12

PORTABLE HARD  
DRIVES ON TEST

#### HOW WE TESTED

Benchmarks were tested using a USB 3.0 Type-A connection on a Surface Pro 4 running full Windows 10 Pro 64-bit. The disk speed results were determined using a 2015 version of Crystal Disk Mark 3.0.4 running all sequential, 512B and 4KB benchmarks through five test instances of 1,000MB of data. The only exception to this is if the drive was formatted for use with macOS, in which case, we ran BlackMagic Diskspeed Test to find sequential read and write speeds on a 2014 13-inch MacBook Air.



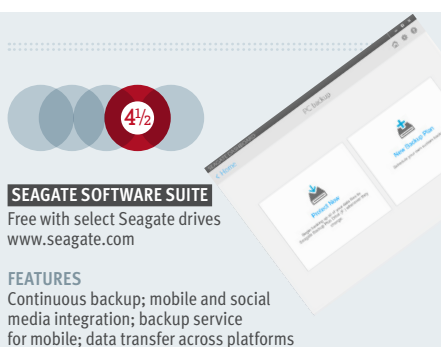
#### Seagate software suite

**GREAT SOFTWARE TO GO WITH SEAGATE'S SOLID HARDWARE.**

ARGUABLY THE BEST bundled backup solution available right now, Seagate's Dashboard comes with nearly all of its consumer external hard drives. Dashboard provides an easy one-click solution for PC backup, and supports continuous backup as well as full-system backup.

The true strength of the app is in its mobile and social media integration. It can back up your Facebook and Flickr media easily: you just need to give it your password. It also provides a backup service for Seagate mobile backup apps on Android and iOS. Those apps will talk to the Seagate Dashboard app installed on your PC and use it to transfer the data to the Seagate drive attached to the PC.

If a backup solution is important to you, this is definitely the one to get. There are some strong contenders — WD in particular — but this is our current top solution.



#### Toshiba software suite

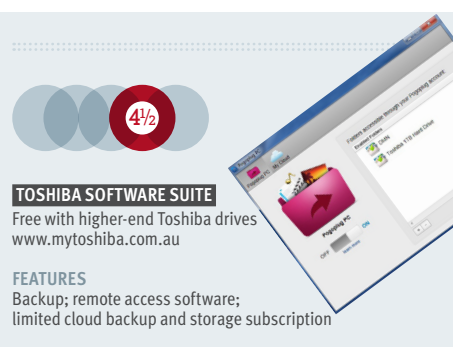
**PROVIDES A GREAT FEATURE SET.**

WITH TOSHIBA, THE availability of bundled software depends on whether you purchase the Connect/Premium model or the Basics model. Canvio Basics drives do not come with additional software. They're just provided as-is.

Canvio Connect drives, however, come with an interesting suite of tools. For backup, they provide NTI Backup Now EZ, the same tool provided with ADATA drives. It's not as sleek as the WD and Seagate solutions, but it's still a serviceable solution (and better than nothing).

Perhaps the more valuable inclusion, however, is the fully licensed Pogoplug Remote Access software that lets you access the contents of the drive over the internet. It's easy to use and works really well, a major selling point for Toshiba.

Canvio Connect drives also frequently come with a limited cloud backup and storage subscription.







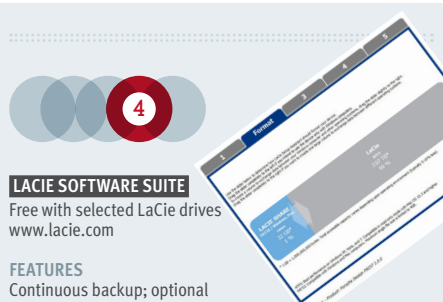
## LaCie software suite

**STURDY AND USER-FRIENDLY.**

LACIE DRIVES COME with a first-rate software suite, including a unique setup application that will initialise the drive for your platform. It will, by default, create a common shared section of the drive in FAT32 and an optionally encrypted partition, formatted for your OS where the bulk of the data will be stored.

After the drive is initialised, the setup application will install LaCie Backup Assistant/Genie Timeline Free, an absolutely solid backup system with continuous backup. It's very easy to use and definitely an improvement on Windows backup, although a lot of configuration options are annoyingly disabled in the free version you get with the drive. It will also install LaCie Desktop Manager.

Finally, LaCie also offers Private-Public (which you may have to visit its site to grab), a capable software encryption tool that requires no installation.

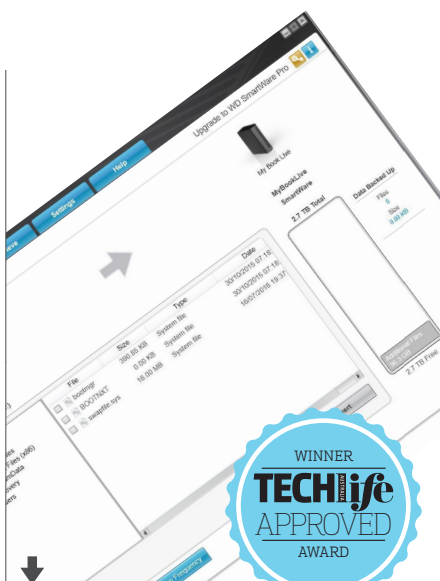


### LACIE SOFTWARE SUITE

Free with selected LaCie drives  
[www.lacie.com](http://www.lacie.com)

#### FEATURES

Continuous backup; optional encrypted partition in your drive; software encryption tool



## Western Digital software suite

**SIMPLE, BUT NOT LACKING.**

NEARLY ALL WESTERN Digital drives come with WD SmartWare as their software suite of choice, and many drives (particularly the bigger 'desktop' class drives) come with a licence for a special edition of Acronis True Image as well.

WD SmartWare is an excellent, consumer-friendly backup solution, on par with Seagate's solution for PC backup but lacking its mobile and social media support. It provides a super-simple one-click option as well as a customised backup. Backup is continuous or scheduled, and the app provides plenty of storage imagery, showing you how much space is being used by what kind of data.

Acronis True Image (a drive imaging tool) is available on many drives, too. It's an outstanding solution for performing a full-system Windows backup or even a system migration to a new internal hard drive or SSD. It offers incremental and continuous updates, ensuring that the backup drive image always matches the actual PC.



### WESTERN DIGITAL SOFTWARE SUITE

Free with select WD drives  
[www.wd.com](http://www.wd.com)

#### FEATURES

Continuous/scheduled backup; drive imaging tool; incremental and continuous updates



## PORTABLE HARD DRIVE BUYER'S CHECKLIST

WHAT TO LOOK FOR WHEN SHOPPING FOR A PORTABLE DRIVE.

### PEAK SPEEDS

Fast is best, but expect speeds to be slower for a mix of smaller files compared to sequential transfers of large files.

### VALUE FOR MONEY

Cost per GB gets better on larger drives, but the smallest 500GB models are usually worth skipping.

### CONNECTIVITY

USB 3.0 is ubiquitous, but some drives offer other options, such as Thunderbolt.

### SIZE MATTERS

Larger capacity portable drives have more platters and are usually a little bit thicker — up to a noticeable 5mm.

### SPEED DEMON

For mechanical drives, larger capacities typically give slightly faster transfer speeds, simply because the data is more densely packaged.

### BUNDLED SOFTWARE

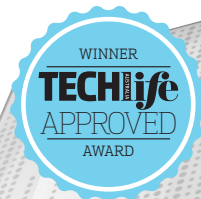
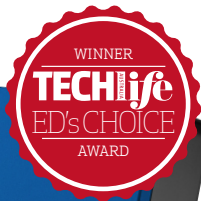
Many (but not all) drives come with a variety of bundled software that's anywhere from excellent to mediocre. There are also plenty of free options available in case you want something better. Typically, the software is included on the drive by default, or can be downloaded.

### EXTERNAL CASE

Using an old, spare laptop drive? Just buy a cheap USB 3.0 external case for it instead of shelling out to buy a whole drive.

### SECURITY

It typically slows transfer speeds, but encryption is an important feature to protect sensitive data.



SUPERGUIDE  
TAKE IT ALL WITH YOU

## Seagate Backup Plus Portable 5TB

SIZE REALLY DOES MATTER.

SEAGATE'S LATEST BACKUP Plus has an absurdly large 5TB capacity. While there's only a slower 5,400rpm internal drive under the hood, the high data density means it was able to achieve a 10% speed boost over comparable drives. The sequential read and write speeds were a high 143MB/s and 134MB/s, using CrystalDiskMark 3.0.4, but the scores fell back to more normal levels for smaller 512KB files (at 44MB/s and 70MB/s). The USB 3.0 Type-A to micro-B cable gives the drive ample power, and remains compatible with older USB 2.0 computers. The Backup Plus provides an unparalleled cost-to-capacity ratio of 6.4 cents per GB. And with 200GB of OneDrive storage and Seagate's suite of backup software to boot, it's hard to fault the 5TB Backup Plus Portable in any real way.



### SEAGATE BACKUP PLUS PORTABLE 5TB

\$319  
[www.seagate.com/au](http://www.seagate.com/au)

#### CRITICAL SPECS

5TB storage; USB 3.0, USB 2.0; 11.4 x 7.6 x 2cm; 247g

## Seagate Backup Plus Fast 4TB

A COMPELLING BUT SLIGHTLY PRICIER OPTION.

NOT TO BE confused with Seagate's standard 4TB portable drive, this chunky model is heavier and larger than most on the market. But there's actually two 2TB drives inside in a RAID configuration, which means it's also very fast (up to 250MB/s) — that's provided, of course, you've got a USB 3.0 connection and you're copying to or from a similarly speedy drive, like an internal SSD. There's a two-headed Y-cable in the box, which you'll need to use for connecting to USB 2.0 ports. Seagate's Dashboard software is included, one of the most comprehensive backup apps on offer. Of course, higher-end features cost moolah, so this one's not cheap. You do get what you pay for, though.



### SEAGATE BACKUP PLUS FAST 4TB

\$390  
[www.seagate.com/au](http://www.seagate.com/au)

#### CRITICAL SPECS

4TB storage; USB 3.0, micro USB; included USB2.0 adaptor cable; 11.7 x 8.3 x 2.2cm; 307g

## Seagate Backup Plus Ultra Slim 2TB

TEERING OFF WITH AN EVEN SLIMMER DRIVE.

SEAGATE DECIDED THAT a shiny metallic gold or silver topside with a golf ball pattern was the key to its latest Backup Plus Ultra Slim drives, hoping the lunar-like surface will accentuate the 3mm reduction in width from the existing range. But more noticeable is the drive's slight boost in read and write speeds when compared with the Backup Plus Slim. The Backup Plus Ultra Slim showed 15MB per second boosts for sequential read and write speeds on the Backup Plus Slim models, which roughly corresponds to the 10% price difference. The cost per GB is reasonable on this drive and the weight and size live up to its title.



### SEAGATE BACKUP PLUS ULTRA SLIM 2TB

\$156  
[www.seagate.com/au](http://www.seagate.com/au)

#### CRITICAL SPECS

2TB storage (1TB also available); USB 3.0, micro USB; 11.3 x 7.6 x 0.96cm; 159g

## WD My Passport Ultra 3TB

REASONABLY PRICED AND GOOD AT THE BASICS.

THE MY PASSPORT Ultra is Western Digital's ultra portable offering at 150g — the second lightest we've tested. Apart from introducing a 'New' upgraded model that boosted speed slightly, this drive hasn't changed much. It's reasonably priced with the 500GB model going for \$89, though you can get the 1TB Canvio Connect II from Toshiba for the same price. The hardware here is top notch, with an attractive external design, hardware-based 256-bit AES encryption and the software suite is a good package. The new My Passport Ultras net respectable sequential read and write speeds of 124.5 and 123MB/s, respectively, and the wide range of available colours are sure to suit anyone.



### WD MY PASSPORT ULTRA 3TB

500GB, \$89; 1TB, \$100; 2TB, \$160; 3TB, \$285  
[www.wd.com](http://www.wd.com)

#### CRITICAL SPECS

3TB storage (500GB, 1TB and 2TB also available); USB 3.0, micro USB; 11x 8.1 x 1.5cm; 150g





## Toshiba Canvio Connect II 1TB

**STUCK IN THE MIDDLE.**

THOUGH THE MARKETING spiel for the Canvio Connect will have you thinking the drive has some kind of wireless data transfer capability, it's nothing more than the bundled software that allows for the remote access of files and, even then, it's not remote access of files stored on the portable drive. The drive itself is reasonably commonplace in other ways, with the usual 10.9cm, 7.8cm and 1.4cm dimensions, plus a nicely light 149g weight. The tested speeds also stick closely to what we expected, with 116MB/s sequential read and write speeds with a similarly unsurprising small file read and writes speeds of 41MB/s and 49MB/s. There weren't any downsides, well other than it being a little dull.



## Toshiba Canvio Slim II 1TB

**AN AVERAGE PERFORMER.**

A BRUSHED-ALUMINIUM CHASSIS, compact design and low 150g weight make this nice to look at and hold. It's even a tad smaller than WD's My Passport Ultra design. Unlike the Canvio Basics line, you get some software — both encryption and backup are handled with third-party tools and Toshiba has also bundled in an NTFS driver for Macs, so you can use this drive without reformatting it. We've noticed some online retailers discounting this 1TB model to as low as \$70 and, at that price, it's a bit of a steal. We're presuming this particular line's nearly at the end of its shelf-life, with fewer retailers stocking it; so if you want to pick one up for that price, you'd better get a wriggle on.



## WD My Passport Pro 2TB

**A LIGHTNING-FAST DUAL-DRIVE MODEL.**

WITH THE ARRIVAL of portable SSDs that can reach over 450MB/s write speeds, dual hard disk portable drives are going to have a hard time if they want to remain competitive. This model uses a thunderbolt connection and a dual drive in RAID 0 configuration to read and write speeds over the 200MB/s mark, around double the speeds of a hard disk drive. The use of thunderbolt and a the HFS+J disk format peg this drive as one specifically for Mac users. \$400 is a lot for a portable drive, but at the moment, it still hits a unique price, speed and capacity point when you consider, for the same money, you could only afford a 512GB portable SSD.



## G-Drive ev ATC 1TB

**THE MAC USER'S IMPERVIOUS STORAGE UNIT.**

THE EV ATC range is the fastest 'rugged' drive we've ever seen. When you look at the sequential read speeds, it's even at the heels of the fastest single portable drive we've tested. G-Drive's current range is aimed at Mac users; the drives don't even register on Windows Devices straight out of the box. The ev ATC has a unique design with the main hard drive being ensconced by a removable waterproof casing that includes an inbuilt Thunderbolt casing, allowing you to transfer files without having to remove it. Punching out sequential read and write speeds of 137MB/s and 130MB/s, respectively, and coming with a USB 3.0 cable, this speedy drive is hard to fault in any way.



### TOSHIBA CANVIO CONNECT II 1TB

1TB, \$88; 2TB, \$136  
[www.mytoshiba.com.au](http://www.mytoshiba.com.au)

#### CRITICAL SPECS

1TB (500GB, 2TB, 2.5TB, 3TB also available); USB 3.0, micro USB; 10.9 x 7.8 x 1.4cm; 149g



### TOSHIBA CANVIO SLIM II 1TB

\$90  
[www.mytoshiba.com.au](http://www.mytoshiba.com.au)

#### CRITICAL SPECS

1TB; USB 3.0, micro USB; 10.7 x 7.6 x 1.3cm; 150g



### WD MY PASSPORT PRO 2TB

2TB, \$400; 4TB, \$550  
[www.wd.com](http://www.wd.com)

#### CRITICAL SPECS

2TB (4TB also available); Thunderbolt; 14.3 x 8.9 x 2.8cm; 450g



### G-DRIVE EV ATC 1TB

\$320  
[www.g-technology.com](http://www.g-technology.com)

#### CRITICAL SPECS

1TB; Thunderbolt, USB 3.0; 20.4 x 5.4 x 5.2cm; 372g



### G-Drive Mobile USB-C Drive 1TB

**FAST BUT NOT GREAT.**

THE G-DRIVE USB-C mobile drive from G-Technology has a little more to boast about than some of the company's other offerings, but it's still worth prefacing that the USB-C standard doesn't offer improved transfer rates over and above USB 3.0. That said, the G-Drive Mobile USB-C Drive is packing a fast 7,200rpm disk drive that pushes sequential transfer rates to 135MB/s when reading and 128MB/s while writing. The G-Drives are formatted specifically for Mac, so for PCs, you will have to manually format the drive before you can use it. It is better than the Mobile USB/Firewire model but it's far from being good value in terms of available hard drives.



#### G-DRIVE MOBILE USB-C DRIVE 1TB

\$190  
[www.g-technology.com](http://www.g-technology.com)

#### CRITICAL SPECS

1TB; USB 3.0, USB 3.1; 12.9 x 8.2 x 1.3cm; 174g



### Toshiba Canvio Basics 2TB

**A BARE-ESSENTIALS OPTION.**

FOR THE LAST few years, Toshiba's Canvio Basics drives have been excellent-value options, with this family of models often selling for \$10–\$20 below the equivalent WD and Seagate units. That margin has narrowed to almost nothing in recent months, however, and poor availability does dull the appeal. The name ('Basics') denotes something important — there's no software included (backup or otherwise), so you'll need to sort out your own, like SyncBack Free. You'll also need to reformat it if you want to use it on a Mac. Performance was largely average with transfer speeds of around 116MB/s for reads and 114MB/s when writing.



#### TOSHIBA CANVIO BASICS 2TB

1TB, \$90; 2TB, \$140  
[www.mytoshiba.com.au](http://www.mytoshiba.com.au)

#### CRITICAL SPECS

2TB (500GB, 1TB also available); USB 3.0, micro USB; 11.9 x 7.9 x 1.5cm; 210g



### LaCie Porsche Design Mobile Drive 4TB

**C INTO THE (EXPENSIVE) FUTURE.**

BEING ONE OF the only portable drives here with the option of USB Type-C to C transfers and the only hard drive to be designed by a sports car manufacturer, we were expecting the Porsche Design Mobile Drive from LaCie to be a speedy little device. Despite it being the fastest single portable hard drive we've tested, transfer rates are still leagues away from actually needing the new USB 3.1 protocol. At 137MB/s and 134MB/s sequential read and write speeds, Porsche Design Mobile Drive is between two and three times slower than the speediest flash drives. When you put it up against Seagate's \$160 2TB Backup Plus Ultra Slim drive, it's less than 5% faster overall.



#### LACIE PORSCHE DESIGN MOBILE DRIVE 4TB

\$399  
[www.lacie.com](http://www.lacie.com)

#### CRITICAL SPECS

4TB (2TB also available); USB 3.0, USB 3.1; 12.2 x 8.2 x 0.7cm; 315g



### G-Drive Mobile USB/FireWire 1TB

**CAN THIS DRIVE REALLY HANDLE THE GS?**

SLIGHTLY CHUNKIER THAN your average ultra-portable drive, the G-Drive isn't going to be breaking any records for how compact it is and considering it weighs in at 283g, it's also notably heavier than most of the other drives we tested. The G-Drive Mobile USB is one of the only portable drives we've seen with two firewires and a USB output, so even though it is encased in a stock-standard metal enclosure, it does have at least one unique feature. Unfortunately, the 5,400rpm disk drive is a little slower than what we're used to, with sequential read and write speeds at around 105MB/s and 102MB/s, some 20–30% slower than your standard 7,200rpm-equipped portable drives.



#### G-DRIVE MOBILE USB/FIREWIRE 1TB

\$150  
[www.g-technology.com](http://www.g-technology.com)

#### CRITICAL SPECS

1TB (500GB also available); USB 3.0, FireWire; 12.7 x 8.3 x 1.8cm; 177g



[ THINK INSIDE THE BOX ]

# Why you need a NAS box

IN TODAY'S MULTI-DEVICE HOME AND OFFICE ENVIRONMENTS, A NETWORK-ATTACHED STORAGE DEVICE IS BASICALLY ESSENTIAL — AND THEY CAN DO SO MUCH MORE THAN JUST STORE FILES. WE TEST SIX MAINSTREAM FOUR-BAY MODELS.

[ NATHAN TAYLOR ]

WITH DATA STORAGE on PCs actually shrinking thanks to SSDs, as well as more and more threats that might wipe out your photo and video collection in an instant, there has never been a better time to get a NAS box.

A network-attached storage device is a box that you plug into your network, providing a shared storage medium for all the devices on your network. You can put your media and documents on them to share them between devices, and they make an excellent backup target for your PCs and mobiles. Many NAS boxes can also do a lot more than that: they can take feed from IP cameras and record them. They can serve websites. They can transcode movies so that mobiles can play them. Some can even do virtualisation, telephony, web content management and media playback.

Four-bay devices pretty much hit the sweet spot for a lot of home users. They let you configure drives in a RAID 5 array, which is pretty much the perfect balance between reliability and capacity (in RAID 5, if any one drive in the NAS dies, you don't lose any data; the cost is the capacity of one of the drives). With a two-bay NAS, you lose half your capacity if you want reliability; with four bays, you only have to sacrifice 25%.

They're also well priced right now. Most NASs come diskless, meaning that they have no inherent storage capacity and you have to purchase your own hard drives to put in them. Even so, you can get a four-bay NAS, as well as four hard drives to go in it for less than \$1,000 total — which is a pretty great deal for having the reliability and features of a full NAS.

## NETWORK-ATTACHED STORAGE DEVICE BUYER'S GUIDE

WHAT TO LOOK FOR WHEN SHOPPING FOR A NAS BOX.

### SMARTPHONE APPS

If you want a personal cloud or to remotely stream, solid apps are critical to getting the most from your NAS.

### DISKLESS OR WITH DRIVES?

It's often cheaper and easier to install drives. But sometimes, the included drives are actually a bargain.

### EXPANDED FEATURES

Look on the manufacturer's website for the full list of apps available to run on the NAS for extra functionality.

### MEDIA-ORIENTED FEATURES

All modern NASs can handle streaming, but look for extras such as HDMI, Plex compatibility and transcoding.

### TOOL-LESS INSTALLATION AND HOT SWAP BAYS

Less important than often imagined, unless you plan to change a lot of drives in and out.

### EXTERNAL CONNECTIVITY

USB ports allow extra storage expansion, but some can handle print serving, Wi-Fi dongles or even keyboards and mice.

### TWO- VS FOUR-BAY

Bigger isn't always better, and four bays are generally only needed for specific RAID or huge storage needs.

### TRANSFER SPEEDS

All these NAS boxes are fast enough for day-to-day use — compare only by speed if you have a specific need in mind.



06

NETWORK-ATTACHED  
STORAGE DEVICES  
ON TEST

### HOW WE TESTED

For each device reviewed here, we performed a simple copy test and measured both the write and the read speed, in megabytes per second (MB/s). All tests bar the Seagate were performed with three Hitachi 4TB drives installed and set up in RAID 5 (since RAID 5 tests the performance more than other modes). For the Seagate, we used the included drives. For NASs that supported link aggregation (using two Ethernet ports and load balancing across them),

we used both Ethernet ports. However, given the client test device only has a single port, this is not really reflected in the results. Looking at the results, you'll see a lot that hover in the 90–105MB/s range. This is essentially the NAS maxing out the Ethernet connection, which is where link aggregation comes into play. It means that the NAS likely has more performance to offer for when multiple devices are accessing it at once.

## GENERAL PERFORMANCE

READ (MB/S)

103.2

WRITE (MB/S)

94.3



## QNAP TS-451A

POWERFUL AND VERSATILE, WITH A DIRECT CONNECTION TO YOUR TV.

WITH A LARGE feature set and considerable processing power, the TS-451A takes its spot as our current top pick for four-bay consumer NASs. It's not all perfect — the price is a little high and QNAP's mobile apps are a bit of a mess — but for an overall solution, this is our go-to answer.

Let's start with a couple of the most notable differentiators: a USB device port and an HDMI port. The USB device port lets you connect the QNAP directly to a PC and use it as you would USB storage. No need for network setup or even a network. Meanwhile, the HDMI port lets you connect the QNAP directly to a TV set, without the need for a smart TV or network media player. This isn't just used for managing the NAS. A copy of Kodi (an outstanding media player) can be installed on the NAS for media playback of stuff you have stored on the QNAP or elsewhere on your network. You can use the supplied remote to control it, or use your mobile as the Kodi remote.

The PC-like capabilities of the QNAP extend to app availability as well. Built on a Linux foundation, there's a huge host of available services and apps for the QTS operating system. Nearly everything you can think of is there: VPNs, camera surveillance (and a licence for two cameras is included), web photo and video galleries, telephony, backup and cloud sync, virtualisation (yes, you can run Windows 10 on it in a virtual machine), print server and much more. There's even a karaoke app.

All this is built on an appealing hardware foundation, with a mid-range processor (for a NAS) and a case that makes it easy to install and swap drives. It was fast in our tests, and easily capable of live transcoding 1080p video. A top buy.



QNAP TS-451A

\$640  
www.qnap.com

### CRITICAL SPECS

Intel Celeron N3060 1.6GHz dual-core processor, 2GB RAM (expandable to 8GB); 2x gigabit Ethernet, 3x USB 3.0, IR receiver, SD Card reader, USB 3.0 device port; OS: QTS

## GENERAL PERFORMANCE

READ (MB/S)

103.6

WRITE (MB/S)

96.4



## Synology DS916+

POWERFUL AND EXTREMELY VERSATILE.

A HIGHLY VERSATILE NAS in the vein of QNAP and Asustor's offerings, the Synology is built for people who want their NAS to do more than just serve files. There are dozens of server applications available for the platform, some from Synology, many from third parties. All these apps are managed in a full windowing interface built atop a version of Linux.

There are far too many apps to list here, but some of the standouts include arguably the best IP camera surveillance manager for NASs (with two licences included), a virtualisation station that lets you run other OSes on the NAS, a photo and video web gallery manager, a web server and content manager, a cloud-based word processor and spreadsheet (think Google Docs), a chat server, an email server, various backup and cloud tools, and a VPN server. And that's just the beginning.

To go along with its excellent operating system, Synology has provided some very capable hardware. With a relatively powerful processor and up to 8GB of memory (we tested with 2GB), live transcoding and virtualisation are real options on this platform. It delivered excellent results in our tests and we found drive installation a breeze and noise from the huge twin fans surprisingly minimal. Like most of the NASs here, it has twin Ethernet ports for load balancing.

It's a fantastic NAS overall, if perhaps a little bit pricey. It has excellent hardware, an elegant design and one of the best software suites around. Even its mobile apps are very good — not as good as Seagate or Netgear's, but capable and easy enough to use.



SYNOLOGY DS916+

\$660  
synology.com

### CRITICAL SPECS

Intel Pentium N3710 1.6GHz quad-core processor, 2GB RAM; 2x gigabit Ethernet, 3x USB 3.0, 1x eSATA; OS: Synology DiskStation Manager



#### GENERAL PERFORMANCE

READ (MB/S)

68.2

WRITE (MB/S)

43.7



### Asustor AS-204T

**A LOW-COST NAS WITH A LOT OF VERSATILITY.**

A CHEAP NAS at the low-end of Asustor's Range, the AS-204T is great for anyone looking for a highly versatile NAS at a cost that won't break the bank. Like QNAP and Synology, Asustor has very much embraced the many options that having a Linux foundation enables. There is a huge variety of applications and add-ons available for its operating system, and while we favour QNAP and Synology's first-party apps, Asustor has access to pretty much the same suite of third-party apps. That includes virtualisation, anti-virus, backup, media gallery and services, streaming, cloud sync, transcoding, peer to peer download, telephony, VPN and much more. Like all the NASs here, there is a mobile app for sync and media file access as well as a (very good!) Windows desktop app for backup.

The interface is also very much like that of QNAP and Synology, with a virtual desktop. For beginners, it's a little more intimidating than the simpler solutions offered by Netgear, Seagate and WD, but if you want more out of your NAS than file sharing, this offers it.

The modest hardware of the Asustor will limit just how much stuff you can load in at once, however. With an older Atom processor and just 512MB of RAM, you're not going to be transcoding 4K video streams or running a surveillance station with dozens of cameras attached. It was, unsurprisingly, one of the lower RAID 5 disk performers in our test set, though we found the virtual desktop worked snappily enough.

The hardware has a simple and functional design, with relatively easy installation of new disks — though it will require a Phillips head screwdriver to get the job done.



#### CRITICAL SPECS

Intel Atom 1.2GHz dual-core processor, 512MB RAM; 1x gigabit Ethernet, 2x USB 3.0, 2x USB 2.0; OS: ADM

#### GENERAL PERFORMANCE

READ (MB/S)

81.3

WRITE (MB/S)

49.1



### Netgear ReadyNAS RN214

**A SOLID MID-RANGE PERFORMER. SIMPLE TO USE AND SET UP, BUT NOT AS VERSATILE AS SOME OF THE COMPETITION**

WITH ITS HARD black-box and front LED information display, the Netgear RN214 is one of the more impressive looking NASs in our line-up, and it's also one of the easiest to set up. It has a simple installation process for both drives and software, handy mobile apps for syncing and one of the easier interfaces to grasp and manage.

When it comes to the firmware, Netgear's offering is much more in line with that of WD and Seagate than it is with QNAP or Synology. It is, for the most part, a simple tabbed affair, with settings that are understandable to less-technical users and a focus on core features: namely file and media sharing and backup. There are additional apps that can be installed onto the NAS, but the library of such apps is quite modest with the highlights being a live anti-virus scanner and Plex, which can be used for streaming or transcoding.

Although the other vendors have moved onto generally more powerful x86 processors, Netgear is still using an ARM processor in its consumer NAS line. It advertises the ability to live transcode 1080p video live in Plex, but when we tried it, we had frequent buffering issues, testifying to the limits of the processor. It did produce solid performance results in the disk tests, however, nearly matching the more powerful Celeron and Pentium-based NASs.

All-in-all, it's a capable mid-range NAS, with nice apps to get it up and running and a simple interface that won't challenge non-technical users. It's not nearly as versatile as some of its competitors, but if you don't care about third-party apps, surveillance or exotic virtualisation services, it's a fair purchase.



#### CRITICAL SPECS

ARM Cortex A15 1.4GHz quad-core processor, 2GB RAM; 2x gigabit Ethernet, 3x USB 3.0, 1x eSATA; OS: ReadyNAS OS

# GENERAL PERFORMANCE

| READ (MB/S) | WRITE (MB/S) |
|-------------|--------------|
| 43.8        | 28.3         |



## Seagate NAS 4-Bay STCU300/STCU20000U300 (20TB)

AN OLDER PRODUCT THAT NOW REPRESENTS EXCELLENT VALUE FOR PEOPLE LOOKING FOR JUST THE BASICS.

THE SEAGATE STCU300 represents a fantastic bargain right now. Sure, it's not going to set the world on fire in terms of performance or anything else really, but if you just want a media and file server that's capable of streaming your video collection to your smart TV or Apple TV, this gets the job done for less than \$300 for a diskless version. The model we looked at came with 20GB of Seagate drives pre-installed (the only NAS reviewed here that came with drives).

