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with HR Monitors

Privacy and
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Tech Awards
Editor's Choice

HW

SINGAPORE

MARCH 2017

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THE POWER TO DECIDE

WHEN RETRO IS BETTER

APPLE AIRPODS:

The future
of audio is
wireless

HUAWEI MATE 9:

Go big,
go long

AND MORE

THE WORLD MOVES CLOSER TO ZERO DARK

The Doomsday
Clock is the
closest it's been
to calamity
in over 60
years

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ED'S NOTE