The Seagate is running on an older 1.2GHz dual core ARM processor with just 512MB of memory, which is far slower than any of the old devices tested here. That's reflected in the RAID 5 test results, where it struggled to reach 30MB/s when writing. As is usually the case with RAID 5, read speeds were a lot faster. The processor is certainly not capable of live transcoding HD video, even if that were an option in its software. It uses Seagate NAS OS, which is actually one of our favourite NAS operating systems. It's designed for optimum simplicity with a very straightforward setup and management. The mobile apps are excellent, and we really like the anti-virus as well as the modest surveillance manager for IP camera recording and management. If you're looking for versatility along the lines of QNAP, Asustor or Synology, however, this doesn't have it. It's built to do the basics and not much more, with a very limited array of third-party tools.

As a value proposition for people looking for something easy to use, this certainly has the goods. It may be a product nearing the end of its life span, but that means you may be able to pick it up for a bargain.



**SEAGATE NAS 4-BAY**  
**STCU300/STCU20000U300 (20TB)**  
\$1,450 (20TB), \$290 diskless  
[www.seagate.com.au](http://www.seagate.com.au)

### CRITICAL SPECS

Marvell ARM 1.2Ghz dual-core processor, 512MB RAM;  
2x gigabit Ethernet, 2x USB 3.0; OS: Seagate NAS OS

# GENERAL PERFORMANCE

| READ (MB/S) | WRITE (MB/S) |
|-------------|--------------|
| 98.5        | 90.3         |



## WD My Cloud Pro PR4100

GOOD HARDWARE, BUT WAY TOO EXPENSIVE FOR WHAT IT DOES. OTHER NAS BOXES DO MORE FOR LESS.

THE MOST EXPENSIVE NAS here by a considerable margin, WD justifies the high cost with the most powerful hardware of any of the others. With 4GB of memory and a 1.6GHz quad core Pentium processor, the WD edges out all the competition for raw performance. It also has a really great design, with a useful front LED letting you know the current IP address, drive status and capacity and a very neat, very straightforward drive tray installation.

What is not so great about the firmware is the application support. Like Netgear and Seagate, WD is focused more on core features (file and media services) than extra apps, and WD has the probably the weakest lineup of third party apps and additional features of any NAS reviewed here. It doesn't have a surveillance station and many other apps and services are missing. Its marquee apps are probably Plex Media Server (which does let you use the WD's considerable processing power for live transcoding of media for mobile devices), Acronis (the outstanding backup tool) and WordPress (for creating your own web site).

On the other hand using and managing the WD is very easy. The simple tabbed interface and excellent suite of desktop and mobile apps can get you running with media services and backup for all your devices very quickly and with little technical challenge.

Still, we wish WD had put more effort into getting third-party developers on board and making their apps available for the platform. There's some really great hardware here, but that alone is not enough to justify the premium price. If you could do more with the NAS, then maybe it would be worth the extra \$200. ■



**WD MY CLOUD PRO PR4100**  
\$810  
[www.wdc.com](http://www.wdc.com)

### CRITICAL SPECS

Intel Pentium N3710 1.6GHz quad-core processor, 4GB RAM;  
2x gigabit Ethernet, 3x USB 3.0; OS: My Cloud OS



[ SUPERGUIDE ]

# Make your hard drive more manageable in Windows

**DISCOVER HOW TO BRING ORDER BACK TO YOUR WINDOWS PC's CHAOTIC HARD DRIVE.**

[ TECHLIFE TEAM ]

BEFORE WE TACKLE a deep spring clean, let's look at hard drive management. Unless you're very organised, it's likely that your filing system is a little haphazard. And if you have multiple hard drives, it's also likely you have multiple copies of the same files.

## FIND DUPLICATES QUICKLY

CCleaner includes a file duplicate finder tool, but it's not very sophisticated. So download and install the free version of Duplicate Cleaner ([www.digitalvolcano.co.uk/duplicatecleaner.html](http://www.digitalvolcano.co.uk/duplicatecleaner.html)) instead.

First, choose what to search for — the default option is to search files by content. You can also set filters — such as documents, pictures or music — for files to include or exclude, and limit your search to files of a certain size and date. For a system-wide sweep, use the defaults as they are and switch to the Scan Location tab.

Next, elect where to search using the tools provided. If you want to exclude a specific location, add it in the usual way, then right-click it and choose 'Exclude Selected Path(s)'. When you're ready, click the Scan Now button and wait while Duplicate Cleaner does its work — it's not a quick process, so be prepared to leave your PC on for several hours. If necessary, minimise the scan window while you work on other tasks.

Once complete, you can review the results on the Duplicate Files tab, where they'll be listed in no particular order. Focus on the largest files by clicking the Size column header twice. Go through the list, ticking the duplicates you wish to remove or use the Selection Assistant.

If you have a single folder or location where your original files sit, you can specify that with the 'Select by Location' button, which tells Duplicate Cleaner to target files in other folders for deletion. Once done, you can select all other files by clicking the magic wand button and choosing 'Mark > Select by group > All but one file in each group'.

While using these and other Duplicate Finder tools may be tempting, they may not be accurate enough. Often it's easier, quicker and safer to go through the list by hand, weeding out unwanted files and clicking 'File Removal'. From here, you can choose whether to delete a file or send it to the Recycle Bin.

The program can be quite slow and even non-responsive at times. The trick is to be patient. If there's a long list of files to clean, you may want to take a break. Close the program — when you next launch the app, your results will be ready for you to continue processing.

## MANAGE YOUR PHOTOS

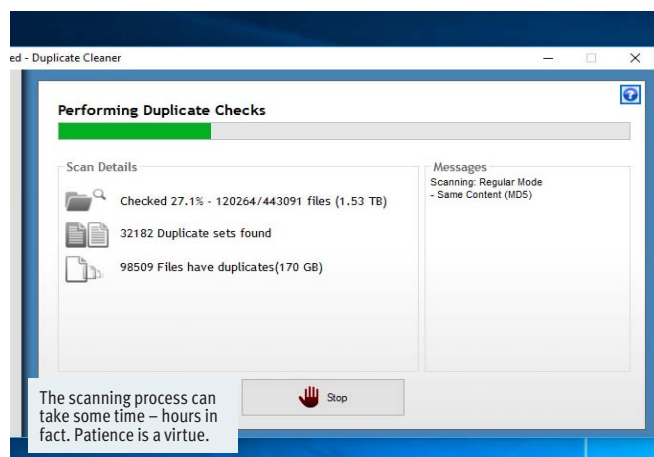
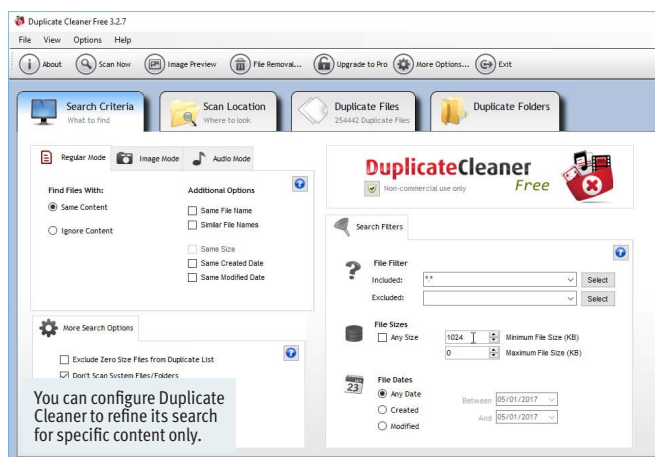
When it comes to managing photos, we need

a tool that can search for similar-looking images as well as identical matches. You'll have to upgrade to the Pro version of Duplicate Cleaner for that, so our favourite alternative is AntiDupl ([antidupl.sourceforge.net/english/index.html](http://antidupl.sourceforge.net/english/index.html)). The walkthrough opposite explains the steps you need to follow, but as always, it plays to move slowly through each photo in the list, to be sure you've got the right match.

By default, AntiDupl assumes the first folder you added to it is the 'master' folder — the one where the files are left untouched. When the search results appear, you'll see a preview of each photo on the left complete with basic information confirming the match. Next to each photo, you'll see three buttons: taking the first photo, the top-most button will delete both copies, while the second icon will overwrite the second copy with the first. The next button removes the top photo.

Below the two arrow buttons, you'll see three similar buttons, with the first one highlighted in red, indicating that the second photo is set to be deleted by default. Below is a button allowing the second copy to overwrite the top one, and the final button — the hand signal — allows you to mark this match as a 'mistake', ensuring it'll be ignored.

Click a button and the desired action is performed now and the next item is selected, ready for you to act on. You'll see similar



THE END RESULT SHOULD BE THIS: YOU HAVE ONE MASTER COPY OF YOUR FILES, PLUS AS MANY BACKUPS AS YOU NEED.

buttons appear under the menu bar — if you select multiple entries using Ctrl-click, you can click these buttons to perform the action on all the matches. There's also a 'Process selected results automatically' button which applies it to all the results — this is not something we recommend unless you're working on a small set of results.

As you go down the list, you'll come to photos that aren't exact matches, giving you the chance to remove similar items. Deleted photos are sent to the Recycle Bin for safety, but once you're done, be sure to empty it to free up drive space.

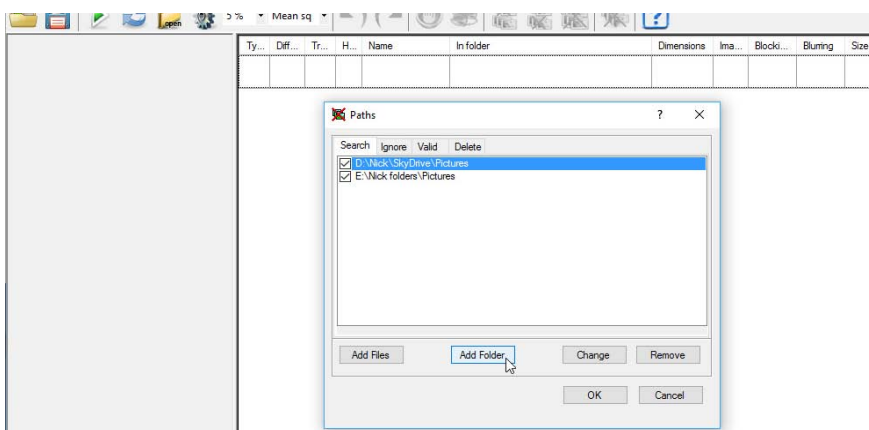
## WHAT TO LOOK FOR WHEN CLEANING UP DUPLICATES

First, backups of critical files are, of course, important, so any file cleaning needs to bear this in mind. Second, you may have renamed a file without changing its content, so a good duplicate finder utility should not simply match files by their names (which could be disastrous if two completely separate files with the same name get linked together), but also by the file's properties too, from its size to the date it was last modified — that's especially important with digital photos that have been downloaded from different cloud computing providers, with each one naming them differently.

And what about the legions of digital photos cluttering up space on your hard drive? It's not uncommon to take five or more shots to ensure you get one usable one, but what about the rest? You only want to keep the best copy, but manually trawling through all your photos can be a daunting task. Panic ye not, as we're about to show you how the AntiDupl app makes this job that bit simpler.

The end result should be this: you have one master copy of your files, plus as many backups as you need. These could be stored as an exact backup copy in one backup folder (which you'll need to identify to make sure it's ignored by the duplicate file finder), or you might have them backed up using a tool such as Windows' own File History, in which case, the backup won't be touched by your file weeding. All other copies — or slight variations — are then candidates for removal.

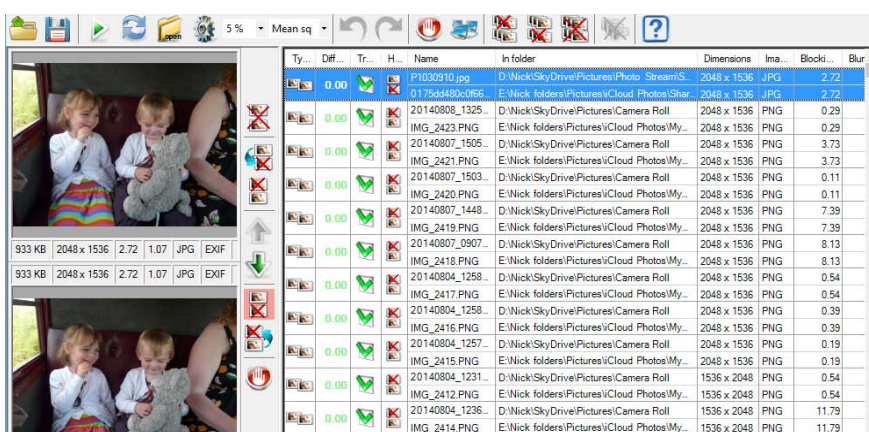
## [STEP BY STEP] STREAMLINE YOUR PHOTO COLLECTION



01

### SET SEARCH PARAMETERS

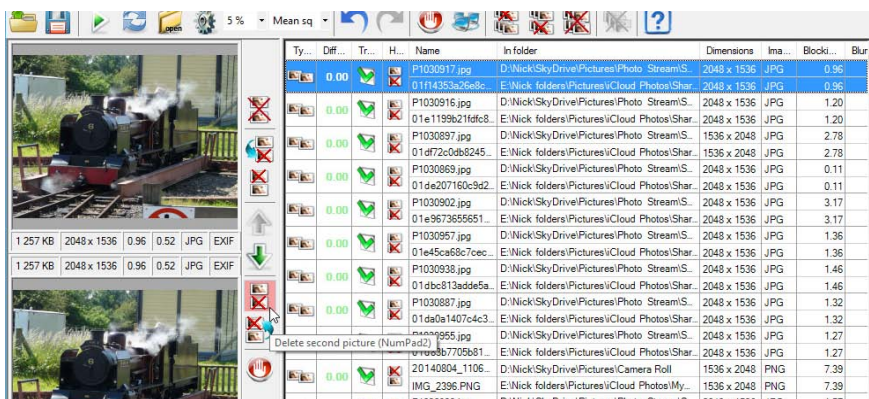
In AntiDupl, go to 'Search > Options' and tick 'Search rotated and mirror image dupls' if you wish. Now select 'Search > Paths'. Click 'Add Folder' to add a folder or drive to search — repeat for as many locations as you need (you can search specific files for duplicates if you want a targeted search). Click OK.



02

### REVIEW RESULTS

Click the Play button and wait while the folders are searched and compared (click Background Mode to minimise it to the System Tray). When the scan finishes, AntiDupl will pop up listing all found duplicates and similar files. See the main text for advice on choosing what settings to choose for each find.



03

### PERFORM CLEANUP

As you click a button for each result, it'll disappear from the list, and the next item will come into view. Work methodically through the list — you can select multiple items at once using 'Ctrl-click'. If you close the program, you can relaunch it later, and the results will be saved, ready for you to resume working. ■





# Fully back-up your Windows 10 PC

PROTECT YOUR PRECIOUS DATA FROM ANY DISASTER WITH OUR STEP-BY-STEP GUIDE.

BACKUPS MAY NOT be the most glamorous of subjects, but they're definitely worth paying attention to. Think about what your data is worth. Some files are more valuable than others — it could be a matter of the time taken to create a document, while other files, such as photos hold sentimental worth.

Most people know the importance of backing up, but can you be sure your backup plan is up to scratch? Many people keep one backup copy of their files, but what happens if it is destroyed along with the original? Seeing as most people keep their backup drive in the same location as their PC,

that's not a fanciful notion. We'll help you create a multi-layered backup of your data, ensuring it's stored in at least two separate locations, preferably more. We'll reveal the best tools to use — both Windows' own backup tools, as well as great third-party tools. We'll also look at backing up your entire system drive, so if you run into problems, you can roll back to a working Windows installation without having to reinstall.

These days, keeping at least one backup in a remote location usually means taking advantage of cloud-based services, such as Dropbox or Microsoft's OneDrive.

There are many potential issues with relying on third parties, whether it's security, constantly changing pricing plans, or what happens to your data if the company ceases trading. If these are deal-breakers, we'll look into alternatives, from sharing backup space with family members to setting up your own encrypted cloud storage, where you have no worries about subscriptions.

We'll also make sure you know what to do should disaster strike and you need to restore a copy of your data.

You may already have a basic backup plan in place — Windows 10 makes this easy by offering you two routes, including both ‘Backup and Restore’ from Windows 7 and ‘File History’ from Windows 8. They’re easy to access and set up — search the Start menu or Cortana for ‘backup’. Both focus on producing backups of key documents, photos and other data, and can back up to any drive that’s visible to your PC, including network-attached storage.

Rule one of our backup strategy is to make use of multiple backup locations (see ‘Select your backup device’, below-right). Neither ‘File History’ nor ‘Backup and Restore’ allow you to back up to alternate locations, but if you’re running Windows 10, you can employ both together to get around this restriction. Configure ‘File History’ to back up to one location — we recommend a drive physically attached to your PC — and use ‘Backup and Restore’ to back up to another drive, preferably a shared folder on your network drive. ‘File History’ constantly monitors for changes and backs up as necessary, while you should schedule ‘Backup and Restore’ to run weekly at a time that won’t interfere with PC use.

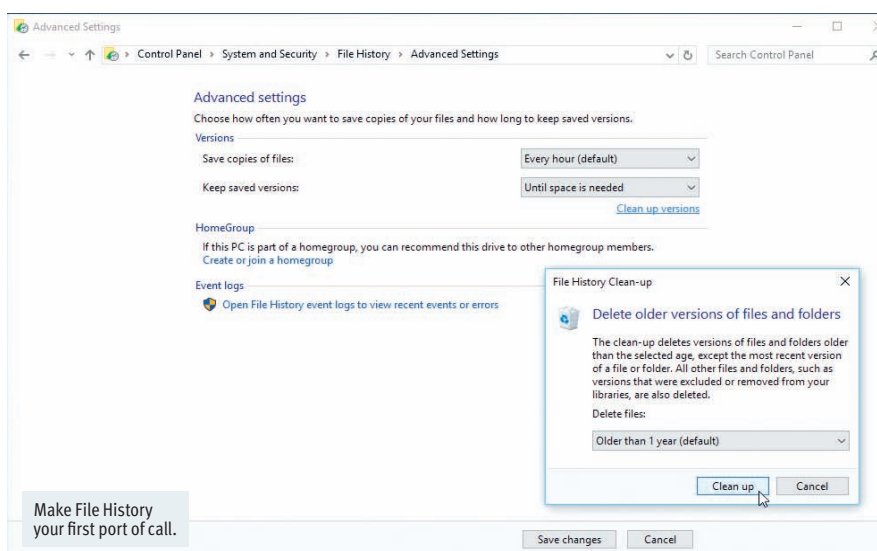
## SYSTEM BACKUPS

Your data is taken care of, but what about Windows itself? If disaster strikes, you could find yourself spending days getting your PC set up again — but if you take a full system backup (known as a ‘drive image’), you can have your PC up and running again within just an hour.

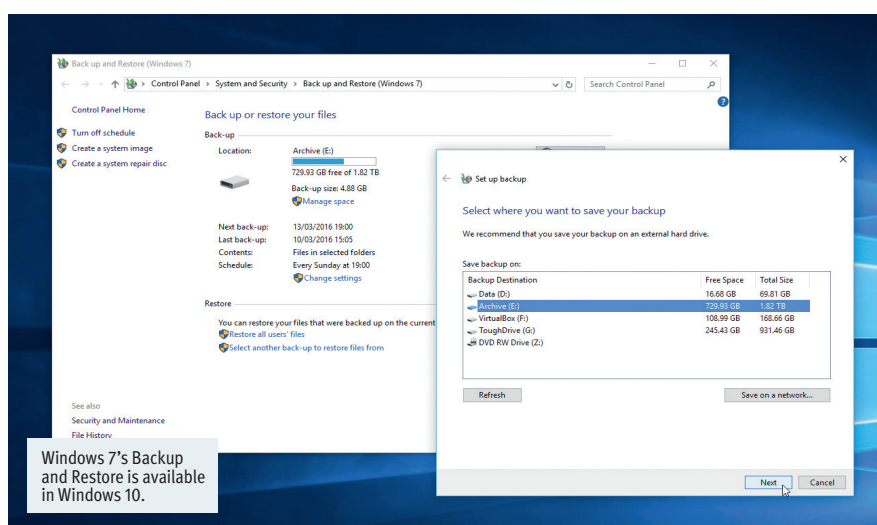
Windows offers to create a system image when you set up ‘Backup and Restore’, but there are weaknesses. First, each backup requires tens of gigabytes of space on your PC. Second, images aren’t verified when they’re created, so you’ve no way of knowing if you can rely on them. And third, images are only stored on a single drive.

Eliminate all three weaknesses by employing the services of our favourite drive imaging tool, Macrium Reflect. We’ve used it to back up (and rescue) Windows countless times over the past five years, and nothing comes close to it. Start with the powerful Free version at [www.macrium.com/reflectfree.asp](http://www.macrium.com/reflectfree.asp), which solves the issue with space by using differential images that take up much less room by only recording the changes made since the last backup was taken.

Launch Macrium Reflect Free once installed, and click ‘Create an image of the partition(s) required to backup and restore Windows’. Next, set your destination — a folder on your backup drive. You might want to change the file name to something more



Make File History your first port of call.



Windows 7's Backup and Restore is available in Windows 10.

## SELECT YOUR BACKUP DEVICE

When it comes to choosing where to back up your files to, you’re spoiled for choice. But it’s not a case of either *this* backup device or *that* one — ideally, you should invest in at least two separate devices. Look for the following:

**Secondary hard drive:** This can be internal or external (USB). Use it for your primary file and drive image backups, using Windows’ own tools and Macrium Reflect Free.

**Network hard drive:** A good secondary solution that can be kept elsewhere in your home for added security. Perfect for any of the backup methods we discuss here — you can even use it as the basis for your own personal cloud storage system using OwnCloud.

**Other computer:** If you own another PC (or Mac), keep your key files in sync on all your computers using a cloud storage service or Syncthing. As an added bonus, the latest version of your data is always available to whichever PC you’re using.

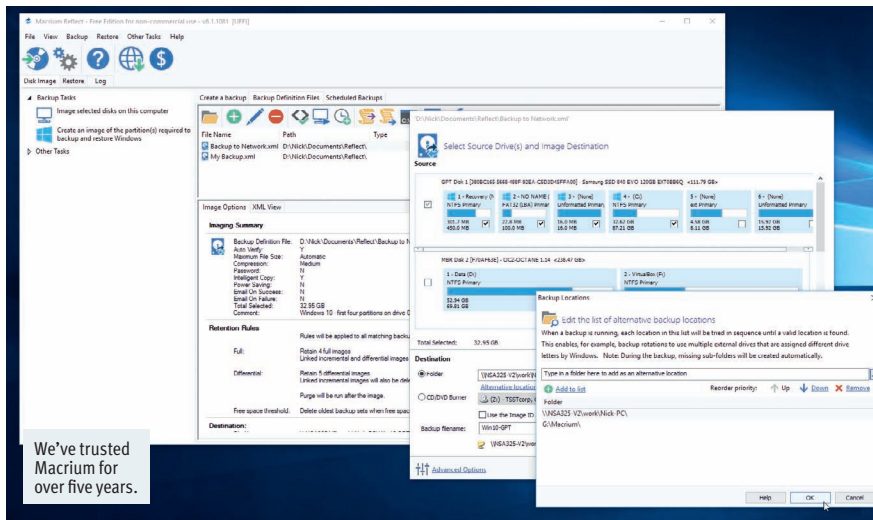
**Friend’s or family computer:** You can swap unused storage space with people you trust, but make sure your data is kept in an

encrypted format on their computer — use Buddy Backup or Viivo in conjunction with Syncthing.

**Cloud storage:** If you have a fast, unlimited internet connection, using a trusted service, such as Dropbox, Microsoft OneDrive or Google Drive is also an option. Again, use Viivo to encrypt sensitive data for extra security.







DISASTER HAS STRUCK —  
YOU'VE LOST DATA,  
SO WHAT NEXT? THANKS TO  
YOUR BACKUP PLAN,  
YOU SHOULD FIND  
YOU'RE ABLE TO RESTORE  
THE DATA YOU LOST.

your videos backed up online, for example? As you have a local backup in place, you could focus on storing important documents and photos in the cloud, where you're unlikely to run out of space quickly. That way, you can usually get away with free storage plans.

If you don't trust your cloud provider's encryption, add a secondary layer of encryption to sensitive files before uploading them to the cloud. The best tool for this purpose is Viivo ([viivo.com](http://viivo.com)), which works with multiple cloud providers, and includes tools for sharing access to files with family and friends. It's free for personal use, but make sure you keep a separate, unencrypted backup of this data somewhere safe, too, to ensure you're not locked out of your files.

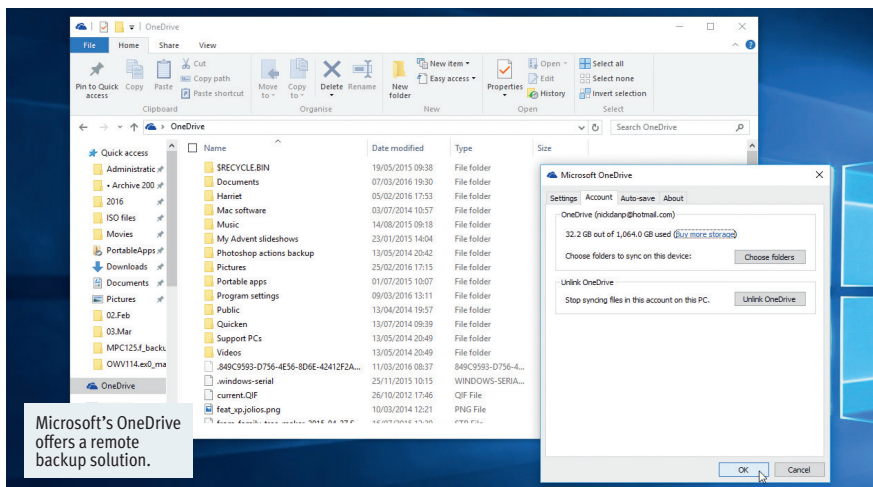
### ALTERNATE STRATEGIES

There are two main alternatives to putting your data in the hands of a third-party provider. Both can be used over the internet if you have a fast and unmetered connection, but you can also use them exclusively over your local network, too, ensuring your data never touches the cloud in any shape or form.

The first of these options involves syncing data from selected folders directly between two or more computers. It works over your local network, as well as the wider internet, if necessary. It's perfect for keeping files in sync between computers you own, and creates a copy of your files, so there are no issues with proprietary file formats. Naturally, the connection is encrypted and the software is open-source.

The program in question is called Syncthing and it works across Windows, Linux and Mac, and can even be directly installed to selected network drives. We recommend installing the GTK build from [github.com/syncthing/syncthing-gtk](https://github.com/syncthing/syncthing-gtk) — install it on both computers, then select the folder you wish to sync on your main computer, before connecting it and your other PC together. Once done, the files are kept in sync automatically whenever Syncthing runs — configure it to start with Windows, to ensure it's always backing up.

Files are transferred directly between computers, so they both need to be on and connected for files to sync. If you wanted to store backups remotely on other PCs, take a look at BuddyBackup ([www.buddybackup.com](http://www.buddybackup.com)), which encrypts your data so it's unreadable on the computers you back it up to.



easily recognisable, and take the time to click 'Advanced Options' to select 'Auto Verify Image' to ensure your backup is checked for errors after it's been taken. Once done, pick a backup schedule — we recommended pairing one monthly full backup with weekly differential backups, or choosing the 'Differential Backup Set' template for more frequent daily backups. Click 'Next' followed by 'Finish'.

In the spirit of data redundancy, you should then repeat the process, creating a second definition rule pointing toward your secondary backup drive — speed things up by right-clicking the rule you just created and choosing 'Duplicate'. Don't forget to create the rescue media (DVD or 4GB USB flash drive) when prompted by Macrium — this ensures you'll be able to restore your system even if Windows won't boot.

If you want more features — including incremental backups, and the ability to back up files and folders — upgrade to Macrium Reflect Home Edition.

### THE POWER OF THE CLOUD

These days, backups are synonymous with the word 'cloud', the logic being that storing backups in the cloud ensures one copy of

your data is kept off-site in a secure location in case of fire, theft or worse. It makes sense, although there are some drawbacks. The obvious choice when backing up to the cloud is to employ a known solution — Microsoft's OneDrive service is baked into Windows 10, but alternate trusted sources include Dropbox ([www.dropbox.com](http://www.dropbox.com)) and Google Drive ([drive.google.com](http://drive.google.com)).

Each service offers limited free plans of around 5–15GB of free storage space, which is fine for personal files, such as documents, photos and even some video, but if you run out of space, you'll need to upgrade to a monthly or annual subscription. One of the best value solutions is to install Office 365 — your subscription includes 1TB of cloud storage and access to the latest version of Microsoft Office for up to five users.

However, there are some reasons to treat cloud storage with suspicion. These include ongoing costs, the security of your data and what happens if the company in question either goes out of business or discontinues its product, as users of Wuala and AVG LiveKive cloud storage services have discovered to their cost over the years.

In terms of fees, consider prioritising what data you store in the cloud — do you need

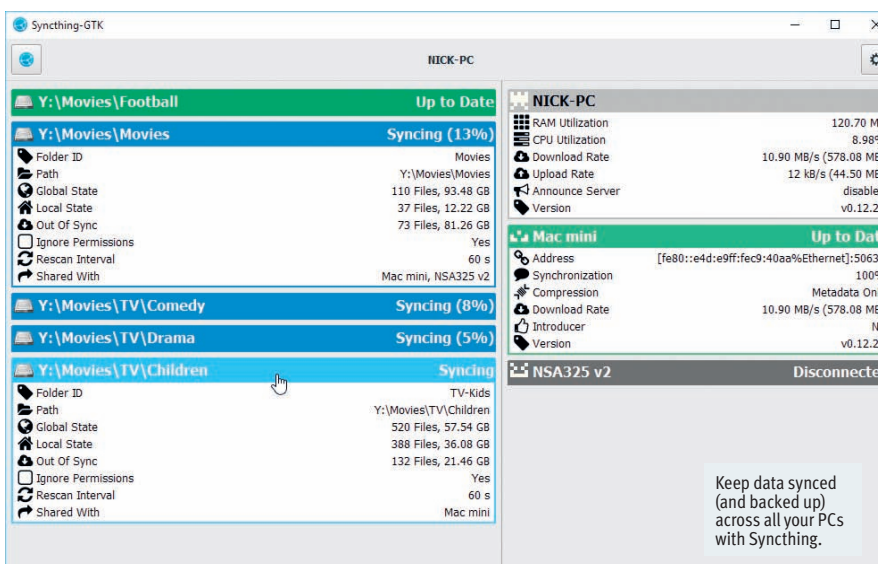
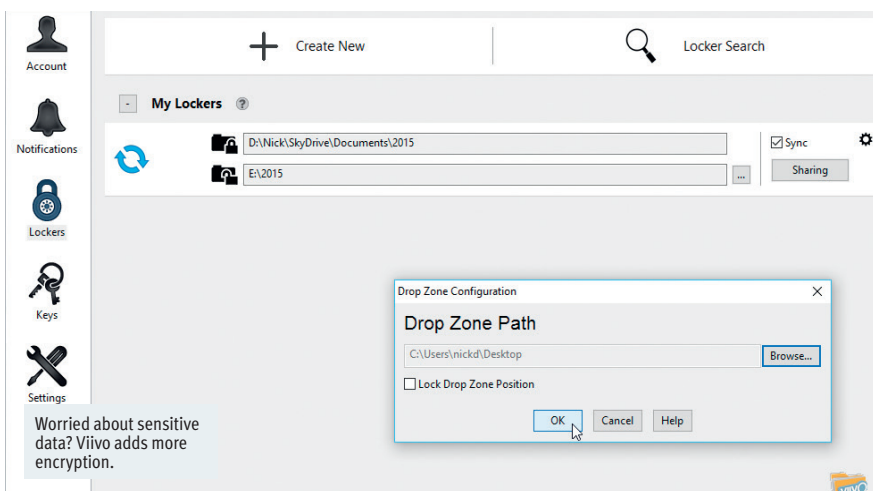
## YOUR PERSONAL CLOUD

If you'd like to store files centrally (creating an additional backup of your files in the process), without relying on a third party, then set up your own using a spare PC or network hard drive as the file server.

Some network drives come with their own proprietary cloud systems — My Cloud from Western Digital, for example — but we recommend choosing something open-source and more widely supported — OwnCloud ([owncloud.org](http://owncloud.org)), which works across a variety of platforms. The server part can be installed to many network drives — including Zyxel and Synology (the latter via [synocommunity.com](http://synocommunity.com)) — as well as Linux-powered PCs, including the Raspberry Pi 2, if you're looking for a low-cost solution. You then download and install the desktop and mobile clients on Windows, Mac, Linux, Android, iOS and other supported platforms, to allow you to both sync and access your files from anywhere.

Think of OwnCloud as being your own personal cloud storage system — you're not tied to any third parties, there are no fees and your cloud can be restricted to your local network or opened up for access over the internet. It works with multiple users, too.

Some initial configuration is required, but everything's point-and-click, with a useful manual on hand to steer you in the right direction. When asked to set up your initial account, be sure to click 'Storage & database' and select the 'MySQL' option, rather than the default 'SQLite' one. This will dramatically speed up the server's

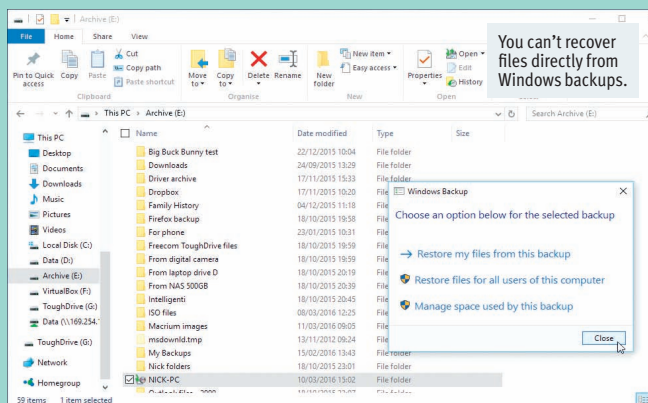


## PROTECT YOUR BACKUPS

Nothing lasts forever — and the same is true of backups. Optical discs don't last a lifetime, while hard drives wear out, and cloud storage can disappear without warning. That's why backing up to multiple locations is essential, but it doesn't stop there. You should take additional steps to protect your data from physical degradation.

Check with the maker of your drive for a monitoring tool, such as Seagate's SeaTools ([www.seagate.com/seatools](http://www.seagate.com/seatools)), to keep an eye on your drives' health, giving you time to replace failing drives before they disappear with your data. If you want a network drive, choose a two-bay model, such as Synology's DiskStation 216+, and fill it with two identical drives in a RAID 1 setup. Data is mirrored on both drives, so if one fails, you can swap it out with a replacement without fear of data loss. Just remember a RAID array doesn't constitute two backups — if the enclosure fries (or gets stolen), you lose both drives. (As an aside, try the free DMDE data recovery tool from [www.dmde.com](http://www.dmde.com) if you need to recover data from NAS-formatted drives.)

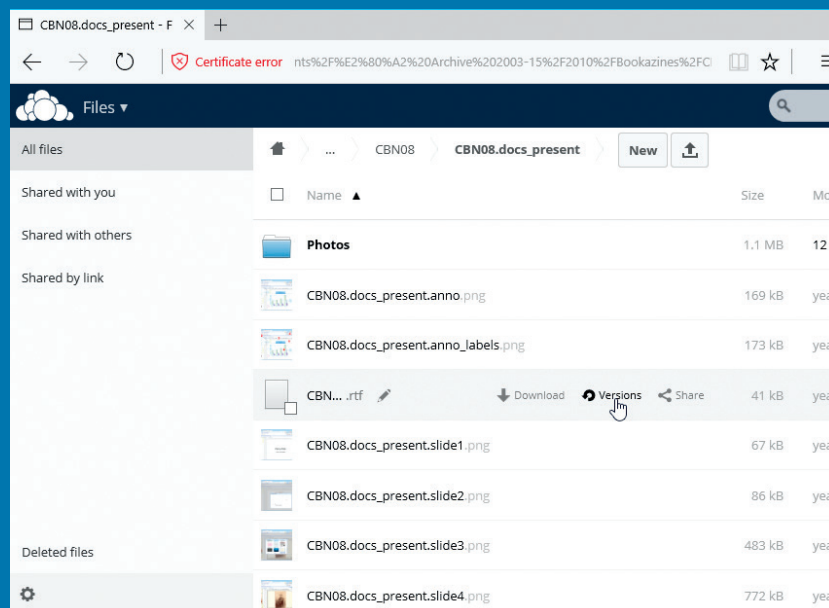
Also watch the software you use. Some tools store your data in their own proprietary formats, so if the software stops working (perhaps after upgrading to an unsupported version of Windows), you lose access to your backup. Both Windows backup tools use their own format, as does



Macrium, Backup Buddy and Viivo (as part of protecting backups through encryption).

So make sure one of your backup plans duplicates your files in their original format to ensure you have one easily recoverable version of your files.





## BACK UP FILE REVISIONS

One of the benefits of following our backup plan is many of the tools on offer record multiple versions of your files, enabling you to undo changes to files as well as restore lost, deleted or corrupt data. Both Windows backup tools support this, although File History's default settings of updating your files every hour (rather than weekly, as with the Backup and Restore tool) gives greater flexibility.

If you back up files to OneDrive, Dropbox or your own OwnCloud server, access your account through your web browser, then locate the file in question. OwnCloud users should click the 'Versions' option next to the filename; otherwise, right-click the file and choose the

option to restore a previous version, to see what's available based on time and date. You can preview earlier revisions by clicking them.

Synching only stores one revision of a file by default, but you can change this on a folder-by-folder basis. Right-click the folder bar in Synching-GTK and choose 'Edit', then select an option from the 'File Versioning' menu — each has a description, and you get context-sensitive options, such as the number of versions to keep.

One caveat: storing multiple versions of files requires more space than straight one-to-one backups. Bear this in mind when choosing what size hard drive to buy.

performance when it comes to syncing large batches of files.

## RESTORING FROM BACKUPS

Disaster has struck — you've lost data, so what next? Thanks to your backup plan, you should find you're able to restore the data you lost.

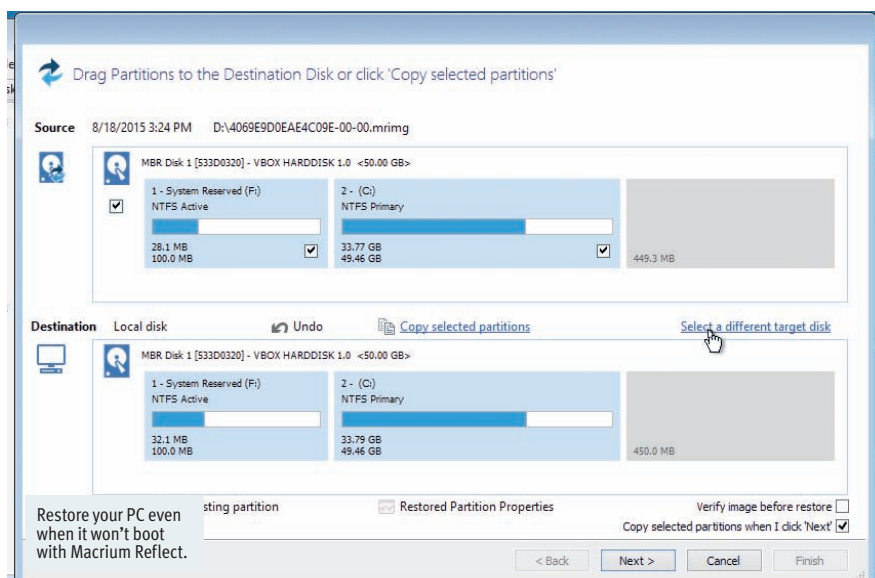
If you've used 'File History', navigate to the folder with the missing data in File Explorer and click the 'History' button on the 'File' tab. A window opens displaying all the backed-up files in that folder — double-click the missing file to preview it, then click the 'Settings' button and choose 'Restore' to save it to the current location, or 'Restore to' to save it elsewhere. If you're trying to recover an earlier version of a file, use the left and right buttons at the bottom of the page to navigate between available versions.

If you're recovering from 'Backup and Restore', browse to the drive or folder containing your backup, then double-click it and choose 'Restore my files from this backup'. Click 'Choose a different date' if you're looking for older versions of your files, or use the search and browse buttons to locate what you want to restore. You can restore them to their original location or choose another — make sure you leave 'Restore the files to their original subfolders' ticked, before clicking 'Restore'.

Need to recover your entire PC? Macrium Reflect makes things straightforward. If you can boot into Windows, launch the app and switch to the 'Restore' tab; otherwise, boot from your rescue media. Select the backup you want to roll back to from the list given, or click 'Browse for an image file' to locate it manually. Select 'Restore Image' to restore the image, or choose 'Browse Image' to mount the image as a virtual drive, enabling you to browse it as a virtual drive in Windows itself — a good option for recovering individual files and folders from the backup. Tick 'Enable access to restricted folders' to allow you to recover data from user folders and other protected places.

Restoring files from the cloud isn't usually an issue, but if you need to restore a file you've deleted, then taking OneDrive as an example, log into your account through your browser. Click the main menu button and select 'Recycle bin' under your PC's entry.

Recovering data from OwnCloud is simple, too — when you reinstall the software and log in as your own user, you're prompted to choose which folder on your hard drive to store your OneDrive content on — once done, the folder syncs up with what's online, restoring any missing data, or you can log on through your browser to download individual files. ■





WHAT'S THE NEXT  
**MUST-HAVE**  
ON YOUR GADGET WISHLIST?

WAIT NO MORE. GRAB THAT LATEST TECH WITH GREATEST SAVINGS.  
[WWW.GETPRICE.COM.AU](http://WWW.GETPRICE.COM.AU)

**GETPRICE** 



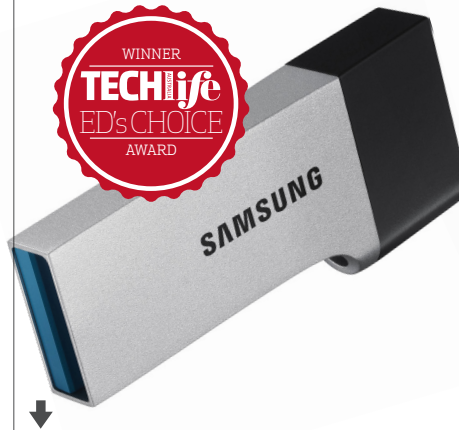
# External smartphone storage: dual USB flash drives

WHETHER YOU'RE A MEDIA JUNKY OR A SMARTPHONE CINEMATOGRAPHER, THE DUAL-PLUG EXPANSION DRIVES ARE A HANDY WAY TO PLUG SOME EXTRA STORAGE SPACE INTO YOUR PHONE.

[JOEL BURGESS & HARRY DOMANSKI]

AS MORE MUSIC and TV streaming services become available, you could argue that the need to store entertainment locally on your smartphone is diminishing. Compounding this faltering need for local storage is a growing dependence on cloud-based storage services and the increasingly online nature of document creation through software like Google Docs. But the amount of storage on smartphones is still the most common parameter smartphone manufacturers use to distinguish pricing tiers, so having just enough storage is going to be the most common situation for people. When you add to this the fact that many high-end phones can shoot video in 4K, that you can now store Netflix shows locally for offline viewing and that some users want to be able to play the massive applications that are required to run smartphone VR, then it's pretty clear that local mobile storage is still a coveted resource. If you're wishing you could make your phone a little roomier, but you don't need it badly enough to fork out for a phone upgrade, then choosing the right smartphone expansion drive could be the best solution.

ANDROID & WINDOWS PHONE  
USB DRIVES



## Samsung USB 3.0 Flash Drive Duo (32GB)

SIMPLE, SLEEK AND SUCCESSFUL.

WHILE TYPE-C USB ports are increasingly being introduced on newer smartphones, micro-USB still dominates the current world of Android-based devices, and the Samsung Flash Drive Duo has that covered. The design is very neat and isn't much larger than the combination of the two connection types, and the result is definitely aesthetically pleasing. A small protrusion allows you to attach a strap for your keyring (strangely, a strap is not included), and this extension doubles as a grip when removing the drive. Because the strap-hole also runs through the micro-USB cover, you won't lose the tiny piece of plastic as it can't stray from your strap. Samsung offers a 5-year warranty with the drive and claims that it's water, shock, magnet, temperature and X-ray proof. When plugged into both a phone and a computer, the drive allows charging of your phone, as well as access to the drive and the phone's storage via the computer. For such a cheap unit, the transfer speeds are still pretty impressive and the Duo's design puts it up there with the best of them.



## Kingston DataTraveler microDuo 3C (32GB)

LOW IN COST, DIMENSIONS AND (UNFORTUNATELY) SPEED.

KINGSTON'S DATATRaveler MICRODUO 3C is about as tiny as a dual USB drive will allow, in that it is more or less the size of a USB Type-A plug, end-to-end with a USB Type-C plug. A clear plastic cover protects the Type-C connection and flips up for use. A small loop, which is part of the drive's aluminium body, allows you to connect the included strap to attach to your keyring—the aluminium loop's location would prevent it from being properly inserted if it were attached directly to a keyring. Our main grievance with the design is the relatively bulky plastic cover, which adds some unnecessary size to an otherwise sleek design, and doesn't allow you to get a solid grip in order to remove the drive. Although the microDuo 3C didn't perform too well in the speed test (we ran it twice just to be sure), for a piddly price, you're getting a super compact 32GB drive that's compatible with most current and upcoming devices, although it could be worth investing a bit more if you're after snappy transfers.

07

WIRELESS STORAGE DEVICES  
ON TEST

### HOW WE TESTED

All drives were speed tested using a Kabylake Gigabyte laptop with SS-USB ports. Results came from CrystalDiskMark 5.2.0 (64-bit) running the Sequential multi-que and single-threaded read and write tests. Apps were tested with all iOS-compatible drives using an iPhone 5.



SAMSUNG USB 3.0  
FLASH DRIVE DUO (32GB)

\$30  
[www.samsung.com/au](http://www.samsung.com/au)

#### CRITICAL SPECS

USB 3.0, micro-USB Type-B; 3.7 x 1.6 x 0.6cm; 5.2g



KINGSTON DATATRaveler  
MICRODUO 3C (32GB)

\$25  
[www.kingston.com](http://www.kingston.com)

#### CRITICAL SPECS

USB 3.1, USB-C; 3 x 1.7 x 0.8cm; 2g





## Toshiba 16GB Duo 2 in 1 USB flash drive

IT'S TIME FOR THIS EARLY GENERATION DUAL DRIVE TO BE RETIRED.

A USB DRIVE that can transfer files from your PC to your smartphone, eBook reader or tablet is a particularly handy thing to have on your keychain and when the drive is as small as Toshiba's Duo flash drive, you'll barely even feel the addition. Taking the form factor where the drive's extremities line up with the part of the USB that fits into a computer, this unit isn't at all cumbersome. A USB 3 Type-A connection sits at one end, with the micro USB connection mounted on the alternate end of the unit making a straight and compact bar. A small plastic cap provides support for the micro USB end and has a hole in it to anchor the string keyring mount. This flash drive isn't the fastest of the bunch with sequential (Q32T1) read speeds of 108MB/s and sequential (Q32T1) write speeds of just 12MB/s, but it was out well before many of the options tested here, so we can't say we are surprised by the result. With a cost of \$1.25 per gigabyte, it's not the best value option available anymore, so you'll probably want to weigh up another drive.



**TOSHIBA 16GB DUO 2 IN 1 USB FLASH DRIVE**  
\$19.99  
[www.mytoshiba.com.au](http://www.mytoshiba.com.au)

**CRITICAL SPECS**  
USB 3.0 Type-A, Micro USB, 2.6 x 1 x 0.4cm; 2g

ANDROID OR IOS



## Lexar Jumpdrive C20i/c/m (64GB)

A FLEXIBLE FLASH DRIVE THAT DOUBLES AS A CHARGING AND DATA CABLE.

DITCHING ANY FORM of conventional form factor, Lexar's Jump Drive C20 looks more like a shrunk charging cable than a traditional flash drive. The flexible cable comes with a plastic clasp that'll hold the two connector heads together once you've threaded it through your keyring. This setup is a little more cumbersome than a simple double-ended bar, but when you consider the tradeoff for an on-hand charging cable, it makes up for the extra effort to carry it round. One of the selling points is speed, with the micro and Type-C USB variations boasting up to 150MB/s read speeds. We didn't manage to record sequential read speeds quite that high, but the unit was still the fastest we tested at 129MB/s seq Q32T1 read and 78MB/s seq Q32T1 write speeds using the C20m variation. The iOS-compatible Jumpdrive C20i was a little slower with read and write speeds of only 10MB/s and 39MB/s in the same test. The cheapest 64GB model we could find was listed for \$164, which comes in at a steep \$2.56 cost per gigabyte, making it a little too expensive for top marks.



**LEXAR JUMPDRIVE C20I/C/M**  
(iOS) \$164 C20i 64GB  
[www.lexar.com](http://www.lexar.com)

**CRITICAL SPECS**  
USB Type-C / Lightning / micro USB; 14 x 1.6 x 0.8cm; 12g

## EXTERNAL SMARTPHONE STORAGE BUYER'S CHECKLIST

WHAT TO LOOK FOR WHEN SHOPPING FOR AN EXTERNAL STORAGE DEVICE.

### TYPE OF CONNECTION

You will only get one type of connection (other than USB Type-A) to choose from with your dual USB flash drive. You'll need to make sure you get the micro USB, USB Type-C or Lightning connection your smartphone uses.

### KEYCHAIN CAPABLE

Most dual flash drives will come with some way of connecting them to your keychain, but not all do, which is generally a bigger inconvenience than you might initially think.

### SOFTWARE.

The Android/Windows Phone-compatible drives can communicate directly with flash drives out of the box, but iOS's walled garden means you need software to exchange files between your smartphone and the flash drive.

### CHARGING

One of the most convenient bonus features of dual USB drives is the ability to use it as a charging cable. There will be enough circumstances where you wish you had a cable available to be a useful accessory on its own (especially if your friends and family use a different smartphone OS).

### DATA TRANSFER

The other handy feature that dual USB flash drives with cables have over the stick variation is that you can generally also use them as direct transfer cables. Useful for circumstances where you'd prefer to move or copy something directly between your smartphone and PC.



iOS-READY USB  
DRIVES



## Transcend JetDrive Go 500

A ROCKET FUELED DRIVE THAT COSTS A BIT TOO MUCH.

THE JETDRIVE GO 500G didn't quite make it in as the smallest unit available, but weighing in at 5g, it wasn't far from it. Squeezing itself into a tight gold USB form factor, this dual drive splays a little at the centre to accommodate a curved bar that acts as a keychain attachment. You can choose to adorn it with one or both of the two included caps that will fit on either end and continue the fluid and functional design. The keychain even adds a leather loop to the equation to smooth over any feelings that this might not be a premium flash drive. If you need more than just looks to convert you, the JetDrive Go 500G was also the fastest flash drive in sequential Q32T1 write tests netting 99MB/s, while also maintaining a decent 120MB/s sequential Q32T1 read speed. The Jetdrive Go iOS application is easy to use and facilitates both smartphone backups and file transfers, but it is a slow 20MB/s process transferring using Lightning. At \$110 for a 32GB drive, it's not cheap, but that's par for the course for these Lightning-connector storage devices.



## Verbatim Lightning USB 3.0

A LIGHTNING USB DRIVE THAT'S ANYTHING BUT LIGHTENING FAST.

WITH A USB 3.0 Type-A connector at one end and a Lightning connection at the other, this dual flash drive takes a more conventional shape, albeit a little chunkier than some of the other offerings here. Verbatim has missed a trick with the plump Lightning USB 3.0 drive by not adding anywhere to attach it to a keyring. Like most of the double-ended stick drives, this flash drive can't be used to transfer data directly or charge the smartphone when both ends are plugged in. With all these missed opportunities, you're probably expecting that this one will at least perform well, but the Lightning USB 3.0 seems to be lacking in that area, too. When connected to a computer, the drive manages sequential Q32T1 read and write speeds of 68MB/s and 32MB/s, respectively, but this drops down even further to 30MB/s and 15MB/s when talking about iPhone transfer speeds. \$110 for a 64GB dual flash drive isn't the worst value unit we've come across, but when you consider all its shortcomings, it's not a device we'd recommend.



## Sandisk iXpand Flash Drive for iPhone and iPad (32GB)

BUT... WHY THAT SHAPE?

LOOKING LIKE SOME kind of strange scorpion, the iXpand's unique shape stands out amongst the dual USB's and is its most striking but also most annoying feature. The singular perk of the mostly rigid loop is that it can be used to hook to your keychain, although I would be wary of the strength of the clasp (which is actually just the Lightning connector wedged in some snug plastic). Although the iXpand charges your phone when also plugged into a computer, the non-flexibility of the drive means that, when using a Macbook or laptop, your phone sits across a lot of your keyboard, and a vast majority of other computer USB ports won't physically allow both to be connected at once. Perhaps its only redeeming feature is that Sandisk has paired the flash drive with a desktop and mobile iXpand app which allows for some clever automatic backing up of photo, video and so on every time the drive is plugged in, and also allows you to play videos directly from the drive. For the price, we expect better speeds, better storage and definitely better design.



### TRANSCEND JETDRIVE GO 500

\$110  
www.transcend.com

#### CRITICAL SPECS

Lightning / USB 3.1 Type-A; 3.7 x 1.4 x 0.9cm; 5g



### VERBATIM LIGHTNING USB 3.0

\$99  
www.verbatim.com.au

#### CRITICAL SPECS

USB 3.0, Lightning; 2 x 5.5 x 0.7cm; 6g



### SANDISK IXPAND FLASH DRIVE FOR IPHONE AND IPAD (32GB)

\$99  
www.sandisk.com

#### CRITICAL SPECS

USB 3.0, Lightning; 5.9 x 1.7 x 1.3cm; 5.4g

[ LOOK MA, NO HANDS ]

# Mobile wireless NAS drives

**NEED A SHARED STORAGE SPACE THAT CAN BE ACCESSED BY MULTIPLE DEVICES WIRELESSLY? THESE WI-FI DRIVES OFFER THE PERFECT SOLUTION.**

[ NATHAN TAYLOR ]

ALTHOUGH THEY'RE TYPICALLY more expensive and deliver slower transfer speeds than their wired USB siblings, for a certain kind of user, wireless storage devices make great travelling and home companions. They're a perfect way to carry a lot of data on the road with you when you're only bringing along a mobile or tablet, for example, and they often do double duty as a relatively inexpensive network-attached storage box for serving media to devices around the home.

For those unfamiliar with them, a wireless drive is an external USB hard drive or flash drive with an integrated Wi-Fi antenna. Most also have internal battery packs, so they can be used for a number of hours when not connected to a power source. The Wi-Fi antenna is used to create a hotspot; any devices connecting to that hotspot can access the contents of the drive, either through a mobile app or standard network-sharing file protocols like SMB or DLNA.

That effectively turns the drive into a kind of limited mini-NAS that you can take with you when you travel. You can access its contents from your mobile or your laptop, share media and files with people you meet just by giving them a password, and even, in some cases, directly download or back up data from your mobiles and cameras.

## WIRELESS STORAGE BUYER'S CHECKLIST

WHAT YOU NEED TO KNOW WHEN COMPARING WIRELESS DRIVES.

### WI-FI SPEED

All wireless drives on the market use the Wi-Fi protocol to allow client devices (that is, your laptop, phone, tablet or desktop PC) to connect. However, be aware that many use the older 802.11n standard, which theoretically limits file transfer speeds to around a maximum of 40MB/s — although, in real-world usage, you'll be lucky to get even half that. Western Digital's My Passport Wireless Pro was the only drive to feature newer 802.11ac tech, so if speed matters, it's the best choice.

### BATTERY LIFE

Basically, all wireless drives have an internal battery of some sort, meaning they can work while you're on the go. Battery life can vary considerably depending on how large that battery actually is, as well as what you're doing with the unit — constantly copying files to and from the drive or streaming media will drain that battery quicker than, say, sporadically working from documents stored on it.

### USB OTG PORT

A handful of the devices we tested offered USB On-The-Go ports, which let you plug in another USB storage device (such as a flash drive) and then access the content contained on it. This can be a handy way of quickly backing up other USB drives or, using a BYO adapter, reading a variety of memory cards.

### SD CARD READER

If you want to use your wireless drive as a way to back up photos without the need for a PC, look for one with a built-in SD card reader.

### MOBILE APPS

Apps for Android and iOS are a must-have if you want to access the contents of a wireless drive directly from your smartphone or tablet. Well-designed apps will have the capability to not only manage files, but view media (such as photos and videos), too.



SUPERGUIDE  
MOBILE WIRELESS NAS DRIVES

## Western Digital My Passport Wireless Pro 3TB

FOR THOSE WHO WANT THE BEST

THE MY PASSPORT Wireless Pro is WD's second-generation wireless hard drive, and offers a heap more features than its non-Pro sibling. That includes the option of a 3TB capacity model (which is what we tested for this review); 802.11ac wireless; an SD Card reader; a USB 2.0 host port, as well as a USB 3.0 device port; and an integrated battery that can drive it for up to 10 hours. The SD Card reader and the USB 2.0 host port allow you to directly dump content from your mobile, flash drives and camera onto the drive without a PC. As an added bonus, the USB host port can charge mobile devices from the Wireless Pro's 6,400mAh battery. To connect it to a PC for faster file transfer, you instead use the Wireless Pro's USB 3.0 device port. Where USB 2.0 devices are pretty much limited to 30–35MB/s, the Wireless Pro hit 83.5MB/s when we tested it with a wired connection. Its use of 802.11ac was also a major performance boon: its wireless transfer speeds were well ahead of the pack — which'll likely come in handy as up to eight wireless device connections are supported at once.

07

WIRELESS STORAGE DEVICES  
ON TEST

### HOW WE TESTED

To test these wireless drives, we connected each to a PC with an attached D-Link 867Mbps 802.11ac Wi-Fi adapter, stepped through any setup and configuration stages as required and performed some basic file-transfer tests alongside investigating the interface and any special features, such as DLNA streaming. Where available, we also tested any Android and iOS apps that allowed connection (and often playback of videos and browsing of photos) on the drive.



### CRITICAL SPECS

3TB (2TB also available); 802.11ac; SD card reader; USB 3.0 host, USB 2.0 device; 10-hour battery





## Kingston MobileLite Wireless G3

A JACK OF ALL TRADES.

UNLIKE THE OTHER devices here, the G3 has no integral storage. Instead, it uses storage connected to its USB 2.0 host port and SD card port. That means it has as much 'capacity' as you're willing to plug into it. (For people who do want some capacity baseline, there is a Pro version with 64GB of flash storage). The USB 2.0 host port can deliver up to 2A of power, so most portable hard drives will work just fine with the MobileLite. That also makes it a decent charger; it has 5,400mAh of power in its own battery bank and is charged via micro USB. There's a wired Fast Ethernet port, the latter allowing the Kingston to bridge to a wired network and be an access point. Even if you're not connected to a wired network, there's an optional wireless bridge mode that lets the Kingston access a separate wireless network as a client, so you can access the Kingston's content and the internet at the same time. The mobile apps are fast and functional, with simple backup and file access, as well as an integral media player. You can easily attach portable drives to it, a USB 3.0 host port would have been nice, but it's still a great buy.



## Seagate Wireless Plus 2TB

A CONVENIENT AND PORTABLE BATTERY-POWERED SERVER IN YOUR POCKET.

SEAGATE WAS ONE of the first vendors to release a wireless hard drive, and although this Wireless Plus model is technically its second-gen product, it's actually going on being two years old. Thankfully, it's easy to setup and still has enough capacity to compete with newer models. It functions as a standard USB hard drive when it's plugged into your computer, but when detached, it becomes a battery-powered 802.11n Wi-Fi access point and server. That means that any device in range can connect to it using Wi-Fi and access the drive. Up to seven devices can be connected to it at once, and Seagate claims its battery can last up to 10 hours. Once a device is connected, the Wireless Plus will appear as a Windows Sharing device, and files can be copied using File Explorer or Finder like normal. You can also use the Seagate Media App, available for Windows, Mac and mobile, which provides a media playback and viewing platform for the contents of the drive. You can also view the content from a DLNA or AirPlay device, which makes it convenient for streaming media to your TV or other compatible players.



## Western Digital My Passport Wireless 1TB

SOME ELEMENTS ARE DISAPPOINTING, BUT IT'S ELEGANT AND EASY TOO.

WD'S ORIGINAL ENTRY into the wireless hard drive space is still a relatively compelling one. It's well designed and sleek and it gets most of the details right, from setup and configuration to connectivity and the mobile apps for accessing content. The My Passport Wireless can either create its own Wi-Fi network with up to eight clients, or connect to an existing one, and any devices connected to the same network can access the drive's content. They can do this through standard Windows file sharing, through bare-bones but usable mobile apps, or via DLNA streaming. Setup is handled smoothly and is readily accomplished from a mobile device or PC using the setup wizards and supplied video guides. WD rates the battery for six hours of video streaming. One handy feature for photographers is the SD Card slot.

WD did show its performance weakness compared to the Seagate drives. Although the drive specifications are nearly identical to its Seagate counterparts, the WD seemed to once again struggle with small file reads and writes.



**KINGSTON MOBILELITE WIRELESS G3**  
\$86  
www.kingston.com

### CRITICAL SPECS

No storage (64GB available in Pro); wired fast Ethernet; USB 2.0 host, micro USB charger; SD card reader



**SEAGATE WIRELESS PLUS 2TB**  
\$260  
www.seagate.com

### CRITICAL SPECS

2TB; USB 3.0; 802.11n; 10-hour battery life; 272g



**WESTERN DIGITAL MY PASSPORT WIRELESS 1TB**  
\$250  
www.wd.com

### CRITICAL SPECS

1TB; USB 3.0; SD card reader; 802.11n; 6–20-hour battery life; 270g



## LaCie Fuel 2TB

IT'S CUTE, BUT THERE'S NOTHING HERE WE HAVEN'T SEEN BEFORE.

LACIE'S BEEN IN the storage game for decades, and its wireless drive has been around for over two years now — but to its credit, this cute little device is quite compact; compared to the Seagate Wireless Plus, it's squarer and squatter, and slightly heavier, but there's not much else to differentiate it. Internally, the specs are eerily similar, right down to the battery life, and in use, the drive works in a very similar fashion. It creates its own Wi-Fi hotspot, and anybody connecting to it can access the files either through standard Windows file sharing, AirPlay or DLNA, or via a mobile app. Since LaCie was bought by Seagate, the Seagate Media App actually works just fine with it — it's an app that might be a little limited in its media playback support, but is easy to install and use. When it comes down to it, however, aside from the design, there's nothing really new or unique in the LaCie. The Seagate does the same things and does them slightly better. Given they're roughly the same price, we'd probably favour the Seagate over this one... although the more-handsome design could sway some users.

## Seagate Wireless 500GB

SOMETIMES, A SIMPLE DESIGN WORKS.

THE SEAGATE WIRELESS is a more limited version of the older Wireless Plus, offering less capacity and power but also coming in at a much, much lower price. But it essentially uses the same software platform. The model we tested came with just 500GB of storage, which can limit its usefulness as a more-permanent NAS device. It's also bulkier than it needs to be, with a 13cm x 13cm face. Even with that bulk, the battery is limited to roughly six hours of use and wireless is only 802.11n, with a max of three simultaneous users supported. It does support a concurrent mode that lets it connect as a client to another wireless network, so you can connect to it and also access the internet. But its software platform is perfect for less technical users. Seagate provides very simple, usable apps for Windows and mobile for accessing and copying content. Files can also be accessed via web browser, and a sync tool on Windows makes keeping the drive contents up to date easy. We had no problems running three HD streams simultaneously, and it essentially maxed out the USB 2.0 connection for direct reads and writes. If you can handle the small capacity, this one's not a bad option.

## SanDisk Connect Wireless Stick 64GB

A THUMB DRIVE WITH WI-FI.

IF PORTABILITY IS your number-one priority in a wireless drive, then look no further. The SanDisk Connect looks much like a fat thumb drive and weighs just 22g. As small as it is, it still has an internal battery, capable of 4.5 hours of independent usage and recharged when you plug it into a USB port. As you might expect, the specs on the Wireless Stick are not exactly top of the line. Only single band 802.11n is supported and it's limited to 150Mbps. The USB is 2.0, so USB file transfers are practically limited to about 30MB/s (15MB/s in testing). Its application support is also limited. It does not have any integral DLNA or SMB support. If you want to access its contents over Wi-Fi, you'll have to use the SanDisk Connect Drive app on Android and iOS or a Web browser on PC. The SanDisk Connect Drive app is solid. You can stream media with it and back up your mobile. If you don't mind being limited to just the mobile apps, the SanDisk Connect Stick is pretty great. However, if you want performance or general access via Windows File Sharing or DLNA, you'll want to look elsewhere.



**LACIE FUEL 2TB**  
\$270  
[www.lacie.com](http://www.lacie.com)

### CRITICAL SPECS

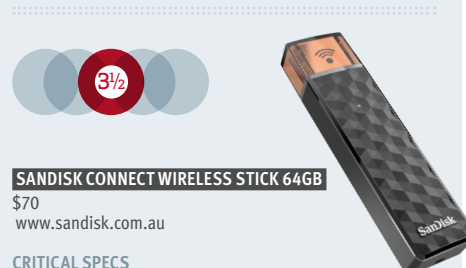
2TB; USB 3.0; 802.11n; 10-hour battery life; 300g



**SEAGATE WIRELESS 500GB**  
\$80  
[www.seagate.com/au](http://www.seagate.com/au)

### CRITICAL SPECS

500GB; available in 5 colours; USB 2.0; 802.11n; 6-hour battery life



**SANDISK CONNECT WIRELESS STICK 64GB**  
\$70  
[www.sandisk.com.au](http://www.sandisk.com.au)

### CRITICAL SPECS

64GB (also available in 16, 32, 128, 200GB); 802.11n; USB 2.0; 4.5-hour battery life; 22g



[ A TECHLIFE TECH PRIMER ]

FEATURE  
TECH PRIMER VR



IT TAKES THE VIEWER INTO ANOTHER WORLD,  
BUT VIRTUAL REALITY IS CREATING A REALITY THAT  
GOES WELL BEYOND GAMING. *TECHLIFE* INVESTIGATES.

[ DARREN YATES ]



The PlayStation VR combines motion sensor with video display technology.

IT'S BEEN DESCRIBED as everything from "the ultimate story-telling tool" to "gaming nirvana", but whatever you call it, virtual reality (VR) is all about bending your mind's view on the world you're looking at. And while it's just come off a breakout year in 2016, VR looks set to start doing even bigger business, with market research predicting that as many as 52 million VR headsets will be sold by the end of this decade ([tinyurl.com/jsa3pzs](http://tinyurl.com/jsa3pzs)). Already, many of the major tech brands from Facebook to Google, Microsoft to Sony and HTC are investing heavily in its development, covering gaming PCs, consoles and smartphones. But what is VR, how does it work and what applications does it have beyond gaming?

#### HOW VR WORKS

By smartphone and console standards, the tech in most VR headsets is comparatively simple. At a basic level, a VR headset is not much more than a display device — it takes in a video input (normally HDMI) and converts it into a stereo output to feed one or two small OLED display panels, depending on the headset design (the Oculus Rift CV1 has two separate OLED panels, one for each eye, while Sony's PlayStation VR has just the one). Either way, you view the panel/s through two special lenses that allow your eyes to focus on something just two finger-widths from your eyeballs.

The video-to-OLED conversion is usually performed by a dedicated chip known as an 'interface bridge', which takes in the HDMI signal and outputs a 'Display Serial Interface' (DSI) data stream that ultimately appears on the OLED panels. In the case of the PlayStation VR and Oculus Rift CV1, that chip is Toshiba's TC358870XBG, the first designed to work with high-resolution '4K' video.

#### VR PROCESSING

Unlike a computer processor, this Toshiba chip is a single-function device, meaning it has one job to do, but it needs to be controlled by a

special type of computer processor called a 'microcontroller'. Your smartphone has a main general-purpose processor or 'CPU' to run your apps, but it also uses microcontrollers to handle specific tasks such as telecommunication connections and Wi-Fi. Microcontrollers are used in many applications where smaller amounts of computing power are required, rather than a full-blown computer. Your fitness band will have one, for example.

Unlike computer CPUs, microcontrollers come with their own stock of memory and storage to store data and code. Yet like their CPU cousins, microcontrollers come in various performance grades. What might surprise you is that most VR headsets only need the very entry-level of microcontrollers to work, mostly because all of the hard work is done by specific chips like that Toshiba interface bridge. The Oculus Rift has an ST Microelectronics STM32F070 microcontroller, the PSVR uses a Nuvoton NUC123SD4 — both are from the ARM Cortex M0 series, which is the 'baby brother' design to the Cortex A-series powering your smartphone and just about every other phone, right up to the latest Galaxy S7.

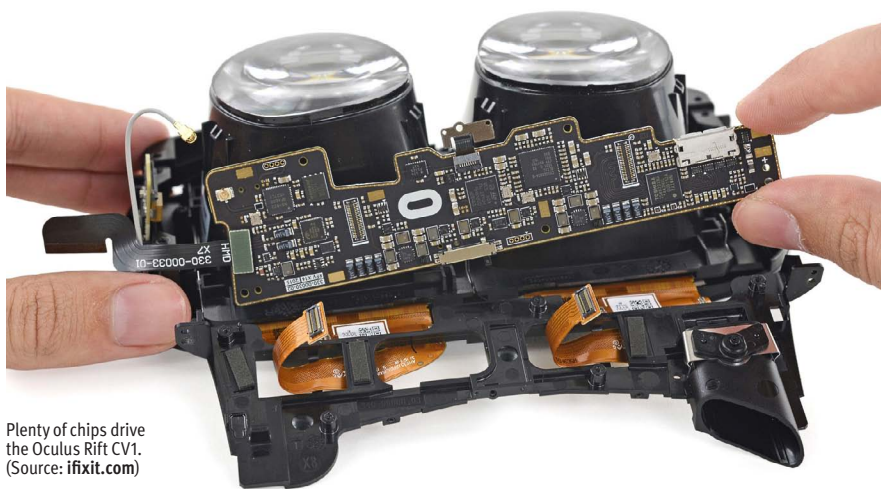
Check out the excellent tear-downs at iFixit of the Rift CV1 ([tinyurl.com/jrofglj](http://tinyurl.com/jrofglj)) and PSVR ([tinyurl.com/h4tyqbf](http://tinyurl.com/h4tyqbf)) for all the geeky details.

#### MOTION SENSORS

But the real trick of VR is its ability to track your head movement and update the display accordingly as if you're actually moving through a real world. That's done with the help of what's called an 'inertia measurement unit' (IMU) sensor. Every smartphone has one — it's the device that tells your phone when you're holding it in vertical (portrait) or horizontal (landscape) mode. However, IMU sensors can do much more than that — for example, they're also used in quadcopters/drones to stabilise flight and check general axis-of-direction. The CV1 and PSVR both use a high-resolution BMI055 six-axis IMU sensor from German



Rivvr's new wireless VR module for Oculus Rift and HTC Vive cuts the wires.



Plenty of chips drive the Oculus Rift CV1. (Source: ifixit.com)

industrial giant Bosch. These sensors are often described as being '6DOF' or '9DOF' (degrees of freedom), but you'll also see them listed as 'six-axis' or 'nine-axis' devices. In 3D space, you have three standard axes — X and Z at right-angles horizontally and the vertical Y-axis. When a device has a six- or nine-axes rating, it means it has multiple sensors, able to measure different physical aspects across the three axes. For example, the BMI055 has a tri-axis accelerometer, for detecting forward and backward (called 'linear') movement and gravity, plus a tri-axis gyroscope, which

measures the rate of rotation of an object about an axis. As you move your head, the accelerometer and gyroscope measure and record that movement down to minute detail. That data is sent back to your PC or console via the microcontroller.

Getting that important data back to your PC or console is the role of the secondary (usually USB) connection. The return data provides feedback to the software or game, which then adjusts the display to match your movement, tricking your brain into thinking the vision you see moving around you is genuine.



Samsung's new Gear 360 camera makes VR video capture affordable.



The Fitbit Alta uses a similar Cortex-M chip to that found in most VR headsets.

## SMARTPHONE VR

But one question you might have is if the PSVR and other similar headsets all need specialised chips, displays and microcontrollers to create VR, how does Google's low-cost Cardboard VR system work if all it has is just a cardboard frame and a couple of lenses? It all relies on your smartphone, which is really a powerhouse computer that contains all the hardware needed to make basic VR work — it has the display, microcontrollers and IMU sensors (these sensors aren't typically as precise as the ones inside VR headsets, but they'll do). It doesn't need HDMI or USB connections since the smartphone is fully self-contained. After that, it's just a matter of having the lenses and the right software to take advantage of the combo.

## MEDICAL RESEARCH

So far, the most common and recognisable application for VR is gaming, which has been the focus for most commercial development. However, there is continuing research into the use of VR in other applications, particularly medical therapies, covering everything from mental health and psychology to neuroscience and motor skills rehabilitation. The University of Southern California's Institute for Creative Technologies, for example, has set up the MedVR Lab ([medvr.ict.usc.edu](http://medvr.ict.usc.edu)) to further research how VR can be utilised. Its primary goal is mental and behavioural health, developing techniques for assessment and treatment of stress disorders such as anxiety and PTSD. At the other extreme, VR is even bringing medical students (and others) right into the action — the Royal London Hospital streamed the first live surgery via VR online in April 2016 ([tinyurl.com/z64e9uc](http://tinyurl.com/z64e9uc)).

## TREATING DEMENTIA

As the population ages, one of the most debilitating disorders affecting greater numbers of older people is dementia, which increasingly robs sufferers of their lucidity and memories. Early tests conducted by Alzheimer's Australia found that a new VR game developed by the organisation led to a significant reduction in the amount of medication required by some dementia patients ([tinyurl.com/hfj4r7e](http://tinyurl.com/hfj4r7e)). Called 'the Virtual Forest' ([tinyurl.com/zhfoszf](http://tinyurl.com/zhfoszf)), the system uses Microsoft's Kinect technology to enable users to move objects about in a virtual forest by simple hand movements. It requires a quad-core Windows PC with an Nvidia GTX 970 graphics card, 8GB of RAM and Kinect adapter for Windows.

It follows on from Education Dementia Immersive Experience (EDIE), an initiative launched by Alzheimer's Australia in September 2016, to give everyone a taste through a smartphone VR app and Google's Cardboard VR headset of what it's like for people living with dementia ([vic.fightdementia.org.au/edie](http://vic.fightdementia.org.au/edie)).



## TREATING STROKE

VR has also long helped pioneer new treatments in stroke rehabilitation. In 2000, researchers at Rutgers University, New Jersey, reported in the IEEE Transactions on Neural Systems and Rehabilitation Engineering of using force-feedback gloves to allow stroke patients who lost hand function to move through a virtual environment and provide rehabilitation ([tinyurl.com/hmv557g](http://tinyurl.com/hmv557g)). In Australia, a team from the Murdoch University School of Engineering and IT, in conjunction with the Western Australian Neuroscience Research Institute, created a VR app called Neuromender. Inside, patients fly a virtual wing-man suit through a virtual cloudscape, while a computer monitors the patient's upper body strength through a series of automatically-adjusted challenges ([tinyurl.com/hq9vno5](http://tinyurl.com/hq9vno5)).

## MARKETING/ADVERTISING

Just about every new technology attracting eyeballs also attracts advertisers, and VR is no exception. Right now, you almost have your choice of market researchers offering reports on how VR will change the face of marketing. We've read others say VR will so change the world, no-one will any longer do business in the 'real world'. Puh-lease!

## MAKE YOUR OWN VR HEADSET

While the more expensive VR headset options promise a more immersive experience, you can still get a feel for what VR is for as little as \$20, thanks to Google Cardboard and Cardboard clones ([tinyurl.com/zvlzpw2](http://tinyurl.com/zvlzpw2)). They turn your smartphone into a VR device, using its built-in screen and IMU sensors. The trick is in the lenses that make it possible for your eyes to focus on your phone screen at such close distance. Don't forget the Cardboard demo app from Google Play ([tinyurl.com/oyedb3g](http://tinyurl.com/oyedb3g)) — it should work on any Android device with at least Android 4.1/Jelly Bean. There are alternatives, but it's a good start.

## MAKE YOUR OWN CONTENT

Making your own content is a little more difficult, but if you love your creative side, it's infinitely more fun and there are a number of different ways you can go. Depending on your skill and budget, the most basic is to create '360 x 180-degree' still images. With a fish-eye lens attachment, you can capture these images using a smartphone and stitch them together using apps such as PTGui ([ptgui.com](http://ptgui.com)), Hugin ([hugin.sourceforge.net](http://hugin.sourceforge.net)) and GoPro's Kolor ([kolor.com](http://kolor.com)).

At the other end of the scale is the new wave of 360° cameras specifically designed for capturing VR video. While the more professional rigs include multiple cameras pointing every which way, new budget single-lens cameras, including the popular Ricoh Theta S, are a good place to start. The upcoming



EDIE helps you experience what it's like to live with dementia. (Source: Alzheimer's Australia)

dual-lens Kodak PixPro 4KVR360 also looks promising.

And if you want to share your content, Facebook and YouTube already offer 360° video uploads and playback, whether it's through a standard web browser on your PC and headset or, in the case of Google, through your smartphone and Google Cardboard.

## VR OR 360°?

However, the real debate amongst purists is what to call this content — is it VR content or is it just 360° video? The argument revolves around the fact that making your own content with 360° cameras doesn't automatically gain you entry into the VR club. In most cases, 360° video is just that — video. You enjoy the ride, but you can't control the action as you would in genuine VR. It might seem an argument better left to the purists, but like the mess 'HD' TVs dissolved into, it may affect your purchases one day, so it's important to be across the ideas now.

## THE FUTURE

So now that VR has arrived in gaming consoles and smartphones, where does the technology go from here? The first major steps on the display side are continued improvement in

screen resolution, as well as getting rid of the wires and making the whole system completely wireless. Right now, teams from Rivvr ([tinyurl.com/hj9dh9j](http://tinyurl.com/hj9dh9j)) and others are working on different alternatives to cutting the cables — Rivvr's solution will work with Oculus Rift and HTC's Vive, the upcoming Sulon Q ([sulon.com](http://sulon.com)) is a standalone wireless headset. There are also efforts to improve the 'touch' side of things, with more responsive hand-controllers that let you navigate your way through a virtual reality with greater precision and dexterity.

On the content-generation side of things, 2017 should be a breakout year for low-cost compact consumer-grade 360° video cameras that make capturing spherical video a snap. While we saw a few in 2016, the flood gates should open this year.

But while there's been plenty of progress in VR becoming mainstream over the last 12 months or so, it's the growth in VR research, particularly in medical therapies covering everything from mental health to dentistry and beyond, that could potentially lead to a far more enriching future for VR in the real world.

For help with dementia, call the National Dementia Helpline on 1800 100 500. ■

PlayStation VR uses similar tech to the Oculus Rift CV1. (Source: [ifixit.com](http://ifixit.com))

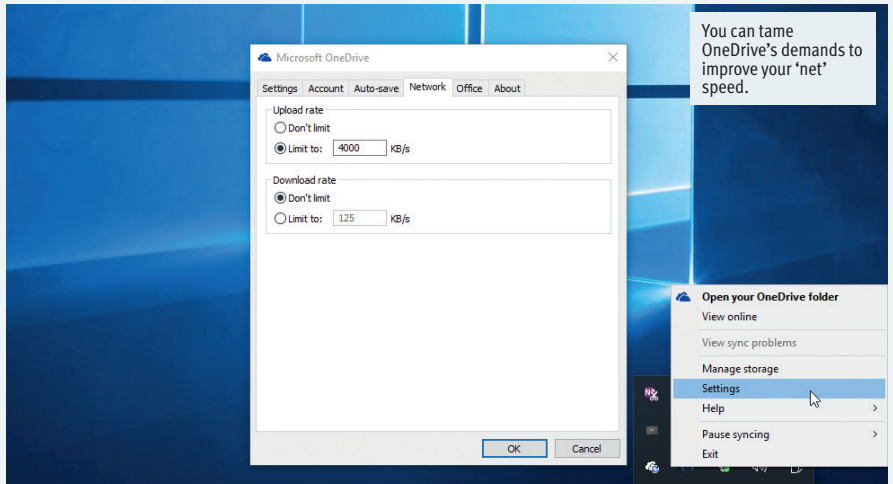


## HELP STATION

GET THE MOST FROM YOUR TECH

## [ THIS MONTH IN HELP STATION ]

- 88 **Q&A**  
YOUR QUESTIONS ANSWERED
- 90 **Windows**  
GET WINDOWS 10 NOTIFICATIONS UNDER CONTROL
- 92 **Mac**  
ENHANCE MACOS SIERRA'S TODAY VIEW
- 94 **iOS**  
ADVANCED VIDEO EDITING ON IOS WITH APPLE MOVIE
- 96 **Android**  
TROUBLESHOOTING ANDROID BUGS
- 98 **Downloads & streaming**  
MINIMISING MOBILE DATA USAGE
- 100 **Security & privacy**  
TOP EXTENSIONS FOR SECURING YOUR BROWSER
- 102 **Home networking**  
YOUR GUIDE TO BROADBAND TECH
- 104 **Photography**  
MASTER YOUR DSLR: LENS ABBERRATIONS



## [ HARDWARE ]

## Flashing cursor at boot time

My Windows 10 PC has suddenly stopped booting — after a lengthy delay at the initial boot screen, all I see is a flashing white cursor. It may be linked to a recent Windows update process. Could you shed any light for me?

[ ADAM COLLETTE ]

**Graham Barlow replies:** This usually happens when your PC's UEFI or BIOS changes your boot drive settings, which, in turn, is often symptomatic of your main boot drive no longer being detected by your PC. While it could indicate hardware failure in a worse-case scenario, it's often simply a case of powering down the computer, opening the case and checking the cables connecting your drives to the motherboard.

When you next boot up, you may need to enter your UEFI or BIOS setup utility to verify the drive is detected again, plus make it the primary boot device. This may be as simple as going to the Boot section and making it the first option under 'Boot Priorities', or you may need to first locate a section called something like 'Hard Drive BBS Properties' if you have more than one hard drive installed. Once done, save your changes and exit — you should find that Windows now boots correctly.



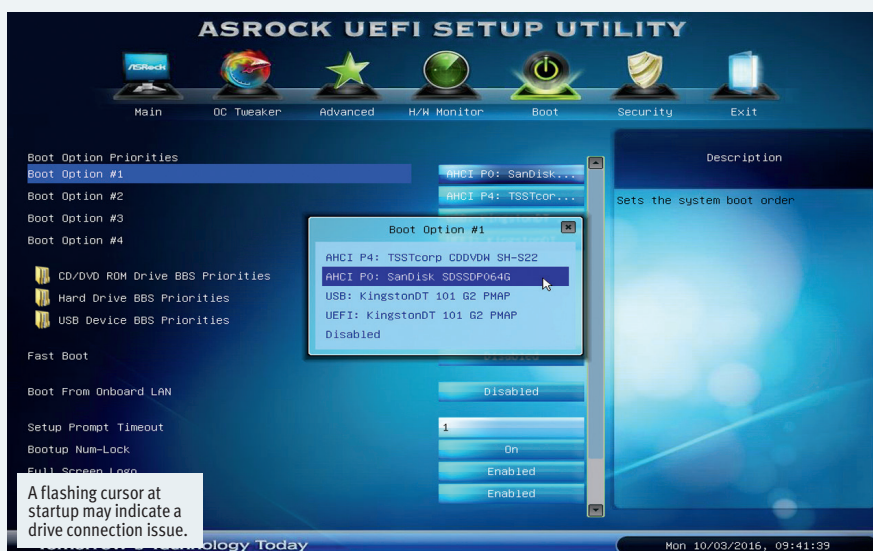
## [ INTERNET ]

## OneDrive affecting internet performance

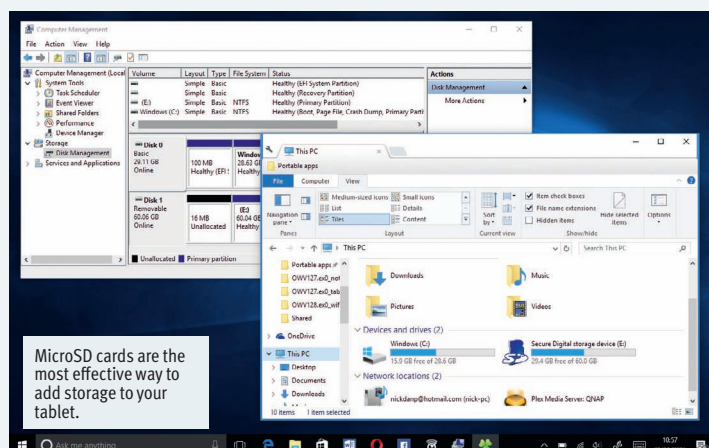
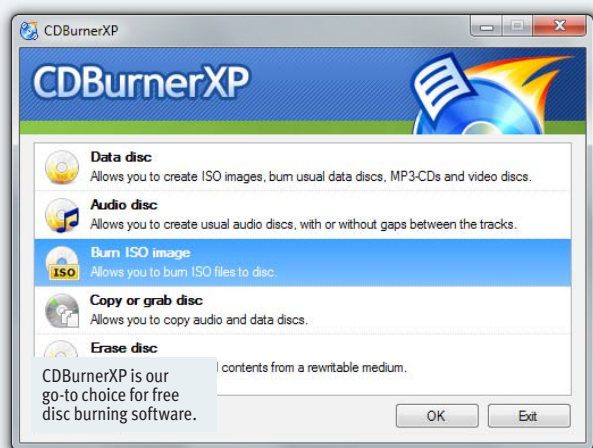
I have set up OneDrive for my own personal use, taking advantage of the 1TB free storage I get as an Office 365 user. I've got about 10GB to upload to the cloud, but after setting up OneDrive, my internet connection — and powerful PC — have almost ground to a halt. What's the problem, and is it fixable?

[ IAN MCANDREW ]

**Nick Peers replies:** The obvious cause of this problem was OneDrive itself — it appeared to be consuming all available internet bandwidth, as well as overwhelming the PC. Luckily, there's a way to rein in its demands — click the ^ button on the Taskbar Notification area, then right-click the OneDrive icon and choose 'Exit'. Next open your browser and perform a speed test at [www.speedtest.net](http://www.speedtest.net) — make a note of both download and upload speeds (multiply by 1,000 to get the equivalent figure in KB/s). Now type OneDrive into the Search box and click the 'Desktop app' link to restart OneDrive. Next, right-click its Taskbar Notification area icon as







before, but this time, choose 'Settings > Network' tab. Select 'Limit to:' under 'Upload rate' and set this to half your connection's upload speed in KB/s — for example, 500KB/s for a 1MB/s connection, or 4,000KB/s for an 8MB/s connection. You can set a download limit too, but in most cases, it's capping the upload speed that will fix the problem. Click 'OK' and you'll find your PC and internet connection recover while OneDrive continues to work in the background.

some third-party software was involved — given Hamish had upgraded his ASUS laptop to Windows 10, it's likely that the PC came with software pre-installed, but we were unable to identify what this was. Our next suggestion was to install the free CDBurnerXP package ([www.cdburnerxp.se/en/home](http://www.cdburnerxp.se/en/home)) to see if the drive was physically able to burn discs, but Hamish decided to order some Roxio software instead, which solved his problem.

to check the connections, plus check the CMOS battery isn't dead and requires replacing. Also, consider disconnecting everything except the power, graphics, display and keyboard to see if the PC will respond to a minimal boot. Often this clears an issue and if you can boot to the POST screen, you can then look to reconnect your storage and a mouse to see if Windows now boots. If it does, plug in your other peripherals and hopefully the problem will be cleared.

### [ SOFTWARE ] DVD writer has stopped working

My DVD writer has stopped working and I've no idea what software it's using. Could you recommend a good CD/DVD writer please? I'm running Windows 10 on an ASUS laptop with a Core i3-2350M CPU.  
[ HAMISH DONALDSON ]

**Cat Ellis replies:** We first ascertained it wasn't a hardware problem — Hamish confirmed the disc would read and play DVDs, but on inserting a blank disc, he would see a Command Prompt window briefly flash up with a list of instructions that disappeared in the blink of an eye. This suggested that

### [ HARDWARE ] Fix a dead laptop

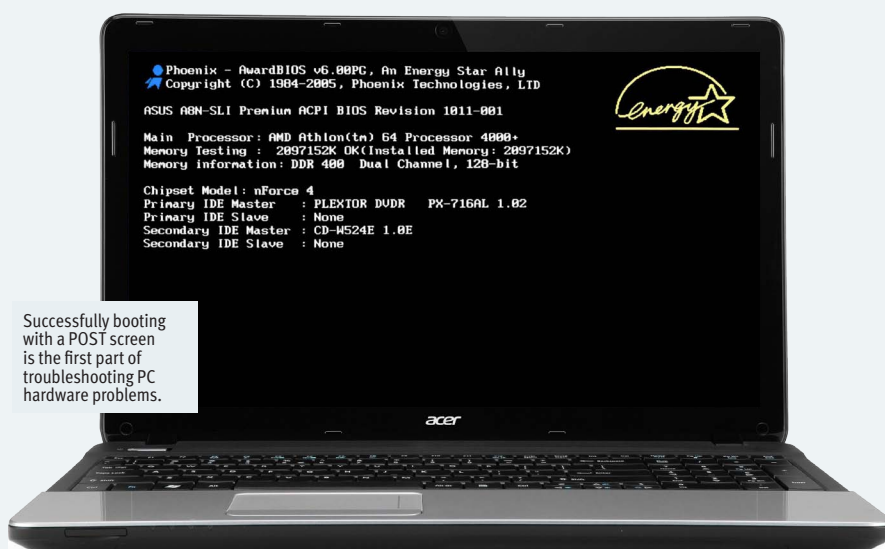
My PC powers up, but there are no beeps from the motherboard. It has an Intel i3 CPU — can you help me please?  
[ PRABATH JAYANATH ]

**Matt Hanson replies:** This could indicate a major failure, or it could be that something has worked loose inside the PC. Confirming this is only really possible with a desktop PC that's easy to open — in Jayanath's case, he had a laptop. He could try removing and reinserting the battery, but other than that, he would need the help of an expert technician or at least a service manual. Desktop users can open up the case

### [ STORAGE ] How to maximise tablet storage

I own a HP Stream 11 2-in-1 device, and its lack of onboard storage (a paltry 32GB) is incredibly difficult to manage. What are my options for extending its storage, preferably without having to connect an external hard drive?  
[ DAVID PRICE ]

**Nick Peers replies:** The Stream 11 has a microSD card slot, which gives David the ability to double or even treble the amount of storage available to him. The manual claims it supports up to 32GB only, but some HP users have reported that they've been able to use 64GB (and even 128GB in one instance) SDXC cards from the likes of Kingston, Lexar and Samsung. Another option would be a USB 3.0 flash drive, although they're no quicker (plus microSD cards are less conspicuous). Another way to eke out more storage might be through the use of a cloud storage device or shared folder on a NAS drive (as covered in our Superguide this month, see page 59), although that's not practical for running apps off, whereas you can easily divert applications to the internal microSD card following the step-by-step guide in last month's Q&A section (see 'Move apps to another drive' in TechLife #60, page 87).



[ WINDOWS ]

# Get Windows 10 notifications under control

GOT A BUSY DAY AHEAD? WE'LL SHOW YOU HOW TO KEEP PESKY WINDOWS 10 NOTIFICATIONS UNDER CONTROL SO YOU CAN DO MORE WITH YOUR PRECIOUS TIME.

[ NICK ODANTZIS ]

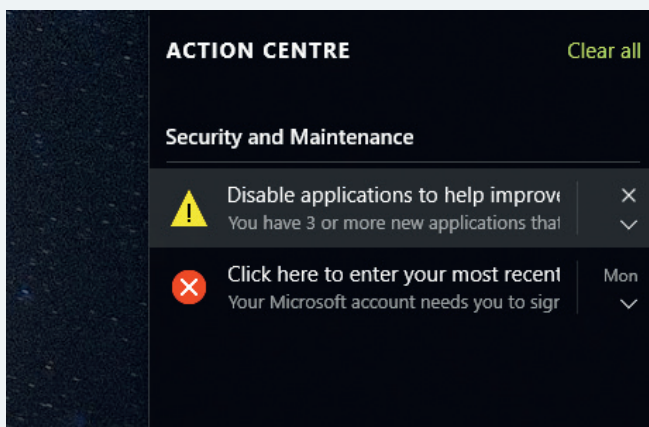
THE BRAIN IS a wonderful thing, capable of memorising many things. Only, it doesn't always work that well in practice — some of us are more forgetful than others! This is why Windows notifications are such a valuable thing to have — they warn us of upcoming events, such as appointments in the calendar, new emails that arrive throughout the day and it even tells us if our Windows machine needs some kind of maintenance or app action that we may have forgotten to carry out.

But sometimes, you just want to focus your attention on one task, and when you've got Windows reminding you of dozens of emails that need checking or some other event, it can get in the way of what you want to do. Luckily, it's easy to take care of notifications and minimise their impact on your life.



[ STEP BY STEP ]

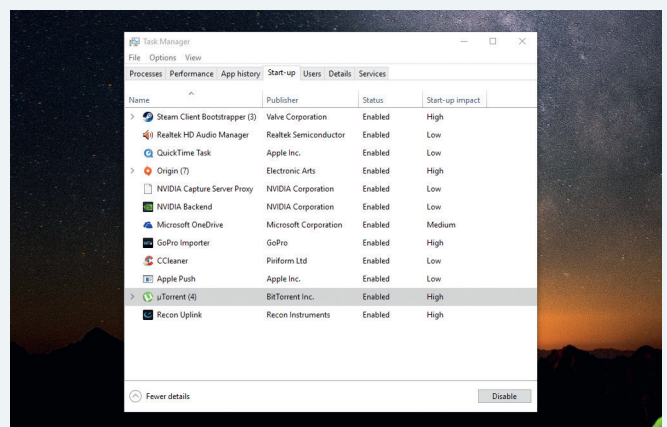
## MASTER ALL INCOMING NOTIFICATIONS



01

### SEE NEW NOTIFICATIONS

When you receive a notification, a pop-up window will appear above the Taskbar at the bottom of the screen. If you miss the alert, opening the Action Centre will allow you to view all notifications that you've received at any time by clicking the message bubble icon on the Taskbar. All notifications are displayed in a list, in order of when they appeared.

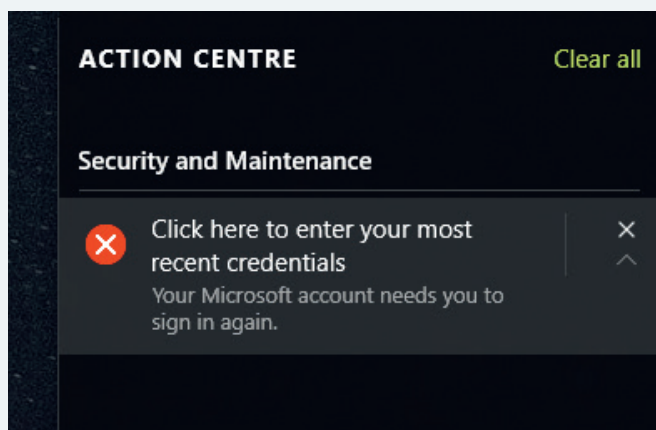


02

### CHECK OUT ALL NOTIFICATIONS

With the Action Centre still open, you can quickly deal with all open notifications by clicking the 'Clear all' link above. If you want to be a little more methodical with your approach, you can view individual notifications by clicking on each one — doing this will show you what exactly needs addressing, such as a pending system update or a forthcoming calendar event.

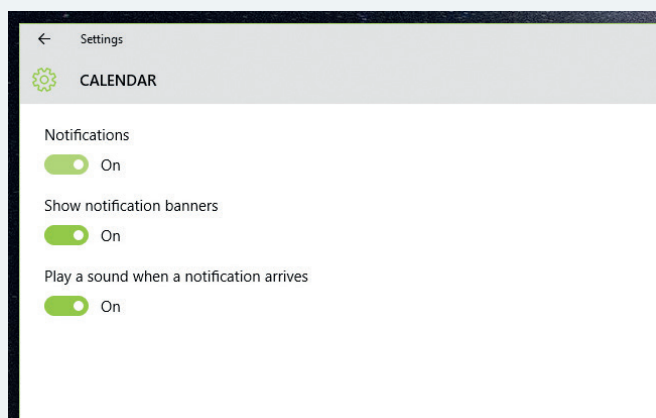




03

### ACTION INDIVIDUAL NOTIFICATIONS

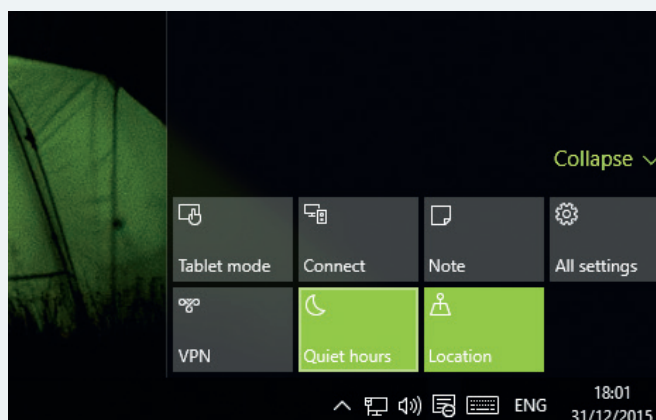
To quickly deal with events that you don't need to open for further information, you can hover your mouse cursor over them to reveal more notification controls. If you're satisfied that you don't need to know any more, click the cross next to it to dismiss it. If you want to quickly find out more without actually opening the notification, click the down-facing arrow.



05

### FINE TUNE NOTIFICATIONS

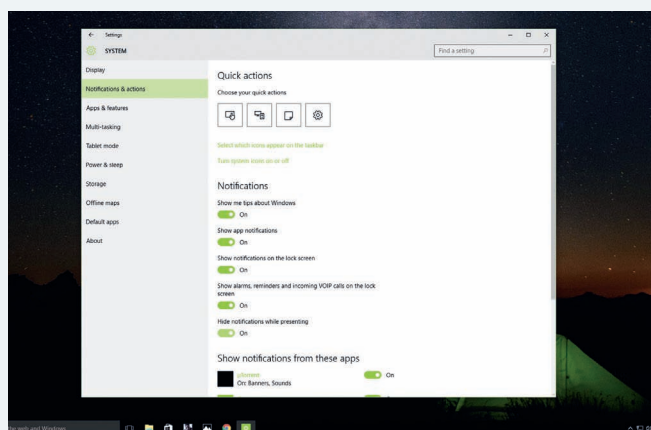
If turning off all notifications bothers you, turn off notifications just on individual apps, keeping the ones you want to see. Once again, in Notifications and action settings, scroll down and you'll see individual apps with a toggle switch next to each one, allowing you to turn them off individually. Or click on one to turn on specific features, such as a notification noise.



07

### THE POWER OF TOUCH

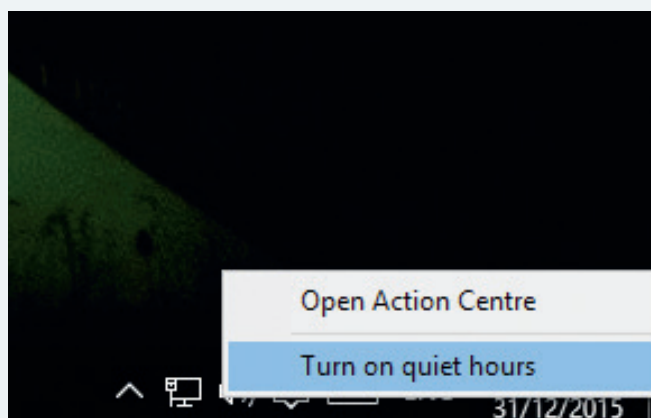
If you're using a touchscreen PC, there's a more touch-friendly way to turn 'Quiet Hours' on or off. To find this, simply tap (or left-click) the notifications icon in the Taskbar to open the Action Centre. At the bottom of this pane is a Quiet Hours tile — tap this to turn it on or off. If the tile doesn't show, just tap the 'Expand' setting above and to the right of the tiles.



04

### CONTROL GENERAL NOTIFICATIONS

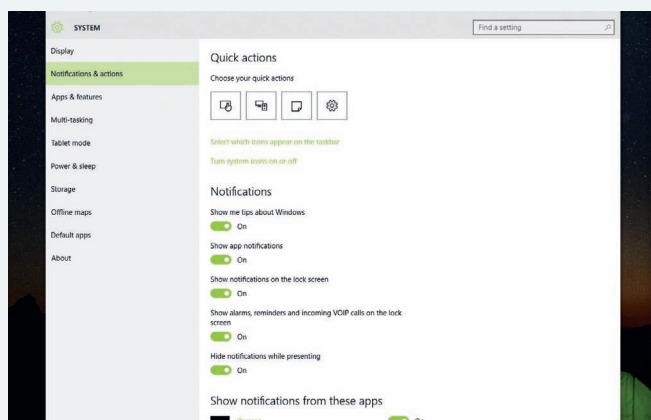
If you want to control when notifications appear, you can alter this in the settings. Type Notifications and action settings in the search bar on the Taskbar, and click on this heading from the list that appears. Here, you'll see options that you can toggle on or off, such as showing tips on using Windows, app notifications and even being able to hide notifications during a presentation.



06

### TURN ON QUIET HOURS

The easiest way to avoid distracting notifications is to use the 'Quiet Hours' function. This one-click feature silences everything in an instant. Turn it on or off by right-clicking the notifications icon in the right-hand side of the Taskbar and selecting 'Turn on quiet hours' from the menu that appears. When you want to turn this feature off, just do the same thing again.



08

### THAT'S IT!

You should now be able to take control of the way you view notifications on your PC! You can easily view and deal with notifications in the Action Centre, or turn them off in the notifications settings or in individual apps. Finally, 'Quiet Hours' allows you to quickly turn off notifications altogether, ideal if you're in a meeting or turning in for the night.

[ MAC ]

# Enhance macOS Sierra's Today view

EXPAND NOTIFICATION CENTRE'S TODAY VIEW WITH ADD-ON WIDGETS.

[ TECHLIFE TEAM ]

ONE OF THE most notable things about macOS is how it not only works closely with iOS, but it has also adopted some of the best bits from the iPhone and iPad over time, too. The big revamp to Notification Centre in iOS 8, for example, proved very popular on iOS devices, enabling users to use the Today view to see regularly accessed information, and add widgets to customise the experience.

The Today view made its way into OS X (now macOS) in 10.10 Yosemite in 2014, providing at-a-glance views of calendar events, reminders, weather forecasts, stock prices and more. Although developers have been slower to get the Today view on the Mac than they have been on the iPhone and iPad, there are a number of very useful third-party widgets available in the Mac App Store. Here, we'll show you how to use these and Apple's default widgets, along with the Today view in general.

One thing worth noting if you try out a lot of widgets — and then discard a bunch of them that you don't want to stick with — is that macOS Sierra has a tendency to cache them in memory, even if you uninstall their

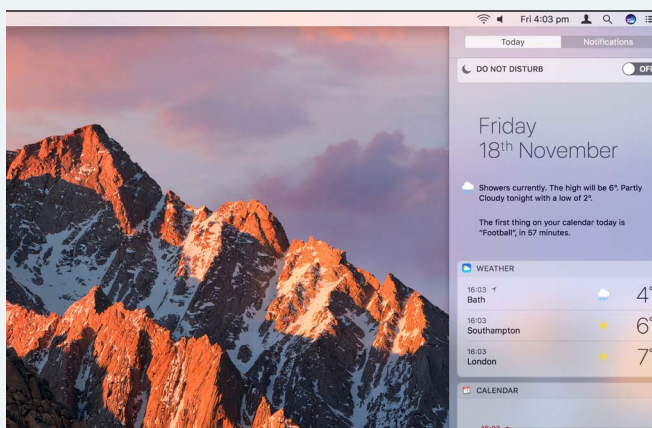
parent apps. Restarting your Mac fixes this, but it's quicker to open Terminal and reboot Finder by typing the command `killall Finder`. Hit `⌘`, and you'll find your Finder windows

briefly disappear, then reappear. Now when you reopen Notification Centre, any uninstalled widgets will be gone.



[STEP BY STEP]

## GET STARTED WITH TODAY VIEW



01

## OPEN NOTIFICATION CENTRE

To access Notification Centre, click the icon on the far-right of the menu bar. It then slides across, above other on-screen content.

As in iOS, you get a Today tab for time-sensitive info and widgets. If your screen can't show it all, scroll up and down with a two-finger drag/swipe.

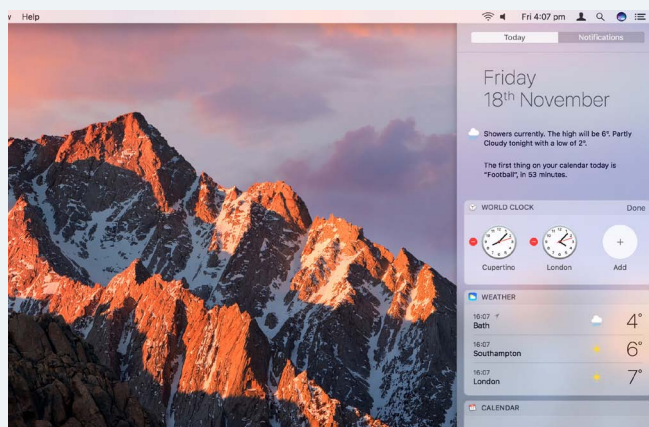


02

## TURN OFF AUTOMATIC LOGIN

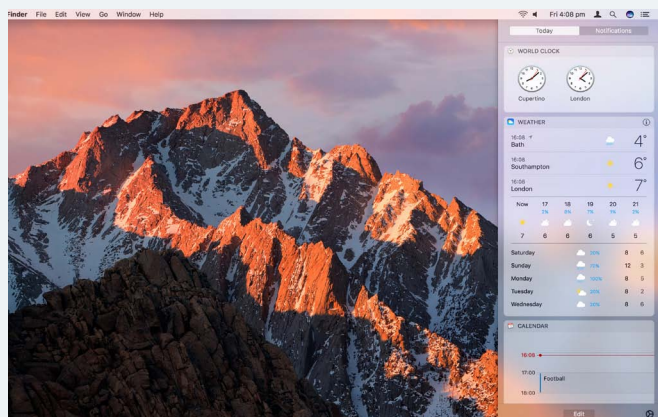
The first time you access Today view, you'll see Apple's default layout. The Weather app will ask for permission to use your location; click OK in the Weather widget. Click Edit (at the foot of the panel) to expand Notification Centre to see installed widgets (left) and those you can add (right).





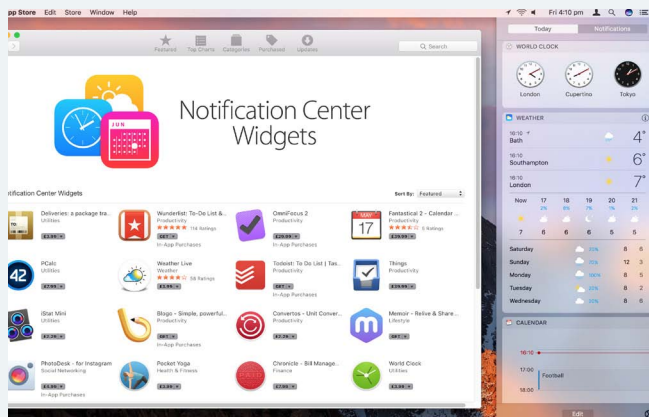
### 03 SWITCH SOME WIDGETS

Widgets can be added/removed via drag and drop or using the +/– buttons. Try removing Stocks by clicking its – button; it'll move to the right-hand pane. Add World Clock by clicking the +; it'll move to the left. Drag the drag-handles at the right of widget titles to reorder your installed widgets.



### 04 CUSTOMISE A WIDGET

Various widgets can be customised. Click Done to stop editing, then move your pointer over the World Clock widget, and click the 'i' to put the widget into edit mode. Click Add to create a new clock, then type and select a location for it. Drag the clocks to reorder them. Click Done when finished.



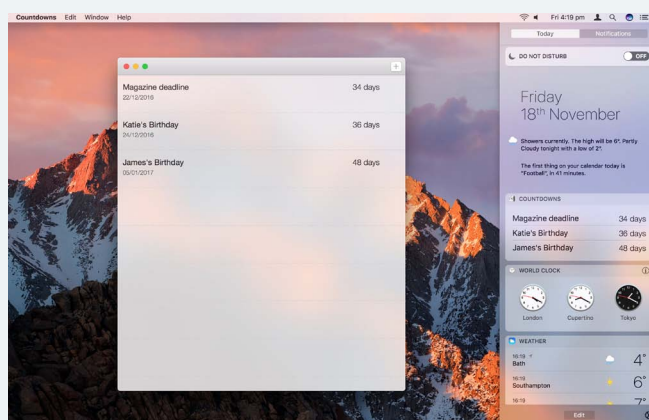
### 05 ACCESS WEATHER DETAILS

Some widgets, such as Weather, provide more info when interacted with. By default, you see current conditions, but click a location and an extended forecast is provided, showing the next few hours and also the coming days. Using the same process as in Step 4, you can add further locations.



### 06 DETECT THIRD-PARTY WIDGETS

The Today view in macOS Sierra is extensible, which means you can add third-party widgets installed via the Mac App Store. Also, some apps have an associated widget. When a new widget is detected by your Mac, the Edit button (at the foot of the Today view) will alert you to new items.



### 07 ADD THIRD-PARTY WIDGETS

You add third-party widgets in the same way as the built-in ones, and some may need configuring. Note that Today view is primarily designed for 'at a glance' information that's important to you, so put what you consider most useful at the top. Resist the temptation to install too many.

### 08 INTERACT AND EXPERIMENT

Some third-party widgets may interact with their associated parent apps. For example, if you use the Countdowns widget to set reminders, you'll need to click the Settings button next to Add to open the main app if you want to edit any of your countdown timers. ■

[IOS]

# Advanced video editing on iOS with Apple iMovie

ENHANCE YOUR PRODUCTIONS WITH PRECISION EDITING AND VIDEO OVERLAY EFFECTS.

[GEORGE CAIRNS]

WHEN USING IMOVIE on an iPad, it's a simple matter to drag-and-drop the best parts of your raw footage into the timeline and then trim them for a tighter cut. You can easily swap the running order of each clip in the non-linear timeline to tell a story more clearly. This results in a series of consecutive clips that you can share easily with family and friends to a range of social media sites, or simply save to the device itself and show your creation on your Apple TV through AirPlay for a home screening.

By deploying iMovie's more advanced editing features, you can make your iPad-edited movie stand out from the crowd. Here, we'll demonstrate how iMovie's advanced editing tools and techniques enable you to apply more professional-looking production values to your programmes.

When filming repetitive activities (such as a man juggling), you can make your movie

look more engaging by varying the shot sizes and camera angles that you use. With careful editing, you can then cut from a wide shot to a close up and the action will flow seamlessly (despite the fact that the two clips were shot at different times). This makes it look like you were filming the action using two cameras instead of one. iMovie's Precision Editor enables you to fine-tune the 'in' and 'out' points of consecutive shots to ensure continuity of movement — we'll show you how in just a moment.

## ADD VIDEO LAYERS

Next, we'll move on to demonstrate other advanced features, such as combining video clips in layers. This enables you to add cutaway clips. Professional editors use

cutaways to illustrate a point being made or hide jump cuts in interviews. Cutaways also add texture and variety to your programmes.

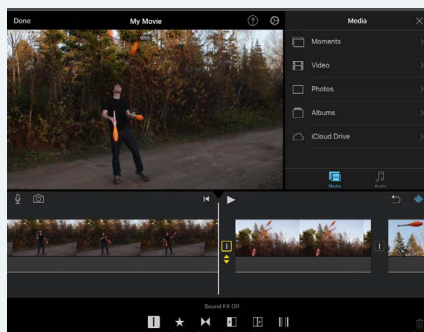
By editing in layers, you can also display two clips at the same time. This adds more visual variety and enables you to tell a story more creatively. By splitting the screen to show sections of two clips, you can create a title sequence montage, for example.

Alternatively, you can place one picture inside another to add extra information to your project's narrative.

BY DEPLOYING IMOVIE'S MORE ADVANCED EDITING FEATURES, YOU CAN MAKE YOUR IPAD-EDITED MOVIE STAND OUT FROM THE CROWD.

[STEP BY STEP]

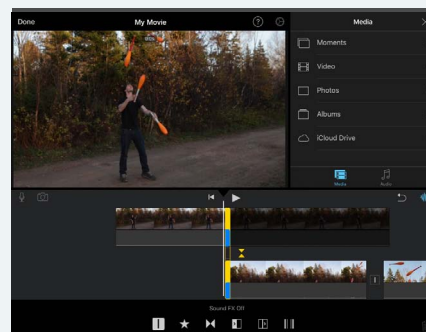
## HOW TO USE THE PRECISION EDITOR



01

### PRECISION EDITOR

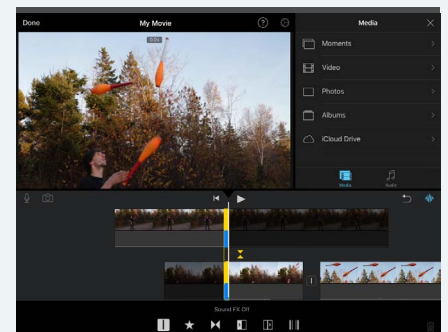
Tap the transition icon between two clips to select it. Then tap the yellow arrows icon below the transition icon to summon the Precision Editor. This will place the two adjacent clips onto separate tracks.



02

### CHOOSE OUT POINT

Now drag the top clip's yellow trim handle to scrub through individual frames. In this example, we've chosen a frame where the club is about to leave the juggler's right hand near the end of the wide shot.



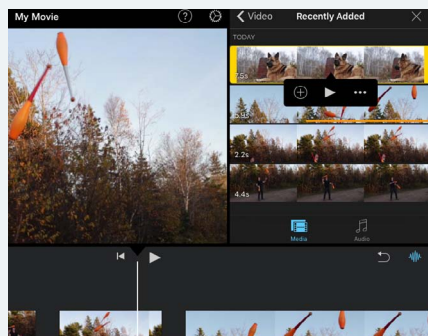
03

### CHOOSE IN POINT

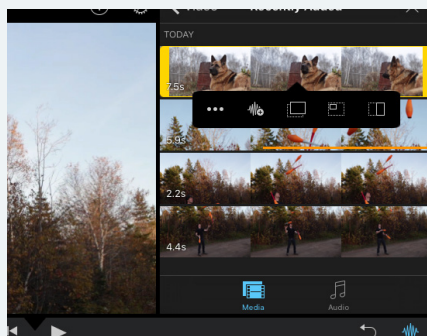
Drag the lower layer clip's yellow control handle until you find the precise frame that you want to cut to. Here, we've matched the action of the wide shot to the movement in the mid shot, ensuring seamless continuity.



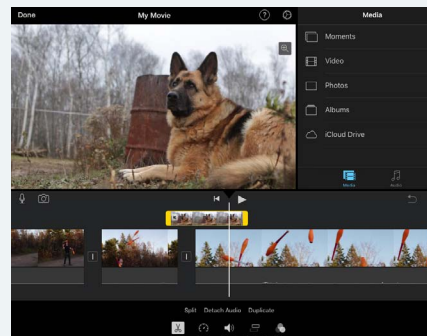
## [STEP BY STEP] HOW TO ADD A CUTAWAY CLIP



- 01 SELECT A CUTAWAY**  
You can hide an edit point in the timeline by placing a separate clip above it as a cutaway layer. Place the timeline's playhead where you want to insert a cutaway. Tap to select a cutaway clip in the browser.

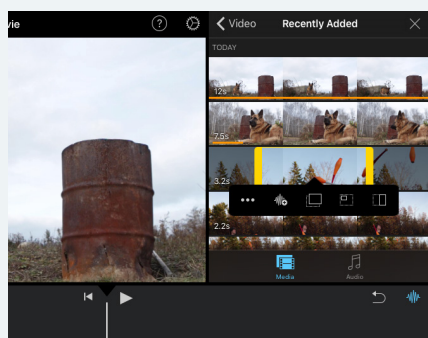


- 02 ADD AN OVERLAY**  
Tap the three dots in the dialog box that appears next to the selected clip to access more options. You can tap the overlapping rectangles cutaway icon to overlay the clip as a separate video layer in the timeline.

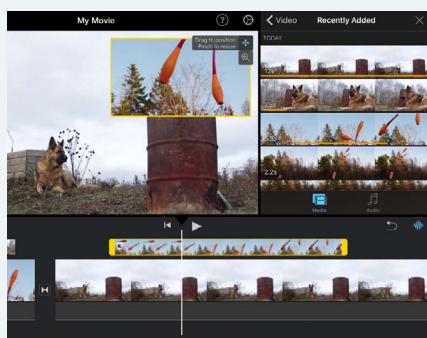


- 03 TRIM THE CUTAWAY**  
Tap the cutaways layer to select it in yellow to edit. Then drag the trim handles to choose where it starts and ends. Here, we've cut from the juggler to a cutaway of the dog watching and then back to the action.

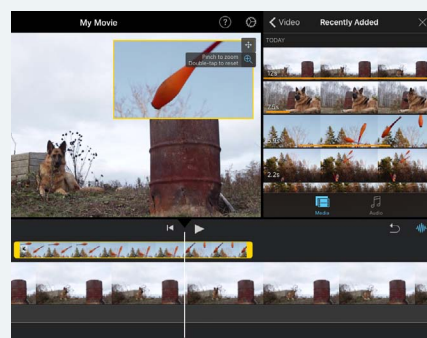
## [STEP BY STEP] HOW TO ADD A PICTURE IN PICTURE



- 01 CHOOSE PIP EFFECT**  
Place the playhead where you want to insert a picture in picture (PIP) effect. Select a clip in the browser. Tap the '...' icon and choose the icon of a small rectangle inside the larger one. The clip will appear as an overlay.



- 02 REPOSITION THE OVERLAY**  
Tap the PIP overlay clip in the timeline. Tap the move tool icon (arrows) in the viewer. Drag the inserted clip to re-position it. Pinch the inserted clip to resize it within the bigger frame.

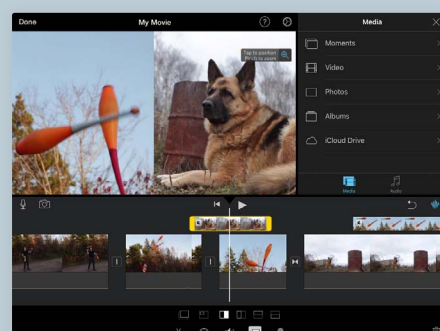


- 03 ZOOM IN**  
You can magnify the content within the inserted picture to make it easier to see. Tap the magnifying glass icon in the viewer. Pinch inside the frame to zoom in on an area. Drag to reposition the zoomed area.

## LET'S SPLIT

Create a split-screen sequence.

Even after you've added a clip as a cutaway or picture-in-picture overlay, you can change the way it mixes with footage on the timeline's lower layer. Tap the overlay clip to select it. An Overlays icon appears below the timeline. Tap it. You can now choose from a range of split-screen effects that combine parallel timeline clips left/right or top/bottom. Once you've split the screen, tap the magnifying glass and pinch and drag to fine-tune the composition of the overlay layer's contents. Here, we've juxtaposed the dog and the clubs. ■



[ ANDROID ]

# Troubleshooting Android bugs

ANDROID IS A FANTASTIC OPERATING SYSTEM, BUT ITS NUMEROUS VERSIONS AND THOUSANDS OF HARDWARE VARIATIONS MEAN THAT FRUSTRATING BUGS DO POP UP FROM TIME TO TIME.

[ LINDSAY HANDMER ]

MOST OF THESE nasty bugs can be fixed quite easily, but the more stubborn ones can take a little digging to find and rectify the root problem. To help get you started on troubleshooting, we've put together a guide to the most common potential issues and how to fix them. We tested with a Nexus 6P running Android 7, so your phone's menu layouts and options may vary somewhat.

## DO THE RESEARCH

Before anything else, try turning your phone off and on again. It might not be a permanent fix, but can often get a stubborn phone working long enough to try some other fixes. For a phone that won't turn off, press and hold the power button for at least 10 seconds.

Also, take the opportunity to make sure your phone is fully backed up.

While we have covered the key points to get you started on troubleshooting, Google is your friend. Chances are someone else has

experienced your same problem or something similar, and information can be found online to help narrow down the cause. Try to be as specific as possible when searching, including specific phone model and make, and Android version. Find the latter under 'Settings > About phone'.

Your device's manufacturer or the developer of a specific buggy app can often provide useful support as well. And, of course, make sure everything is up to date, as small hotfixes are rolled out all the time.

## MISBEHAVING APPS

Nothing is more frustrating than an app that doesn't work as intended. Make sure you have the latest version — otherwise, clearing an app's stored temporary files can often help.

CHANCES ARE SOMEONE ELSE HAS EXPERIENCED YOUR SAME PROBLEM OR SOMETHING SIMILAR, AND INFORMATION CAN BE FOUND ONLINE TO HELP NARROW DOWN THE CAUSE.

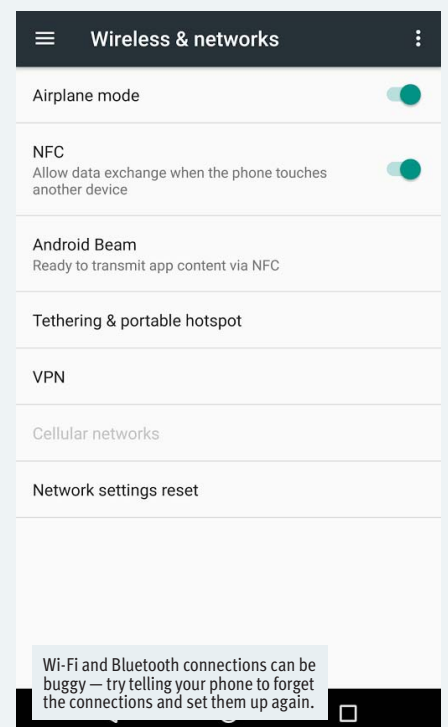
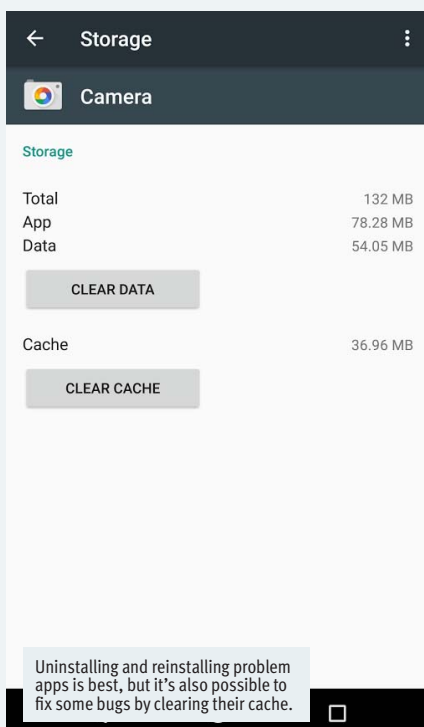
Head to 'Settings > Apps', then select your problematic app, then 'Storage > Clear cache' — this does not affect any personal data or settings. Under the same menu, clearing the App Data will wipe any custom settings and

return the app to a fresh state.

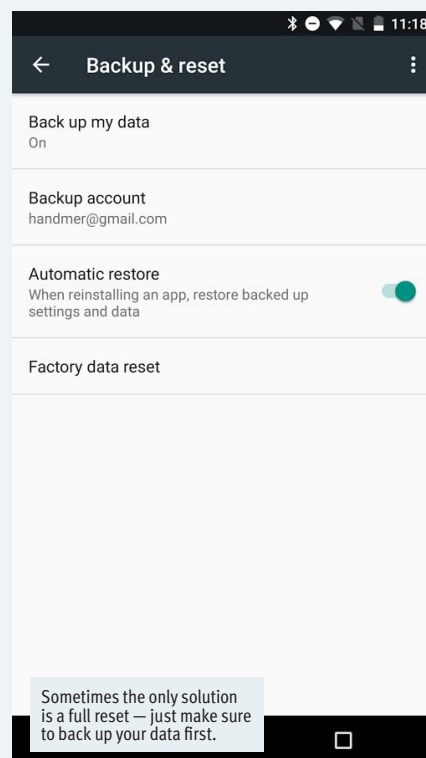
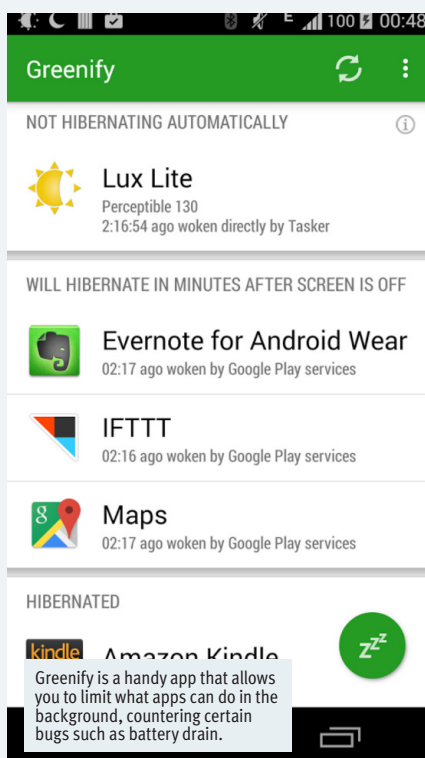
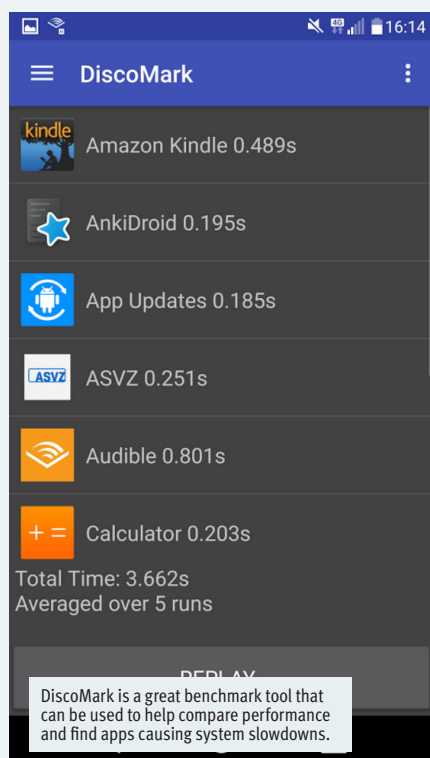
If your app is still misbehaving, try fully uninstalling and reinstalling it. If you're still experiencing problems, many app developers provide great support — get in contact via their links at the bottom their Google Play page.

## BATTERY DRAIN

Having a misbehaving app or process drain your smartphone battery is quite annoying, and also fairly common. It's usually a bug that







is keeping the phone 'awake', or keep the GPS on when not needed. Fortunately, it's easy to spot the culprits — navigate to 'Settings > Battery' where the usage is broken down. If it's a specific app causing the drain, then focus on that. Often unexpected battery drain can be for other reasons, such as poor cellular signal.

For very troublesome apps, there are third-party management options that can help force them to sleep and avoid background battery drain, such as Greenify ([goo.gl/weo88](http://goo.gl/weo88)).

### PERFORMANCE LOSSES

Some bugs can consume extra resources and cause performance issues, such as lag. Checking the battery drain is a good way to spot errant apps, but using a performance testing app can be helpful at identifying issues. The free app DiscoMark ([goo.gl/rRJU30](http://goo.gl/rRJU30)) can be used to create a baseline performance benchmark for comparisons. Run it a few times to check it gives consistent results, then uninstall any suspect apps and run it again to check for performance difference. Apps such as Facebook can give a small but noticeable performance hit.

### CONNECTIVITY BLUES

Wi-Fi and Bluetooth connections suffer from their own share of bugs, but can be very hard to pinpoint. First, check your Wi-Fi

### RECOVERY MODE AND RESET

For particularly vexing issues, sometimes the only solution is a full reset back to the factory-fresh settings. It won't fix all issues, but is a good option of last resort. Double check everything is backed up, then head to 'Settings > Backup and reset > Factory data reset'. The process will take a while, but then your phone will be ready to set up again. Consider installing suspect apps one by one with enough time in between to check for problems. For phones where the reset menu is not accessible, Recovery Mode allows another way to reset your device, delete the cache or apply updates. Different phones have a different process for entering recovery mode — just Google your model and "recover mode". On a Nexus 6P, from a powered-off state, hold down the power key and volume down until the Android mascot appears, and follow more detailed instructions from there. Under the same menu, wiping the system cache partition can sometimes fix issues, and does not delete any personal data.

connection or Bluetooth device is working correctly with another phone or tablet, as issues are often external to your device. Sometimes enabling then disabling aeroplane mode can help reset the connections without a reboot. When testing Wi-Fi issues, make sure to have Bluetooth turned off and vice versa. Try swapping Wi-Fi networks or moving closer to the router — especially with dual 2.4GHz and 5GHz setups.

If nothing else works, try telling your device to forget the settings (touch and hold the network entry) for the problem networks, then reconnect.

### HARDWARE ISSUES

A software bug that is easily fixed is the best case, but often an underlying problem can be hardware related. It might just be an

incompatibility with an app and your specific device, and not a lot can be done to fix it.

Touchscreen issues are often caused by a faulty connection in the phone, or physical damage. While some phones work fine with even a broken screen, others can have entire sections of the touch screen stop working because of hard-to-see tiny chip or crack.

Smartphones will throttle back (and cause performance problems) if too hot, so make sure your device is cool and out of a case when testing.

Charging issues are most often the cable itself or charger, so make sure to try on a known working one. Occasionally, Android can mess up the battery calibration, giving inaccurate percentage readings. Try letting the phone drain until dead, then fully charging it before turning it back on, to recalibrate. ■

[ DOWNLOADS AND STREAMING ]

# Minimising mobile data usage

SHORT ON YOUR GIGABYTES WHEN OUT AND ABOUT? HERE ARE THE TOOLS YOU NEED TO GRAB YOURSELF SOME EXTRA DATA.

[NATHAN TAYLOR]

WHILE MONTHLY QUOTAS for landline broadband services have (thankfully) finally grown to the point at which you generally don't have to stress over your data usage, the same is not true for mobile services. Most mobile services offer only a few gigabytes per month, the kind of quota that can be easily wiped out with system and app updates, plus casual browsing. Worse, most post-paid mobile services will charge a ludicrous excess usage fee if you do accidentally go over your quota.

Luckily, there are tools to help you deal with quota anxiety. This month, we're going to look at some of the top techniques to reduce your mobile data usage.

## USE A DATA SAVER PROXY

Data savers have been around for a few years, with the functionality now even built into several browsers, but not many people know about them. A data saver is a proxy or VPN service that pre-downloads sites you visit, then compresses those sites before sending them on to you. That way, the

amount of data sent across the mobile link can be significantly reduced. The amount of data saved varies significantly depending on the service and the type of content you're accessing, but 10–50% extra data is not uncommon. As an added bonus, they also frequently speed up browsing, since less data has to traverse the last mile of the internet connection.

There are a surprising number of service options here. Some of the best include Chrome, Opera and Firefox.

Chrome has a built in option, hidden away in its advanced settings. In the mobile version of Chrome, tap on the vertical ellipsis and select Settings. Look under

## SETTING MOBILE DATA LIMITS ON ANDROID

If you're worried about going over your limit (and suffering massive excess charges), Android has a handy feature that will automatically cut off mobile data once a threshold is reached. It's not available in all versions of Android, but look under 'Settings > Data usage' for an option to 'Set mobile data limits'. This will let you configure a period of use and a mobile data usage cap for that period. Once Android reaches that cap, it will cut off all mobile data, preventing you from exceeding your limit.

Advanced for 'Data Saver'. Tap on it, then turn the switch to 'on'. A graph will appear showing you how much data you've saved. (As an aside, this is also available as an add-on in the Desktop version of Chrome. Look in the Chrome Web Store for Data Saver.)

Opera was one of the first to implement data saving, and is available in both its desktop browser and mobile browsers. Its mobile browser Opera Mini actually has several settings, letting you choose how much compression to apply to images and media. You can find the data saver in the settings.

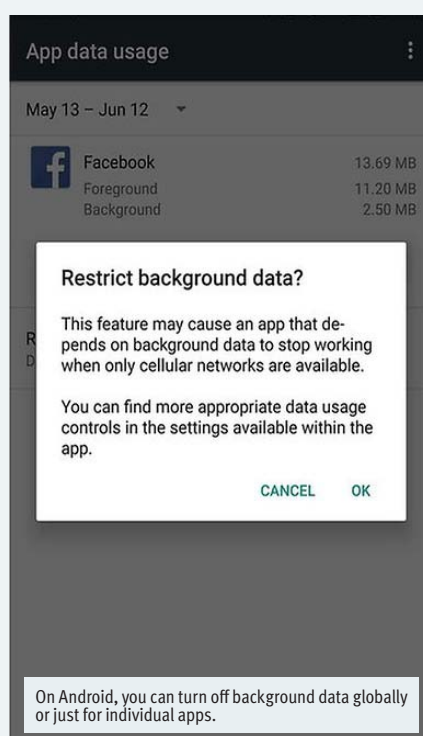
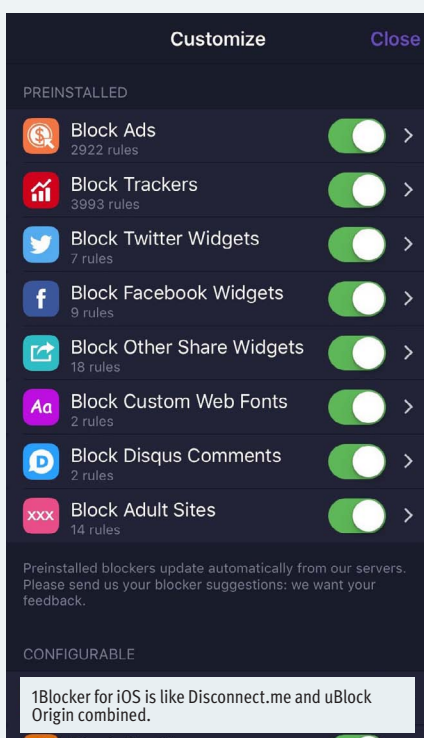
Firefox has several add-ons that can do the job, including one that uses Google's Data Saver service. In the Firefox add-on directory, look for either Data saver proxy for Firefox (which uses Google's compression proxy) or skyZIP acceleration and compression Proxy.

Opera Max for Android is a great tool from Opera that sets up a VPN that both compresses incoming data and blocks ads — and provides reports on background data usage. It's rather annoying that you have to keep "renewing" the service every 12 hours, but it's otherwise a very useful service.

## USE AD BLOCKERS

A substantial volume of your mobile data quota is likely going into downloading ads — and ads can be some of the worst offenders when it comes to bandwidth, with embedded video, rotating galleries and heavy flash embeds. An ad blocker can spare you both annoyance and save you bandwidth on ads.

On iOS devices, Apple has actually built in a content-blocking API that lets third-





party applications block certain types of media. There are a number of apps that use it, but we recommend 1Blocker, a tool that will stop ads, trackers, social media widgets and tracking cookies from ever making it to your browser.

On Android, you have the option to use a browser like Firefox (with add-ons), Adblock Browser or Opera Mini, which has tools available for ad-blocking. There are also several apps that you can install for ad blocking — but you'll have to download and install them from their home pages since Google tends to remove all ad blockers from the Play Store. We can recommend AdClear, which can be found at [www.seven.com/android-adblocker-download.php](http://www.seven.com/android-adblocker-download.php).

### DOWNLOAD MEDIA FOR OFFLINE PLAY

A number of subscription services, including YouTube Red and Spotify Premium, allow you to download media for offline viewing. For instance, in Spotify, you can go to 'Settings > Playback' and switch on offline playback, at which point Spotify will start caching your music library locally. Even though you're not technically 'offline' when you're on a 3G/LTE, Spotify will still use the local version for playback, saving bandwidth. Plus, if you're on Apple Music, you can download songs to your device for later offline listening.

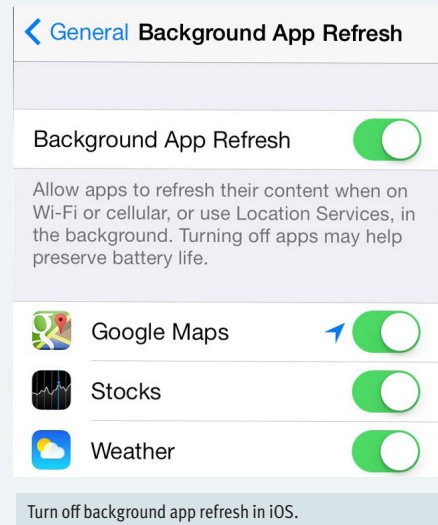
Google Maps also has an offline mode, which is recommended if you use your phone for navigation. Within the app, tap on the hamburger to bring up your option, then tap on 'Offline areas'. You'll be able to

select a zone (or multiple zones) and Google will download the map for that area to your phone, meaning that it won't have to use 3G data to download live maps while you're travelling.

### TURN OFF BACKGROUND APP UPDATES AND DOWNLOADING.

Apps can use data even when you're not actively using them. Background updates and syncing should only be enabled when you're on Wi-Fi.

On Android, go to 'Settings > Data usage' under 'Wireless & Networks' ('Settings > Connection > Data usage' on Samsung TouchWiz). This will give you an overall view of your data usage, as well as an app-by-app breakdown. There should be a button to 'Restrict background data' which you can switch on (in later versions of Android it's just listed as 'Background data', in which case, you would switch it to 'off', and in some versions of Android, you have to tap on the vertical ellipsis to see the option). Doing this means that only the app in the foreground (that is, the one currently open in front of you) can access the internet as long as you're connected only to a mobile network. Once you connect to Wi-Fi, normal background downloading



will start again. Alternatively, you can turn off background data for individual apps. Under 'By application', Android will

show usage for each app. Tap on an individual app, then switch background data off for that app. If you switch it off for Google Play, app updates will be disabled until you connect to Wi-Fi.

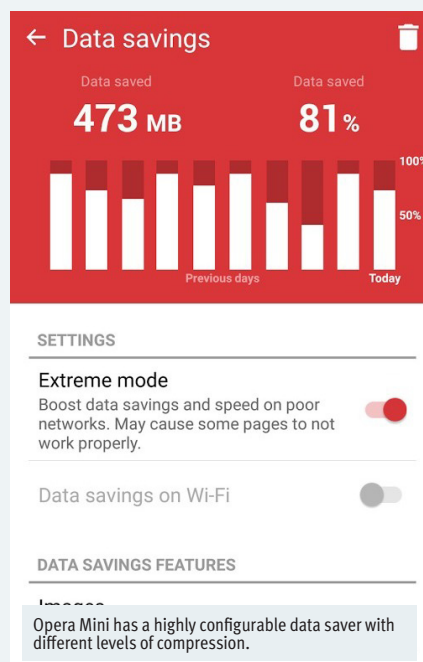
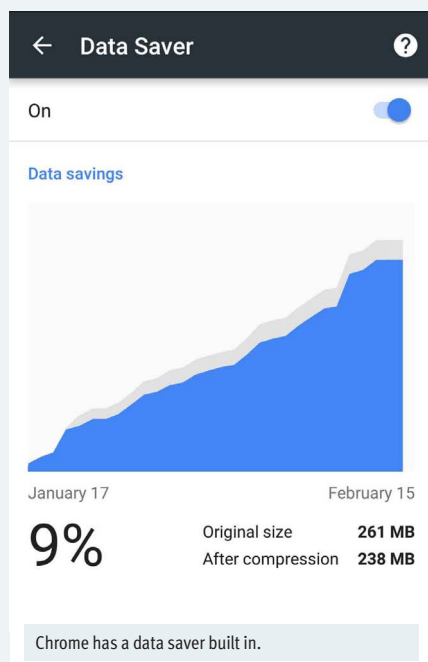
On iOS, go to 'Settings > Mobile'.

Under 'Use mobile data for', there are individual switches for each app you have on your phone. You can turn them all off or select which ones you want to allow to use 3G/4G data. For any you switch off, these apps will not access the internet at all, even while you're connected to a mobile network.

If you just want to stop background downloads, however, go instead to 'Settings > General > Background App Refresh'. There is a switch here to turn off background downloading either globally or for individual apps. As with Android, as soon as you connect to a Wi-Fi network, normal background and foreground internet service resumes.

As an extra note for iOS, you should also turn off Wi-Fi Assist, found at the bottom of 'Settings > Mobile'. With Wi-Fi assist, your phone may use mobile data even when it's connected to Wi-Fi, if iOS decides that your Wi-Fi connection is too slow or spotty. It's probably better to make that decision yourself. ■

A SUBSTANTIAL VOLUME OF YOUR MOBILE DATA QUOTA IS LIKELY GOING INTO DOWNLOADING ADS AND ADS CAN BE SOME OF THE WORST OFFENDERS WHEN IT COMES TO BANDWIDTH, WITH EMBEDDED VIDEO, ROTATING GALLERIES AND HEAVY FLASH EMBEDS.



[ PRIVACY AND SECURITY ]

# Top extensions for securing your web browser

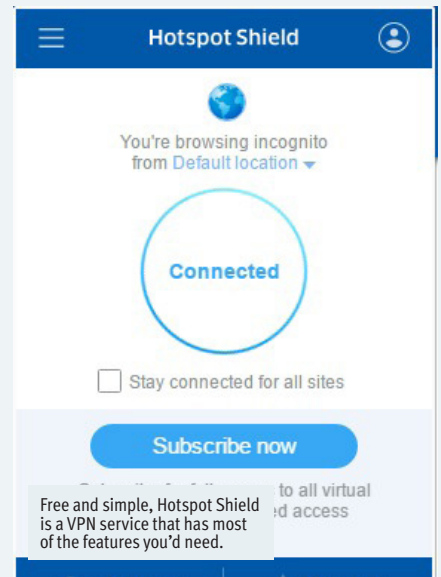
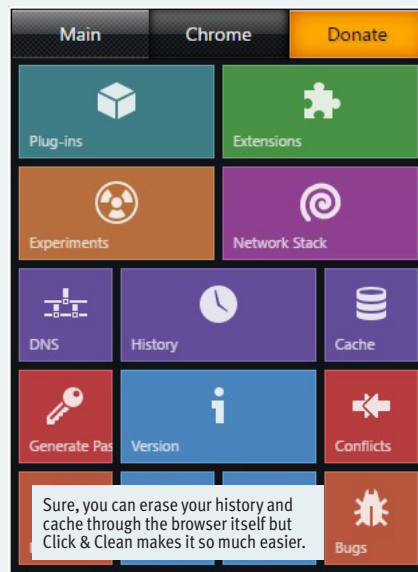
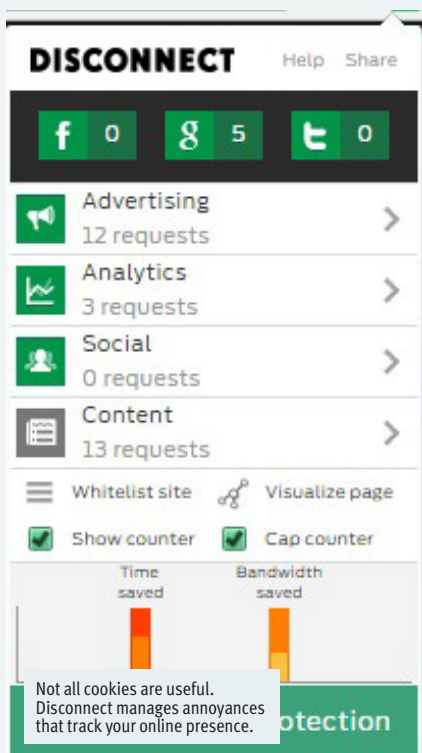
EVERY NOW AND AGAIN IN THIS COLUMN, WE LIKE TO GO THROUGH AND UPDATE OUR LIST OF THE BEST ADD-ONS FOR SECURING YOUR BROWSER.

[ NATHAN TAYLOR ]

THESE ARE THE very top add-ons for making you safe from tracking cookies and metrics, from malicious website code and from hackers trying to intercept your browser traffic. They will block ads and bypass geoblocks and content filters as well — the latter particularly relevant now that certain websites are being blocked by Australian ISPs. All of these are available in the Chrome Web Store and in the Firefox Add-ons directory.

## LASTPASS

If you're not using a password manager by now, you should be ashamed (and welcome to the Privacy and Security column, first time reader). A password manager generates and stores good passwords for the sites you visit, allowing you to have unique passwords for each site without busting your brain trying to remember them all. If you didn't know, using dictionary words for passwords is a no-no,



as is using the same password for multiple sites (you can be 100% sure that if someone cracks your Twitter password, they're also going to give that password a try on Google, Paypal, Facebook and dozens of other popular sites.)

LastPass still reigns as our top pick for password managers, with a host of features including two-factor authentication and cloud storage of password libraries. It will cost you a small amount of money to get it on mobile as well, but the desktop browser add-on is free.

## WOT: WEB OF TRUST

Web of Trust is a community rating service, letting users rate sites for trustworthiness and child safety. You can contribute to its ratings by clicking on the trustworthiness and child safety bars when you visit a site, and see the community consensus for that site. You'll also see a little ratings icon next to search result links to indicate its trustworthiness level.

If you head into the settings, you can control how the add-on uses those ratings. You can set the threshold at which WOT will send you a warning about an untrustworthy site and you can enable parental controls, which completely blocks sites with a low child safety rating.

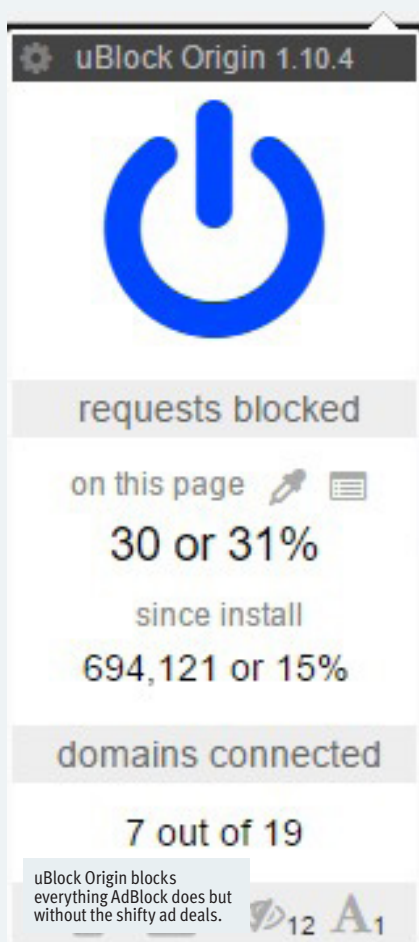
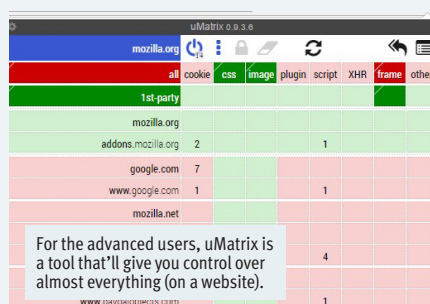
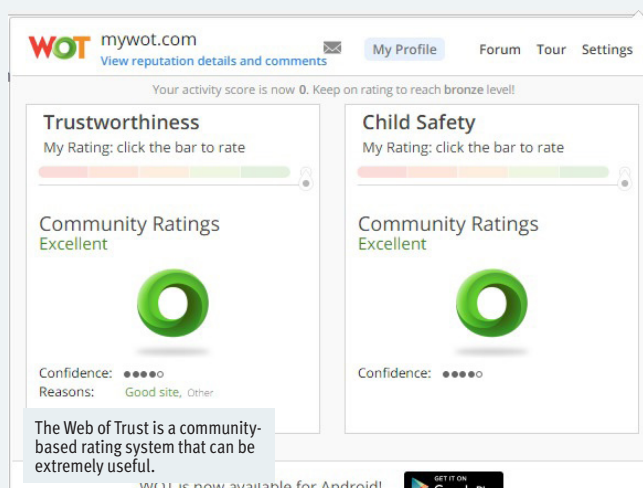
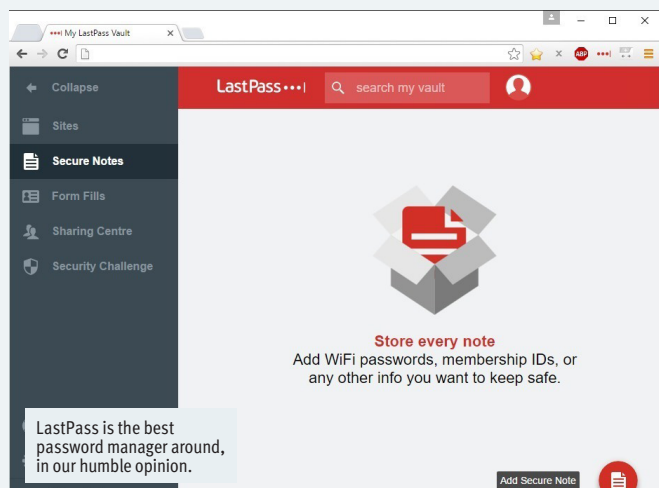
If you find the link safety icons annoying, you can disable them or only enable them for sites that are dangerous.

It is, overall, a very handy service. Of course, because it relies on user ratings it can be gamed, but in our experience, it generally provides solid ratings.

## UBLOCK ORIGIN

For a long time, Adblock Plus reigned as the king of the ad-blockers, but since the company that created it started making questionable moves (like allowing ads from companies willing to pay it), we'd recommend moving on to uBlock Origin, a tool that's actually better than Adblock in many ways. It's certainly lighter and faster by a considerable margin, and it still blocks everything that Adblock did.

If you're willing to drill down, it also gives you quite fine control over the rendering of page elements. You can block large media files for a site, as well as pop-ups, style sheets and fonts. You can even enter "element picker mode" and actively block parts of a site that you never want to see again.



competition (features that are handled by other add-ons listed here), but its free service is simple, unlimited and doesn't ask for user details or require registration. You can choose your connection country from a list — although if you want to connect to the US or UK, you need a Premium account. It will also direct you to an ad page when it connects on the free version.

### UMATRIX

uMatrix is very much a tool for advanced users, but if you can understand what it does, then it gives you unprecedented control over the downloading and execution of page elements on a site-by-site basis. It allows you to block sites from downloading images, plugins, scripts and even frames and style sheets.

When using uMatrix, red = blocked and green = allowed. For example, if the cookie column for google.com is red, then cookies for that site are disallowed. There are 'default' rules (indicated by light red or light green) and you can change them to hard rules by clicking on the bottom or top half of a field to change the field to green or red. So if you wanted to allow google.com to use cookies, then just change the cookies field for that site to green.

You can also click on column and row headers to change the default rules for that entire class of object. For instance, you can switch the default to block website scripts by clicking on the script column header to change it to red (or switch the default to allow scripts by changing it to green).

Obviously, this can break a lot of sites if you block things that the site needs, and you need to know a little about how websites work to get the most out of it. But it's the most powerful and useful tool we've seen for really controlling how websites behave. Once you understand its operation, it's fast to get things done and great tool for truly managing the web. ■

### DISCONNECT

Although there are some great alternatives like Ghostery and Privacy Badger, we still think Disconnect is the way to go when it comes to blocking tracking cookies, analytics, social media widgets and all the other embedded web page annoyances that can be used to follow your online activity. It also forces HTTPS where it's available, so that as many sites as possible employ end-to-end encryption.

With Disconnect, you can very quickly see what it's blocking and there's a running tally of how much data it has blocked. You can whitelist a site you're on and see, with a very handy visualisation tool, all the third-party sites that the site you're visiting is trying to grab data from.

### CLICK & CLEAN

Click & Clean serves as a quick browser cleaner, capable of removing your history, cache, download history and cookies with the touch of a button. Yes, you can do all those things without the add-on, but this makes it much easier to access. This add-on also lets you clear your history/cache/cookies/passwords/form history for a certain period, so you can just clean, say, the last 24 hours.

The app also features a lot of quick access buttons, like buttons for quickly firing up incognito mode, visiting a privacy testing website, generating good passwords (though it won't remember them — it's not a password manager) and more. There are also optional

system utilities that can be installed along with the add-on.

### HOTSPOT SHIELD FREE VPN PROXY

When it comes to VPN add-ons, there are some great ones available in Chrome now: ZenMate VPN, TouchVPN, Betternet, Tunnelbear and several others offer worthy free services (be careful of Hola, however — the company has proven very dodgy with its privacy practices).

When it comes down to it, we're currently landing on Hotspot Shield as our favourite. It doesn't have some of the features of its



[ HOME NETWORKING ]

# Your guide to broadband tech

FTTP, FTTN, HFC, GPON? THE AUSTRALIAN BROADBAND SCENE CAN BE CONFUSING, SO WE'VE PUT TOGETHER THIS QUICK GUIDE TO HELP YOU COMPREHEND THE MOST IMPORTANT BITS.

[ NATHAN TAYLOR ]

OUR MULTI-TECHNOLOGY MIX NBN sure has created some confusion. With at least five different technologies in use, on top of the four major broadband techs already available, it's no wonder that there's a lot of misunderstanding about how things work and what the different technologies are capable of. So this month, we thought we'd break it down for you.

## CONTENTION

Before we start talking about the different technologies, we should touch on an incredibly important concept in networking — contention. We'd say that the misunderstanding (or lack of understanding) of contention is the reason for roughly 90% of false claims about broadband. It's why people, including politicians that should know better, still make claims like 4G being as good as fibre ("It can do gigabit!"), even when it's actually not even a contest.

Contention, in short, is competition for the network. When two devices on the same network try to transmit at the same time, they have to share network resources. If you have two Wi-Fi devices, both have to share the airwaves, so the bandwidth for each is halved. Pretty simple, really.

When it comes to broadband, you may have heard the term 'contention ratio'. Your ISP doesn't have enough backhaul (that's the links that carry data from your local exchange or hub back to the ISP) and internet bandwidth to support all users going at max speed all the time. Instead, it under-provisions, expecting that, at any given time, only a certain number of users are accessing the internet at once.

The higher the contention ratio is, the worse the ISP will be at peak times.

But contention also plays a part in what's called the local loop — that's the 'last mile', the link between your home or wireless device and the hub/node/exchange/cell

where your signal is joined with that of your neighbours and sent on to the ISP for delivery onto the internet. This is a huge part of what separates different services. For example, with 4G, every user connected to a given cell is competing for bandwidth, and that could be several thousand users at once so the 'gigabit' speed is divided amongst all those users. With ADSL, on the other hand, there is no contention between you and the exchange. The link is yours alone.

Now with an understanding of that in mind, let's look at how the different techs stack up.

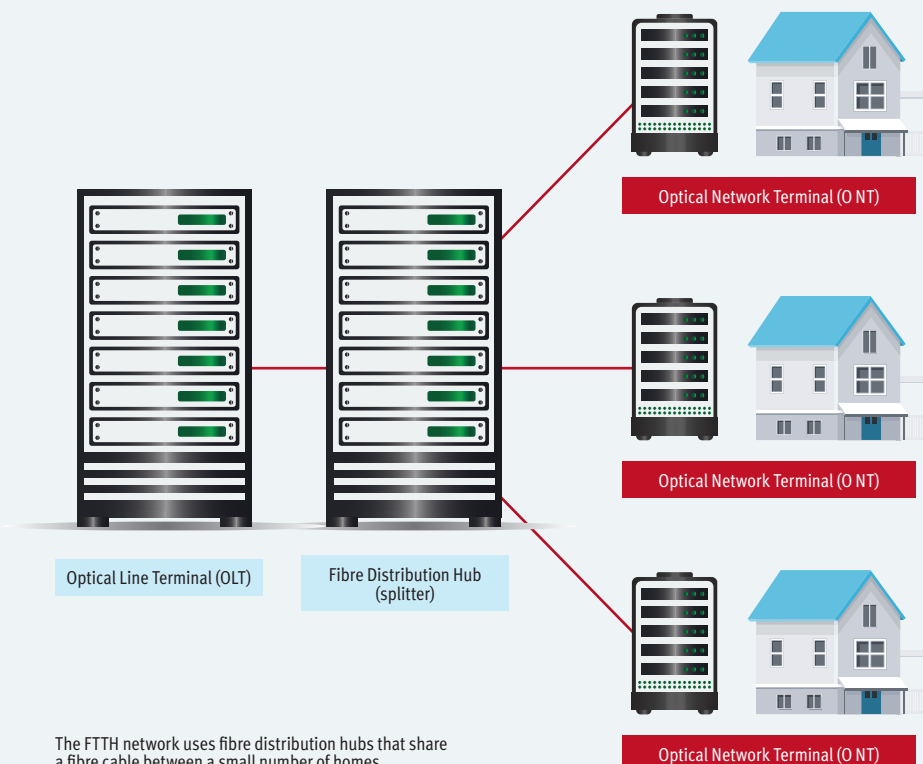
## FIBRE TO THE HOME (FTTH)

FTTH is, as many have noted, the Rolls Royce of Australian broadband. If you have FTTN (fibre to the node), you've pretty much won the broadband lottery.

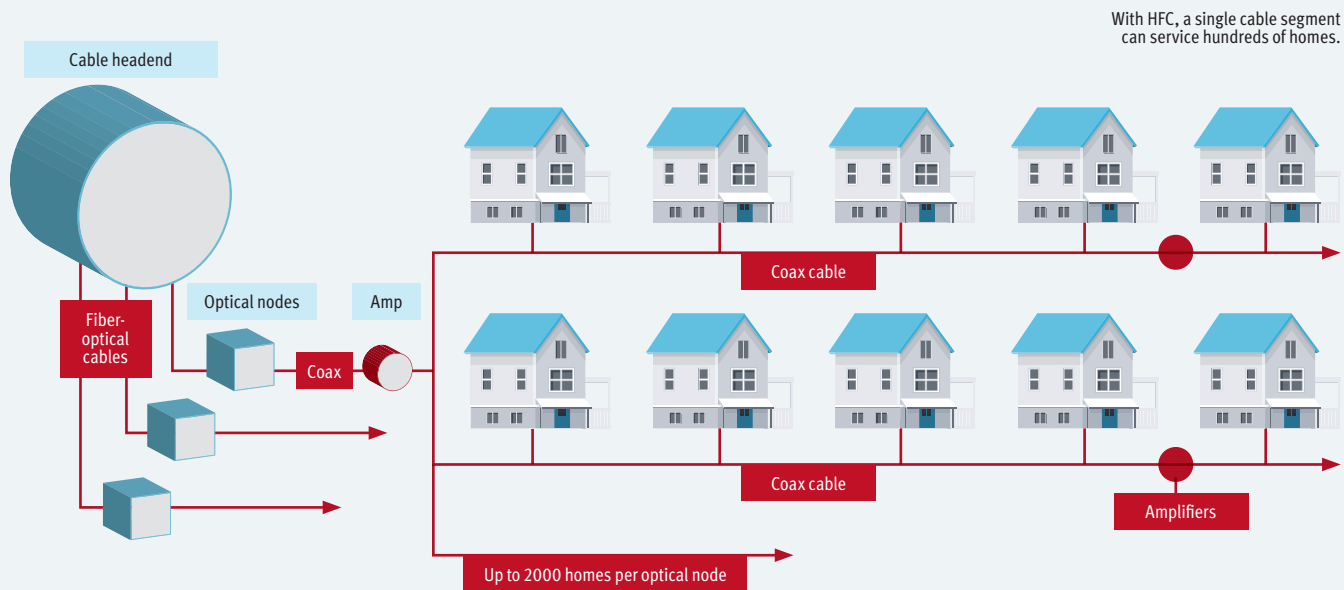
In Australia, the NBN is using what is called GPON: gigabit passive optical network. The 'passive' part means that, unlike FTTN, the fibre distribution hubs (FDH) — the street-side cabinets that connect to your home — require no power.

Each FDH node has a total bandwidth of 2.488Gbps downstream and 1.244 gigabit upstream. That is effectively divided amongst the homes connected to that FDH — nominally 32 homes per FDH according to the initial rollout plans. Technically, any home could connect at the full 2.488Gbps, but to prevent a single home from sucking up all the bandwidth they're throttled to 25, 50, 100 or 1000Mbps, depending on the type of service you're subscribed to.

The contention ratio with fibre is, thus, incredibly good. A single GPON is enough to deliver around 77Mbps to every user, all at once. So, at least in the local loop, you'll be pretty much guaranteed to always get the full 100Mbps barring some freak occurrence where every user is typing to max out their connection at once. In the future, an upgrade to XG-PON (also known as 10G-PON), which provides four times as much downstream bandwidth, would be possible, easily allowing 1Gbps subscriber services with very little



The FTTH network uses fibre distribution hubs that share a fibre cable between a small number of homes.



contention. Of course, there can still be contention deeper in the network, depending on how much internet bandwidth your ISP has provisioned, but locally fibre is the bee's knees.

### HFC CABLE

Cable internet looks good on paper. Technically, subscriber speeds of 1Gbps downstream are possible. But it's the very high contention ratios that make it less capable than it might appear.

With cable, a coaxial cable is run from a node along the street sides. To connect to the network, you essentially splice into this cable. The bandwidth on this cable is shared amongst all the homes it passes, which is typically several hundred. The node itself is connected back to the parent network via a fibre cable (thus hybrid fibre-coax, or HFC).

With the current setup, a single cable segment can pass several hundred homes. With DOCSIS 3.0 (which we're currently using) a total bandwidth of just over 1.2Gbps is possible, shared amongst all the users on a given segment (as with fibre, individual users are throttled to 30Mbps or 100Mbps to prevent one person taking over the network). Thanks to the relatively low current subscriber base, that actually works

out pretty well – but if everybody whose house was passed by cable actually used it, it would be a different story.

When DOCSIS 3.1 is implemented on the NBN, the shared speed can actually go up to 10Gbps, though with the plan to put everyone in the cable footprint onto cable, the subscriber base will also likely go up (barring the building of more nodes).

### DSL, FTTN AND FTTDP

Although they don't provide nearly as much total bandwidth, the copper cables used in ADSL, VDSL (used in fibre to the node) and G.Fast (potentially used in FttDP) have one advantage — they're non-contending. The link between your house and the exchange (for ADSL), local node (for FTTN) or micro-node (FttDP) is yours alone, though, of course, there's still contention deeper in the network. (With FTTN, the uplink from the street-side node to the exchange varies — currently, the design document lists up to 4Gbps — and each node will service between 48 and 384 users.)

So, in general, DSL speeds in the local loop are determined by the quality of the signal your home receives, which is, in turn, a product of your distance from the exchange/node and line noise. There's a theoretical

max, and you'll get some fraction of that depending on your signal quality. ADSL2 can go up to 24Mbps. VDSL2 (in the NBN implementation) can max 100Mbps. G.Fast can theoretically hit 500Mbps.

### 3G/4G, SATELLITE AND FIXED WIRELESS

Wireless technologies all share one Achilles' heel: they're a shared medium. So when someone says "Why do we need landlines when 4G will be able to do 1Gbps?" this is your answer. There is a reason that data volumes on mobile services are so tight: if everybody started to use 4G for everything, the whole system would collapse.

The total amount of data that an LTE-Advanced network can carry largely depends on how much spectrum the telecoms provider has purchased, and the contention ratio depends on the density and range of cell towers. What's more, final speeds are heavily affected by signal interference and signal power loss — without a cable to shield a signal and hold it together, wireless signals degrade easily, reducing the effective bandwidth. The end result is speeds that vary pretty wildly from place to place and time to time. In a perfect situation, with nobody else using a cell, speeds of up to 100Mbps and even 1,000Mbps (for fixed position installations) are possible, but in practice they're likely to be much, much lower.

Like 3G, satellite and fixed wireless are also dependent on a shared medium. Directional antennae and multiple access signalling can and do limit contention, but where signals overlap, there will be performance trade-offs. Nominally fixed wireless speeds go up to 50Mbps/20Mbps and satellite to 25Mbps/5Mbps, but they're subject to the same rules of wireless contention as 3G. ■

### WHAT IS FTTDP AGAIN?

Fibre to the distribution point (FTTDP) is a new alternative to FTTN. It's planned for some implementation in the NBN, primarily in areas serviced by Optus Cable (since it was discovered that the Optus Cable network was in shambles and couldn't be used for NBN). It works like FTTN, but instead of street-side cabinets, fibre-connected 'micro-nodes' are installed in the street ditch or distribution point out in front of the home, and only the tiny last bit between the ditch and home is copper. This enables very high speeds — you'll likely get close to the theoretical maximum of VDSL2 (100Mbps), and the new G.Fast (500Mbps) is possible, though we don't know yet if the NBN will implement G.Fast.



[ PHOTOGRAPHY MASTERCLASS ]

# Master your DSLR: lens aberrations

LEARN HOW LENS MANUFACTURERS ARE TACKLING OPTICAL PROBLEMS AND HOW YOU CAN GET SHARPER, BRIGHTER, CLEANER SHOTS USING LENS CORRECTION TOOLS.

[ TECHLIFE TEAM ]

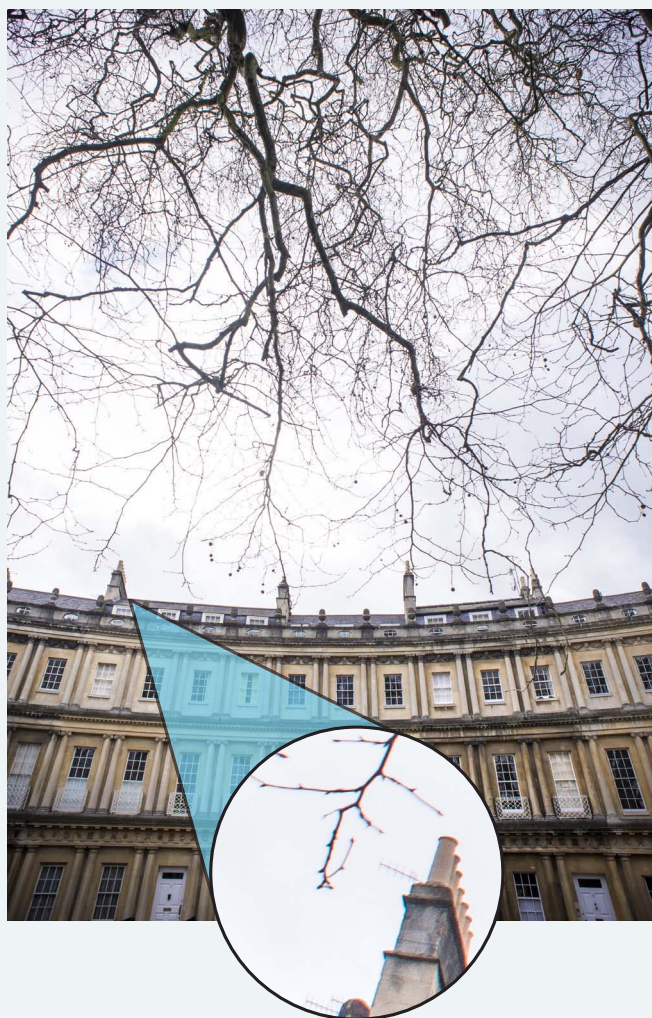
THESE DAYS, CAMERA lenses are very well corrected for optical aberrations. The quality of corrective lens elements and multi-coatings mean that even zoom lenses with complex designs can produce results as crisp and colourful as older primes.

But that doesn't mean they're perfect. Chromatic aberration still continues to plague digital photos, for instance. This phenomenon

is similar to the effect you see when light passes through a prism, with the different wavelengths of light becoming separated. In a digital image, this manifests as a coloured halo around high-contrast objects, and this can make images appear less sharp than they ought to be. More advanced lenses use low-dispersion elements that reduce the degree to which the different wavelengths are dispersed.

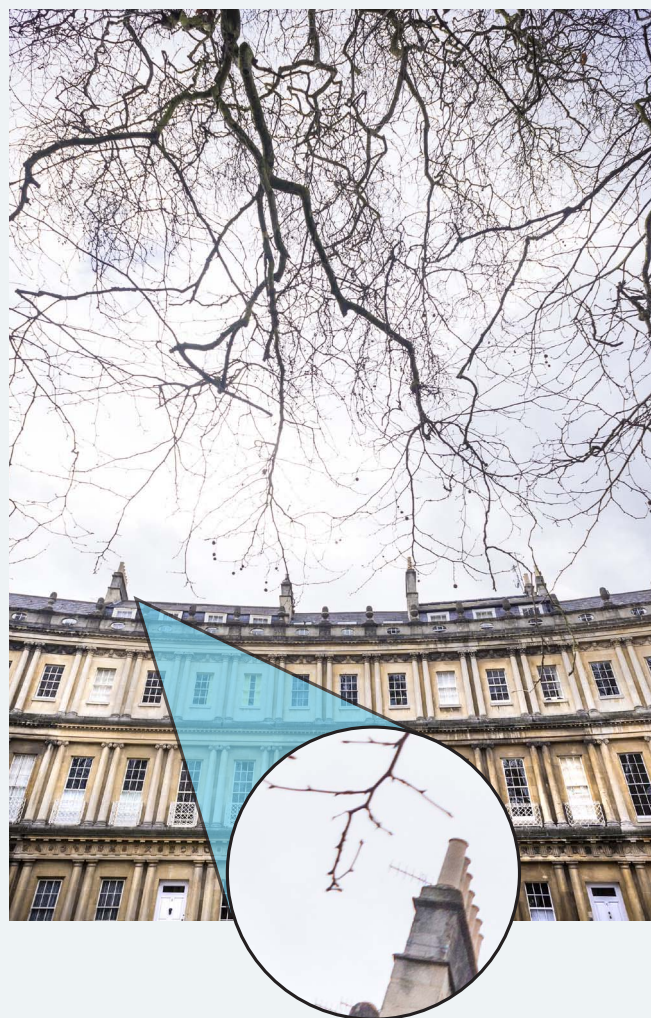
Cheaper lenses don't have these, and pictures taken with them will require more corrections when you process them.

Vignetting, where the corners of a picture are darker than the centre, is another common problem. It's typically noticeable with fast wide-angle lenses, when they're used at their maximum aperture. It's caused by the aperture being so wide that it's picking up the side of the



## BEFORE

This shot shows the typical results you get when you point a wide-angle lens at a strongly backlit, high-contrast scene and use a relatively wide aperture. Chromatic aberration or fringing is obvious along sharp edges near the extremes of the frame and the corners are darker than the centre.



## AFTER

Many of these issues are easy to remedy when you process your images, but they might not be obvious unless you magnify the image to 100%. In this example, we've used automatic removal of chromatic aberration and manually fixed the darker corners using ACR's toolset.



## TYPE OF LENS ABERRATIONS

Common optical problems, and how lens manufacturers combat them



### 01 GHOSTING AND FLARE

These problems are caused by reflections from the surfaces of lens elements. Special coatings are used to reduce this and improve light transmission. Nikon uses Super Integrated Coating for instance, with Canon using Super Spectra Coating.



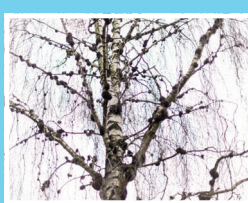
### 02 VIGNETTING

The darkening in corners is typically encountered with lenses that have large maximum apertures. You can reduce this by 'stopping down' the aperture to a smaller setting, or fixing it post-shoot in photo-editing software like Lightroom.



### 03 SPHERICAL ABERRATION

Aspherical lenses are designed to correct for this problem, which occurs when light rays pass through a normal spherical lens. The light rays at the edge are bent or refracted more than the light rays at the centre, which results in softness within the image.



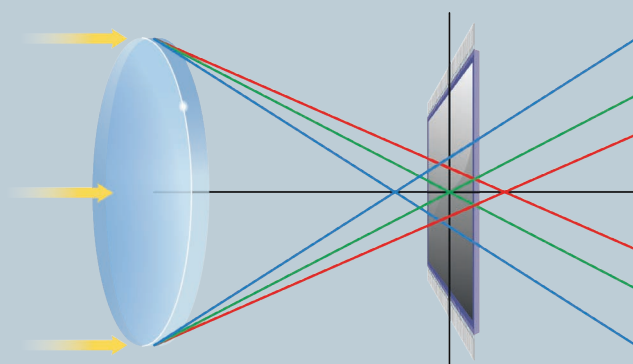
### 04 CHROMA ABERRATION

Manufacturers typically incorporate one or more 'low dispersion' elements to reduce this phenomenon (see below). These go by different names and strengths, such as SLD (Special Low Dispersion) and ED (Extra-low Dispersion).

## CHROMATIC ABERRATION

What's with the rainbow colours along some edges?

Chromatic aberration (CA) can show up as coloured 'fringing' in an image when different wavelengths of light become focused at different points on the camera sensor. There are two types that affect your pictures: longitudinal (or axial) and lateral (or transverse). Using a small aperture can remove axial CA; transverse CA needs to be removed digitally.



## IN-CAMERA CORRECTIONS

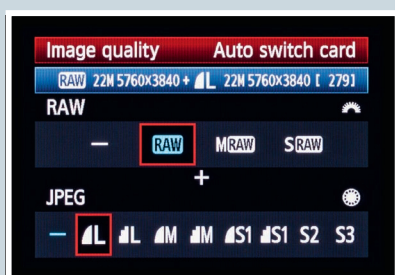
More advanced digital cameras enable you to reduce fringing, vignetting and distortions

You can clean up your pictures when you process them, but many cameras allow you to apply digital fixes in-camera too. You may have to load lens data onto the camera to be able to apply the correction (check your manual), as each lens requires a different degree of defringing, peripheral illumination and distortion

correction. You can apply corrections to raw files in-camera, but these are basic and you don't get the final level of control you get when you process your raws in software. If you shoot raw, third-party software like Lightroom won't recognise lens corrections you applied in-camera, but the software you got with your camera will.

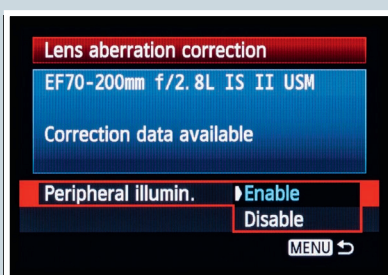


## THREE THINGS TO BE AWARE OF WHEN CORRECTING IMAGES



### JEPEG ONLY

If you shoot raw files, then only the embedded JPEG preview will have the corrections applied, but not the original raw file.



### BRIGHT CORNERS

While you can correct peripheral illumination (dark corners, essentially), you can't correct for vignetting caused by filters or lens hoods.



### GIVE IT SPACE

If you plan to apply distortion correction, remember to frame your shot slightly wider as the corrections may crop details at the edge.

lens, too. Switching to a smaller aperture cleans this up nicely, but keeping some degree of corner shading is often a creative decision, particularly with portraits, as it keeps attention focused in the centre of the frame.

Vignetting can also be caused by stacking filters or an incorrect lens hood, something that's easily remedied.

Lens hoods play an important role in reducing flare and ghosting. If you include a bright light source in the frame or allow stray light to glance across the front elements, you'll end up with pictures that have a ghostly, contrast-reducing sheen across them, or polygonal hotspots. To get around this, fit a lens hood, use your hand to

shield the lens and keep your lenses clean. If you have problems with chromatic aberration, vignetting and other problems, there's a lot you can do to remedy these digitally. We'd recommend shooting raw, as you'll be able to work with the full image data.

## SOFTWARE CORRECTIONS

Dealing with lens aberrations at the raw processing stage lets you tackle the problem.

### 01 SOFTWARE CHOICE

We're using Adobe Camera Raw here, but Lightroom and other raw processing software share similar tools. It's best to apply corrections at the raw stage as you'll be using the best-quality file possible.



### 03 LENS CORRECTIONS

You can remove lens distortions at the same time that you deal with chromatic aberration and vignetting in your pictures.

### 02 ZOOM IN

You'll need to magnify the image to see chromatic aberration. Look for it along the edge of the frame, especially where there's a high contrast edge, such as trees against a pale sky.

### 04 AUTO V MANUAL

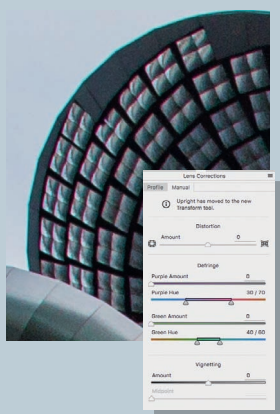
You can simply tick a box and the software will remove chromatic aberration for you, but you may want to fine-tune the result manually (see below).

Chromatic aberration is an easy problem to fix using software like Photoshop CC. You'll have more options open to you if you work with raw files in Adobe Camera Raw. You can open up a JPEG in Adobe Camera Raw, too, but you won't be able to carry out defringing automatically, instead having to rely on the manual sliders under the Lens Corrections panel.

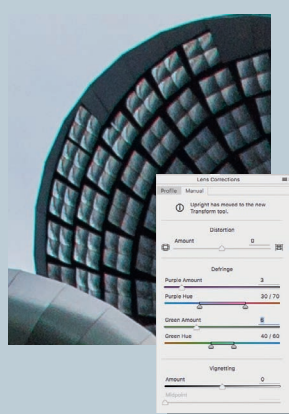
Working with a raw file, the automatic detection and defringing process is very quick and very effective. Using the manual sliders enables you to tackle more resilient purple and green halos that sometimes continue to cling to the edges of objects at the extreme edges of the picture.

## DEALING WITH FRINGING

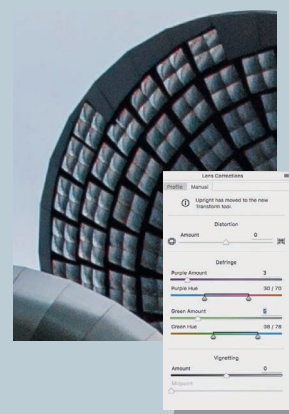
Still left with purple and green fringing? Try removing it manually.



**01 PURPLE AND GREEN**  
With the sliders at zero, the purple fringing (right) and green fringing (left) are obvious.



**02 CLEARING PURPLE**  
Often, setting the sliders to 2 or 3 clears this fringing, but the greens are still present here at a higher setting.



**03 EXPANDING THE RANGE**  
Using the sliders underneath to expand the colour range removes the last traces.



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## BUYER'S GUIDE

YOUR READY RECKONER TO THE BEST TECHNOLOGY PRODUCTS



The *TechLife* team finds the best budget, value and performance products, and the latest releases in the top technology categories. If you believe there are other products that deserve the title in any of the tech categories, let us know and give us your reasons why in 50 words or less. Equally, if there's a hot new product that's worthy of attention, we want to know. Send your email to [techlife@futurenet.com](mailto:techlife@futurenet.com).

|   |   |   |  |   |   |
|---|---|---|--|---|---|
| ↓ |    |    | PRICE CHANGE    | PRICE CHANGE   | ↓ |
|   | [ BEST BUDGET ]<br><b>D-Link DSL-2750U</b>  | [ BEST VALUE ]<br><b>TP-Link Archer D7</b>  | [ BEST PERFORMANCE ]<br><b>ASUS DSL-AC68U</b>  | [ NEW ON SHELF ]<br><b>Billion BiPAC 8900AX</b>   |   |
|   | \$45   <a href="http://www.dlink.com.au">www.dlink.com.au</a><br>A basic-but-functional 300Mbps Wi-Fi ADSL router with four LAN ports. Good wireless range and coverage.          | \$170   <a href="http://www.tp-link.com.au">www.tp-link.com.au</a><br>The UI is a bit no-frills, but once set up, this is a very solid AC1900 router for a price well below the average.      | \$295   <a href="http://www.asus.com/au">www.asus.com/au</a><br>It ain't cheap, but if you want it all, this 802.11ac unit is fast and packed with handy enthusiast features.    | \$450   <a href="http://au.billion.com">au.billion.com</a><br>Billion's joining the '\$500 router' club with this new AC2400 model, plus all the usual high-end features.               |   |
|   |    |    | PRICE CHANGE    | NEW ENTRY    |   |
|   | [ BEST BUDGET ]<br><b>Edimax BR-6478AC V2</b>   | [ BEST VALUE ]<br><b>TP-Link Archer C7</b>  | [ BEST PERFORMANCE ]<br><b>ASUS RT-AC87U</b>   | [ NEW ON SHELF ]<br><b>Netgear Nighthawk X10 (R9000)</b>  |   |
|   | \$79   <a href="http://www.edimax.com">www.edimax.com</a><br>Blitzes its cheaper competition with Gigabit Ethernet and 867Mbps Wi-Fi that delivers great wireless range.          | \$150   <a href="http://www.tp-link.com.au">www.tp-link.com.au</a><br>This modemless version of the D7 (above) has all the basics you'll need to set up a 1,300Mbps AC network.               | \$280   <a href="http://www.asus.com/au">www.asus.com/au</a><br>This full-featured unit is overflowing with options and settings, plus it has super-fast wireless.               | \$799   <a href="http://www.netgear.com.au">www.netgear.com.au</a><br>The first ever 802.11ad router to hit the Aussie market isn't cheap, but has plenty of speed and future-proofing. |   |
|   |    |    |   |    |   |
|   | [ BEST WIRELESS EXTENDER ]<br><b>ASUS RP-AC68U</b>  | [ BEST WIRELESS BRIDGE ]<br><b>ASUS EA-AC87</b>   | [ BEST POWERLINE ADAPTER (BUDGET) ]<br><b>TP-Link TL-PA8010P</b>   | [ BEST POWERLINE ADAPTER WITH WI-FI EXTENSION ]<br><b>Edimax HP-5102Wn</b>  |   |
|   | \$230   <a href="http://www.asus.com/au">www.asus.com/au</a><br>With 5 Gigabit Ethernet ports, this AC1900 Wi-Fi extender's built-in LEDs help you figure out the best placement. | \$220   <a href="http://www.asus.com/au">www.asus.com/au</a><br>This bridge is a great way of linking up to four wired Gigabit devices to a 1,300Mbps AC network.                             | \$125   <a href="http://www.tp-link.com.au">www.tp-link.com.au</a><br>A pair of 1,200Mbps adapters that proved to be both fast and affordable in our most-recent roundup.        | \$65 per unit   <a href="http://www.edimax.com">www.edimax.com</a><br>This Fast Ethernet powerline adapter throws in an 802.11n Wi-Fi access point for both wired and wireless.         |   |
|   | NEW ENTRY    |    |   |    |   |
|   | [ BEST BUDGET ]<br><b>Synology DS216SE</b>  | [ BEST VALUE ]<br><b>Asustor AS-3102T</b>   | [ BEST PREMIUM ]<br><b>Synology DS916+</b>   | [ NEW ON SHELF ]<br><b>WD My Cloud Pro PR2100</b>   |   |
|   | \$170 (diskless)   <a href="http://www.synology.com">www.synology.com</a><br>This affordable 2-bay NAS runs Synology's excellent OS and has all the basics you need.              | \$360 (diskless)   <a href="http://www.asustor.com">www.asustor.com</a><br>This two-bay NAS offers excellent features and can double as a media player, with Kodi and HDMI-output to your TV. | \$690 (diskless)   <a href="http://www.synology.com">www.synology.com</a><br>If you need more space, this four-bay model lets you install apps and can even transcode 4K videos. | From \$850 (diskless)   <a href="http://www.wd.com">www.wd.com</a><br>WD's latest 2-bay consumer NAS offers baked-in Plex and video transcoding up to 4K.                               |   |

ADSL ROUTERS  
(WITH MODEM)BROADBAND ROUTERS  
(NO MODEM)

NETWORKING EQUIPMENT

NETWORKING ACCESSORIES

NETWORK ATTACHED  
STORAGE DEVICES

NEW  
ENTRY[ BEST BUDGET ]  
**JBL Flip 3**

\$150 | au.jbl.com  
This basic battery-powered Bluetooth speaker doesn't cost the Earth but still produces good sound.

[ BEST PORTABLE ]  
**Bose SoundLink Mini II**

\$299 | www.bose.com.au  
It's on the expensive side, but this compact Bluetooth portable sounds amazing for its size.

[ BEST MULTIROOM SYSTEM ]  
**Sonos Play**

From \$299 | www.sonos.com  
Sonos still offers the best multiroom speaker range, with the broadest support for streaming services.

NEW  
ENTRY[ NEW ON SHELF ]  
**Klipsch Stream**

From \$499 | www.klipsch.com.au  
Klipsch is the latest audio vendor to jump on the multiroom streaming wagon, led by the RW-1 (pictured) here.

BUYER'S GUIDE  
READY RECKONERWIRELESS  
SPEAKERSNEW  
ENTRY[ BEST BUDGET ]  
**Skullcandy Grind**

\$99 | www.skullcandy.com.au  
A surprisingly-inexpensive pair of on-ear headphones that punch well above their weight.

[ BEST VALUE ]  
**Audio-Technica ATH-M50X**

\$185 | www.audio-technica.com.au  
A well-priced set of over-ear headphones with fantastic audio and detachable cables.

[ BEST PREMIUM ]  
**Sennheiser Momentum Wireless**

\$630 | en-au.sennheiser.com  
They're not cheap, but the wireless Momentums are about the best over-ear cans money can buy.

[ BEST NOISE-CANCELLING ]  
**Bose QC35**

\$499 | www.bose.com.au  
These are the best noise-cancelling headphones you can buy, with well-balanced audio and superb comfort.

MUSIC HEADPHONES

[ BEST BUDGET ]  
**Google Chromecast 2**

\$50 | play.google.com  
Google's updated wireless HDMI dongle is now 802.11ac and makes it easy to stream online media content to your TV.

[ BEST VALUE ]  
**Minix Neo X8H Plus**

\$185 | www.minix.com.hk  
With 4K output, 802.11ac Wi-Fi and access to the Google Play Store, this is a very flexible Android-powered player.

[ BEST PREMIUM ]  
**Xbox One S**

From \$399 | www.xbox.com  
With support for 4K Blu-ray and Netflix streaming, the latest Xbox is a surprisingly capable media device.

[ NEW ON SHELF ]  
**Google Chromecast Ultra**

\$99 | play.google.com  
This 4K version of Google's streaming stick doesn't offer much more than that, but it's the best choice for 4K TV owners.

NETWORK MEDIA  
PLAYERS

PERSONAL &amp; HOME AV GEAR

[ BEST BUDGET ]  
**Epson EB-W32**

\$700 | www.epson.com.au  
A super-bright, portable 3LCD, WXGA unit at a nice price. Cheap lamps, too.

[ BEST PORTABLE ]  
**Epson EB-1761W**

\$1,199 | www.epson.com.au  
One of the most compact 'full-size' projectors, this WXGA unit is only 1.7kg and new lamps are just \$120.

[ BEST HOME THEATRE ]  
**BenQ MH530**

\$900 | www.benq.com.au  
A high-brightness 1080p DLP projector that's affordable and relatively compact.

[ NEW ON SHELF ]  
**ASUS P3B**

\$1,049 | www.asus.com/au  
This WXGA mini projector is surprisingly bright at 800 lumens and can run off batteries for 3 hours.

DATA  
PROJECTORS[ BEST COMPACT TV ]  
**Samsung UA32K5500AW**

\$630 | www.samsung.com/au  
This compact and inexpensive 1080p 32-inch telly has fantastic visuals and a great interface.

[ BEST BUDGET TV ]  
**Hisense K3110PW**

\$800 | hisense.com.au  
A compelling mix of size (50 inches), value and visuals: a solid all-rounder at a very keen price.

[ BEST MAINSTREAM TV ]  
**LG 55UH770T**

\$2,000 | www.lg.com/au  
With 4K and HDR, this LED-backlit IPS 55-inch provides fantastic image quality.

[ BEST PREMIUM TV ]  
**LG OLED55B6T**

\$4,000 | www.lg.com/au  
LG's slightly more-affordable flat 55-inch OLED 4K offers outstanding picture quality.

TVS

[ BEST BUDGET ]  
**Acer Aspire ES1-431-P2SZ**

\$400 | www.acer.com.au  
This inexpensive 14-inch laptop will do the basics, with a 500GB HDD and Pentium CPU.

[ BEST ULTRABOOK ]  
**Dell XPS 13 (2016)**

From \$1,899 | www.dell.com.au  
This new XPS 13 delivers great battery life alongside the fantastic keyboard, trackpad and tough build quality.

[ BEST GAMING ]  
**Gigabyte P57X v6**

\$2,799 | www.gigabyte.com.au  
With a full GTX 1070 GPU, this huge 17-inch is the fastest gaming laptop we've ever tested.

[ NEW ON SHELF ]  
**Venom Blackbook Zero 14**

From \$1,499 | www.mln.com.au  
Venom's latest MacBook Air-killer hits the sweet spot with a 14-inch screen but a weight of only 1.4kg.

LAPTOPS

LAPTOPS, TABLETS &amp; SMARTPHONES



|   |   |   |   |  |
|---|---|---|---|--|
|  <p>[ BEST WINDOWS ]<br/><b>Microsoft Lumia 650</b></p>  |  <p>[ BEST BUDGET ANDROID ]<br/><b>Motorola Moto G4 Play</b></p>   |  <p>[ BEST PERFORMANCE ]<br/><b>Oppo R7s</b></p>   |  <p>[ NEW ON SHELF ]<br/><b>Motorola Moto G4 Plus</b></p>  | <p>SMARTPHONES:<br/>ENTRY-LEVEL<br/>BUYER'S GUIDE<br/>READY RECKONER</p> |
| <p>\$299   <a href="http://www.microsoft.com">www.microsoft.com</a><br/>With 4G, a 5-inch OLED screen and Windows 10 Mobile, this is a solid entry-level choice for MS fans.</p>                                | <p>\$280   <a href="http://www.motorola.com.au">www.motorola.com.au</a><br/>A basic dual-SIM (2G/4G) phone with a 5-inch 720p LCD, 16GB storage and even microSD slot.</p>                      | <p>\$399 (16GB)   <a href="http://www.oppo.com">www.oppo.com</a><br/>This Android-powered unit has a 5.5-inch IPS 1080p display, solid performance and a stylish design.</p>                    | <p>\$390 (16GB)   <a href="http://www.motorola.com.au">www.motorola.com.au</a><br/>Moto's big 5.5-inch G4 Plus has a 1080p display and a respectable Snapdragon CPU.</p>                            |  |
|  <p>[ BEST BIG SCREEN ]<br/><b>Samsung Galaxy S7 Edge</b></p>  |  <p>[ BEST PREMIUM — TIED ]<br/><b>Samsung Galaxy S7</b></p>   |  <p>[ BEST PREMIUM — TIED ]<br/><b>Apple iPhone 7</b></p>  |  <p>[ NEW ON SHELF ]<br/><b>Google Pixel</b></p>   |  |
| <p>From \$1,149   <a href="http://www.samsung.com/au">www.samsung.com/au</a><br/>With the Note 7 officially recalled, our alternative is this upsized, curved-screen 5.5-inch Galaxy S7.</p>                    | <p>From \$1,149   <a href="http://www.samsung.com/au">www.samsung.com/au</a><br/>The S7 brings back microSD and waterproofing, and combines them with a classy chassis and top specs.</p>       | <p>From \$1079   <a href="http://www.apple.com/au">www.apple.com/au</a><br/>The iPhone is finally waterproof, and as always, this one's also got an improved camera and quicker guts.</p>       | <p>From \$1079   <a href="http://store.google.com">store.google.com</a><br/>Google's new 5-incher aims to take on the iPhone directly with an advanced AI assistant.</p>                            |  |
|  <p>[ BEST BUDGET ]<br/><b>Samsung Galaxy Tab A 8.0</b></p>  |  <p>[ BEST COMPACT ]<br/><b>Apple iPad mini 3 (refurbished)</b></p>  |  <p>[ BEST PERFORMANCE ]<br/><b>Apple iPad Pro 9.7-inch</b></p>  | <p>NEW ENTRY</p>  <p>[ BEST VERSATILITY ]<br/><b>ASUS Transformer Book Flip TP200SA</b></p>                      | <p>LAPTOPS, TABLETS &amp; SMARTPHONES</p>                                |
| <p>\$295 (16GB)   <a href="http://www.samsung.com/au">www.samsung.com/au</a><br/>If you absolutely can't afford the iPad mini 2, this Android alternative is an okay fallback.</p>                              | <p>\$359 (16GB)   <a href="http://www.apple.com/au">www.apple.com/au</a><br/>The iPad mini 4's too expensive, so hold out until one of the 7.8-inch 3's pops up on Apple's AU refurb store.</p> | <p>From \$849 (32GB)   <a href="http://www.apple.com/au">www.apple.com/au</a><br/>This is more than simply an iPad Air 3, with pro-oriented features and hardware.</p>                          | <p>\$450   <a href="http://www.asus.com/au">www.asus.com/au</a><br/>This convertible 2-in-1 has an 11.6-inch display, 1.25kg weight and runs Windows 10.</p>  |  |
|  <p>[ BEST BUDGET ]<br/><b>Apple iPad Air (Refurbished)</b></p>  |  <p>[ BEST VERSATILITY ]<br/><b>Microsoft Surface Pro 4</b></p>  |  <p>[ BEST PERFORMANCE ]<br/><b>Apple iPad Pro (9.7-inch)</b></p>  |  <p>[ NEW ON SHELF ]<br/><b>Samsung Galaxy TabPro S</b></p>  |  |
| <p>From \$369 (16GB)   <a href="http://www.apple.com/au">www.apple.com/au</a><br/>If the budget doesn't extend to an Air 2, get this 2013 unit instead. Recheck the store frequently if it's ever sold out.</p> | <p>From \$1,349   <a href="http://www.microsoftstore.com">www.microsoftstore.com</a><br/>This official Windows 10 tablet has a great stylus and runs traditional Windows software.</p>          | <p>From \$899   <a href="http://www.apple.com/au">www.apple.com/au</a><br/>This smaller iPad Pro has the same top-spec internals as its bigger brother, but is far more portable.</p>           | <p>From \$1,349   <a href="http://www.samsung.com/au">www.samsung.com/au</a><br/>One of the neatest 2-in-1s we've tested, this is a Windows tablet-convertible that's lightweight and flexible.</p> |  |
|  <p>[ BEST FOR IPAD 2/3/4 ]<br/><b>Logitech Keyboard Case for iPad</b></p>   |  <p>[ BEST FOR IPAD AIR/AIR 2 ]<br/><b>ClamCase for iPad Air</b></p>   |  <p>[ BEST FOR IPAD MINI ]<br/><b>Logitech Ultrathin Keyboard Cover</b></p>                                  |  <p>[ BEST FULL-SIZED KEYBOARD ]<br/><b>Logitech Tablet Keyboard</b></p>                                       | <p>TABLETS &amp; 2-IN-1S (ENTRY LEVEL)</p>                               |
| <p>\$90   <a href="http://www.logitech.com">www.logitech.com</a><br/>Offers good protection and comfy, responsive keys on a budget.</p>   | <p>\$150   <a href="http://www.clamcase.com">www.clamcase.com</a><br/>If you want to turn your iPad into a mini MacBook, this clamshell keyboard case is a great option.</p>                    | <p>\$90   <a href="http://www.logitech.com">www.logitech.com</a><br/>The Ultrathin combines a fantastic-quality keyboard with a metal-backed case.</p>  | <p>\$120   <a href="http://www.logitech.com">www.logitech.com</a><br/>If you want the full-sized typing experience, this is your best bet.</p>  |  |
|  <p>[ BEST POINT-AND-SHOOT ]<br/><b>Canon PowerShot G7X Mark II</b></p>  |  <p>[ BEST MIRRORLESS ]<br/><b>Fujifilm X-T10</b></p>  |  <p>[ BEST DIGITAL SLR ]<br/><b>Canon EOS 750D</b></p>   |  <p>[ BEST ACTION CAM ]<br/><b>GoPro Hero 5 Black</b></p>  |  |
| <p>\$850   <a href="http://www.canon.com.au">www.canon.com.au</a><br/>This flexible fixed-lens compact delivers great photos without the hassle of a DSLR or mirrorless.</p>                                    | <p>\$1,070 (16–50mm lens)   <a href="http://www.fujifilm.com.au">www.fujifilm.com.au</a><br/>Offers a compact DSLR-style body, superb image quality and a growing range of premium lenses.</p>  | <p>\$980 (18–55mm lens)   <a href="http://www.canon.com.au">www.canon.com.au</a><br/>This beginner's DSLR is a great place to learn the intricacies of pro shooting (and for a fair price).</p> | <p>\$569   <a href="http://www.gopro.com">www.gopro.com</a><br/>The Hero5 has a 2-inch touchscreen and can shoot video up to 4K @ 30fps. There's a bevy of accessories too.</p>                     |  |
| <p>[ WWW.TECHLIFE.NET ]</p>   |   |   | <p>DIGITAL CAMERAS</p>  |  |

[ BEST POWER BANK ]  
**TP-Link TL-PB10400**

\$50 | [www.tp-link.com.au](http://www.tp-link.com.au)  
This 10,400mAh power bank will let you recharge your smartphone or tablet anywhere and weighs just 241g.

[ BEST WIRELESS HARD DRIVE ]  
**WD My Passport Wireless Pro 3TB**

\$449 | [www.wd.com](http://www.wd.com)  
A great way to share and back up your files anywhere, plus it has Plex media streaming.

[ SMARTPHONE VR HEADSET ]  
**Kaiser Baas VR-X Headset**

\$50 | [www.kaiserbaas.com](http://www.kaiserbaas.com)  
This universal VR headset is a low-cost way to get in on the smartphone VR revolution and is comfortable.

[ BEST MOBILE GAMEPAD ]  
**iPega PG-9025**

\$25 | [www.dx.com](http://www.dx.com)  
You'll need to buy it online, but this gamepad is nice and responsive, and works with both iOS and Android.

[ BEST BUDGET ]  
**Toshiba Canvio Basic 1TB**

\$90 | [www.toshiba.com](http://www.toshiba.com)  
A compact portable hard drive with USB 2.0, 3.0 and backward compatibility.

[ BEST VALUE ]  
**Seagate Backup Plus Ultra Slim 2TB**

\$155 | [www.seagate.com](http://www.seagate.com)  
A neat combination of small size, competitive transfer speeds, fair price and easy-to-use backup software.

[ BEST PERFORMANCE ]  
**Seagate Backup Plus Fast 4TB**

\$390 | [www.seagate.com](http://www.seagate.com)  
This speedy USB 3.0 drive transfers data at up to 220MB/s — twice as fast as most others.

[ NEW ON SHELF ]  
**Western Digital My Passport Ultra 4TB**

\$269 | [www.wd.com](http://www.wd.com)  
A big-capacity drive that isn't too bulky to take with you. The price is decent too.

[ BEST SMARTWATCH FOR ANDROID ]  
**Pebble Time Steel**

US\$199 | [getpebble.com](http://getpebble.com)  
This colour e-paper smartwatch has great battery life and one of the most mature app ecosystems.

[ BEST SMARTWATCH FOR IOS ]  
**Apple Watch 2**

From \$529 | [www.apple.com/au](http://www.apple.com/au)  
Expensive, but with better fitness-tracking and waterproofing, this is a great smartwatch for exercisers.

[ BEST FITNESS BAND ]  
**Fitbit Charge 2**

\$235 | [www.fitbit.com](http://www.fitbit.com)  
A refinement on the Charge HR, this bigger tracker does all-day heart-rate and automatic sleep tracking.

[ BEST EXERCISE HEADPHONES ]  
**Jabra Sport Pulse Wireless**

\$250 | [www.jabra.com](http://www.jabra.com)  
These in-ear buds connect to your phone via Bluetooth and have integrated heart-rate monitoring.

[ BEST BUDGET ]  
**ViewSonic VX2457-mhd**

\$175 | [www.lg.com/au](http://www.lg.com/au)  
This 24-inch 1080p matte-finish display is great for gaming with a 75Hz refresh rate and FreeSync support.

[ BEST VALUE ]  
**Dell S2316H**

\$279 | [www.dell.com/au](http://www.dell.com/au)  
An affordable glossy 1080p 23-inch that, despite the low price, still offers IPS and great image quality.

[ BEST PROFESSIONAL ]  
**AOC U3277PWQU**

\$870 | [www.aocmonitorap.com/au](http://www.aocmonitorap.com/au)  
This 31.5-inch 4K display is design-ready with a 10-bit panel and great colour accuracy.

[ BEST GAMING ]  
**ASUS RoG Swift PG348Q**

\$1,779 | [www.asus.com/au](http://www.asus.com/au)  
A 34-inch IPS monster with a 3,440x1,440 res, Nvidia G-Sync support and a 100Hz refresh rate.

[ BEST BUDGET ]  
**Tt eSports Poseidon ZX**

\$99 | [www.au.ttesports.com](http://www.au.ttesports.com)  
This basic compact board still has it where it counts, with solid performance and comfortable keys.

[ BEST VALUE ]  
**Logitech G710+**

\$130 | [www.logitech.com](http://www.logitech.com)  
This brown switched mechanical gaming keyboard is comparatively quiet and has great key feel.

[ BEST PREMIUM ]  
**Corsair Vengeance K95 RGB**

\$230 | [www.corsair.com](http://www.corsair.com)  
Available in multiple switch colours, the K95's backlighting can be customised in almost any shade.

[ BEST LAPBOARD FOR LOUNGE-ROOM USE ]  
**Razer Turret**

\$220 | [www.razerzone.com](http://www.razerzone.com)  
This lapboard is sleeker than most, with a magnetised mousepad to help keep the included mouse grounded.

[ BEST BUDGET ]  
**Microsoft LifeChat LX-3000**

\$35 | [www.microsoft.com.au/hardware](http://www.microsoft.com.au/hardware)  
A cheap basic USB headset with noise-cancelling tech.

[ BEST VALUE ]  
**HyperX Cloud Revolver**


\$130 | [www.hyperxgaming.com](http://www.hyperxgaming.com)  
This is monstrously good value, with a wide soundscape, great comfort and options for both 3.5mm and USB.

[ BEST PERFORMANCE ]  
**Audio-Technica ATH-AG1**

\$349 | [www.audio-technica.com.au](http://www.audio-technica.com.au)  
A super-comfy headset with massive drivers and fantastic sound.

[ NEW ON SHELF ]  
**Kingston HyperX Cloud II**

\$160 | [www.kingston.com](http://www.kingston.com)  
These affordable cans sound great across games, music and movies.

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| <b>[ BEST BUDGET ]</b><br><b>Logitech G402 Hyperion Fury</b><br>\$49   <a href="http://www.logitech.com">www.logitech.com</a><br>A hybrid-sensor gaming mouse with optical, gyro and accelerometer tracking, this one doesn't skip a beat. | <b>[ BEST VALUE ]</b><br><b>Razer DeathAdder Chroma</b><br>\$65   <a href="http://www.razerzone.com/au-en">www.razerzone.com/au-en</a><br>This super-comfy ergonomic mouse for right-handers has a great, organic-feeling sensor.         | <b>[ BEST AMBIDEXTEROUS ]</b><br><b>SteelSeries Sensei RAW</b><br>\$80   <a href="http://www.steelseries.com">www.steelseries.com</a><br>Ditching unneeded features, this is a lean, mean headshotting machine that's good for lefties and righties. | <b>[ BEST WIRELESS ]</b><br><b>Logitech G900 Chaos Spectrum</b><br>\$200   <a href="http://www.logitech.com">www.logitech.com</a><br>It ain't cheap, but this is the best wireless gaming mouse we've used; surprisingly light and well balanced.          |
|   |    |   |   |
| <b>[ BEST BUDGET ]</b><br><b>Canon Pixma MG2960</b><br>\$49   <a href="http://www.canon.com.au">www.canon.com.au</a><br>An inkjet that can print, scan and copy in colour, send faxes, has Wi-Fi and can AirPrint and Google Cloud Print.  | <b>[ BEST VALUE ]</b><br><b>Epson WorkForce WF-3620</b><br>\$189   <a href="http://www.epson.com.au">www.epson.com.au</a><br>This inkjet prints, copies, scans and faxes in colour and B&W, has inbuilt Wi-Fi and an Ethernet connection. | <b>[ BEST PHOTO PRINTER ]</b><br><b>Epson Expression Premium XP-720</b><br>\$230   <a href="http://www.epson.com.au">www.epson.com.au</a><br>Creates fantastic-quality photo prints at a relatively affordable price.                                | <b>[ BEST SMALL-BUSINESS LASER ]</b><br><b>HP Colour LaserJet Pro MFP M277dw</b><br>\$450   <a href="http://www.hp.com.au">www.hp.com.au</a><br>Built-in wireless, duplex print and scan, cloud and mobile print, and great print quality at a fair price. |
|   |    |    |   |
| <b>[ BEST BUDGET ]</b><br><b>ASUS DUAL-GTX1050TI-4G</b><br>\$245   <a href="http://www.asus.com/au">www.asus.com/au</a><br>You'll get respectable 1080p/Normal gaming performance from this affordable GeForce GTX 1050 Ti card.           | <b>[ BEST VALUE ]</b><br><b>Gigabyte N1060WF20C-3GD</b><br>\$310   <a href="http://www.gigabyte.com.au">www.gigabyte.com.au</a><br>If you want 1080p with all the bells and whistles, this 3GB GTX 1060 is the card to go for.            | <b>[ BEST PREMIUM ]</b><br><b>Sapphire Nitro+ Radeon RX 480 4GB</b><br>\$380   <a href="http://sapphiretech.com">sapphiretech.com</a><br>AMD's made VR a little more affordable with its new RX 480 — this is one of the cheapest variants.          | <b>[ BEST EXTREME ]</b><br><b>ASUS DUAL-GTX1070-O8G</b><br>\$625   <a href="http://www.asus.com/au">www.asus.com/au</a><br>One step down from the new king, this card is a little more affordable and beats the last-gen leaders.                          |
|   | <b>NEW ENTRY</b><br>   | <b>NEW ENTRY</b><br>  |   |
| <b>[ BEST BUDGET ]</b><br><b>ASUS B150M Pro Gaming</b><br>\$145   <a href="http://www.asus.com/au">www.asus.com/au</a><br>A great companion for the Pentium G4400; this has everything you need for under \$150.                           | <b>[ BEST VALUE ]</b><br><b>ASUS Prime Z270-P</b><br>\$220   <a href="http://www.asus.com/au">www.asus.com/au</a><br>This low-cost Z270 board has all the basics you need, including Intel LAN and 7th-gen Core i support.                | <b>[ BEST PREMIUM ]</b><br><b>Gigabyte Aorus Z270X-Gaming 5</b><br>\$320   <a href="http://www.gigabyte.com.au">www.gigabyte.com.au</a><br>A great match for the i5-7600, with lots of useful features at a fair price.                              | <b>[ BEST EXTREME ]</b><br><b>ASRock X99 Taichi</b><br>\$390   <a href="http://www.asrock.com">www.asrock.com</a><br>This (slightly) cheaper X99 board is still feature-packed and a good match for the i7-6800K CPU.                                      |
|   | <b>NEW ENTRY</b><br>   | <b>NEW ENTRY</b><br>  |   |
| <b>[ BEST BUDGET ]</b><br><b>Intel Pentium G4400</b><br>\$85   <a href="http://www.intel.com">www.intel.com</a><br>An extremely overclockable dual-core Skylake CPU for those looking to build budget rig.                                 | <b>[ BEST VALUE ]</b><br><b>Intel Core i5-7600</b><br>\$320   <a href="http://www.intel.com">www.intel.com</a><br>This new 7th-gen Core i5 chip offers great performance with low power use.  | <b>[ BEST PREMIUM ]</b><br><b>Intel Core i7-7700K</b><br>\$520   <a href="http://www.intel.com">www.intel.com</a><br>The top chip from Intel's new 7th-gen Core i series offers lots of speed for those who need it.                                 | <b>[ BEST EXTREME ]</b><br><b>Intel Core i7-6800K</b><br>\$580   <a href="http://www.intel.com">www.intel.com</a><br>This new six-core 'Broadwell-E' chip offers top-shelf performance (at a top-shelf price).   |
|   |    |   |   |
| <b>[ BEST BUDGET ]</b><br><b>SanDisk SSD Plus 120GB</b><br>\$65   <a href="http://www.sandisk.com">www.sandisk.com</a><br>If you just need a basic SSD, this 120GB model does the job for not much cash.                                   | <b>[ BEST VALUE ]</b><br><b>OCZ Trion 150 480GB</b><br>\$190   <a href="http://www.ocz.com">www.ocz.com</a><br>480GB is now the sweet spot for cost-per-gig and this SATA model is a solid all-rounder.                                   | <b>[ BEST PREMIUM ]</b><br><b>Samsung 850 EVO 1TB</b><br>\$425   <a href="http://www.samsung.com/au">www.samsung.com/au</a><br>This successor to the 840 EVO offers the best mix of speed, capacity and price for those with big needs.              | <b>[ BEST EXTREME ]</b><br><b>Samsung 960 Pro M.2 (512GB)</b><br>\$470   <a href="http://www.samsung.com/au">www.samsung.com/au</a><br>It's pricey, but with 3TB/s read and 2TB/s write speeds, this M.2 drive is stupid-fast.                             |

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[ RIDDIKULUS! ]

# The confounding world of ridiculous tech

WE SCOUR THE DARK AND OFTEN PERVERTED CORNERS OF THE INTERNET TO BRING YOU THE WEIRDEST TECH AROUND. YOU MAY WANT TO BRING A SICK BOWL OR A BOX OF TISSUES TO CRY INTO...

[ CARMEL SEALEY ]

## OhRoma

INCLUDING YOUR NOSE WITHIN THE VR EXPERIENCE

[www.camsoda.com/labs/ohroma](http://www.camsoda.com/labs/ohroma)

The internet was made for porn and virtual reality was... also made for porn. But there's something missing in the whole VR experience (apart from touch). Smell. A couple of weeks ago, CamSoda announced an upcoming gadget named the OhRoma — a “sensory mask” that users would wear in addition to their VR headset of choice. The device comprises two canisters with three interchangeable cartridge slots, which can be filled with all manner of mostly erotic smells; for instance, private parts, body odour, panties and aphrodisiacs. Attempting to provide a more “immersive experience”, the OhRoma is, let's face it, just another sex toy. However, if it could be harnessed for good, you could instead smell dirt and grass in *Minecraft VR*, blood in *Surgeon Simulator* and sweat or fear itself in *Keep Talking and Nobody Explodes*.



## Umbrella drone

SING IN THE RAIN AND KEEP DRY, WITH A DRONE

[tinyurl.com/tla61-umbrella](http://tinyurl.com/tla61-umbrella)

It's raining: you haven't had a raincoat since you were a child and you left your umbrella at work. Shucks. This incredibly ridiculous bit of tech is literally an umbrella mounted on a drone, which follows you by tracking your phone's GPS signal. It's apparently perfect for walking the dog, bike riding, watching sport and getting from A to B with a cup of coffee. The battery will last up to 30 minutes (not ideal for most sports, actually) and it has built-in collision avoidance tech, so it won't hit street signs, power lines or trees. We're intrigued as to how well this Phantom 4 drone + umbrella handles torrential rain and wind. (Will it hover above you, therefore not actually covering you when the rain is coming at you sideways?) Still, \$2,170 is cheaper than having surgery to attach an extra arm so you can carry your coffee, briefcase *and* umbrella...



## KISSENGER

A LONG-DISTANCE KISSING SIMULATOR

[kissenger.mixedrealitylab.org](http://kissenger.mixedrealitylab.org)

Presumably for people who really miss their partners (or have forgotten how to make out with their own hands — that's still a thing, right?), this peculiar device consists of “high precision force sensors” which detect the shape and pressure of the kiss that you plant on the silicon pad. It then sends your kiss signature to your partner, who you've somehow managed to convince to buy their own Kissenger, and the kiss is replicated on their own silicon pad. This is meant for couples and families, but eerily also for celebrities and their fans. So if plastering your walls with your idol's face isn't enough for you, maybe they'll be able to send you a digital kiss sometime in the future.



## SELFIE TOASTER

BURN YOUR FACE INTO YOUR BREAD

[tinyurl.com/tla61-toaster](http://tinyurl.com/tla61-toaster)

Bringing a whole new meaning into ‘good enough to eat’, the Selfie Toaster is a device that possesses special stainless steel inserts that can be personalised in a cut-out style picture of your face. These inserts are crafted by the manufacturer from a picture you give them, so choose wisely. Once arrived, you place the inserts on either side of your bread slice and press go. However long you like your toast to burn later, voila! your face is on your food. The good thing about this gadget is that, if you realise later that you actually don't think it's that funny anymore, the toaster by itself works perfectly fine.



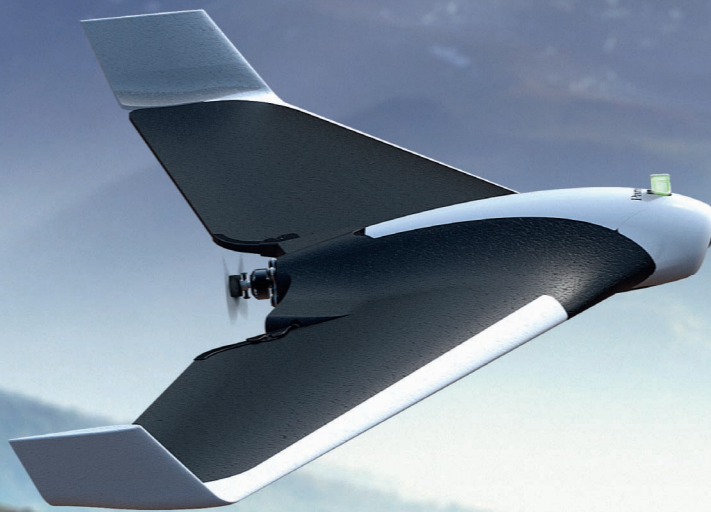
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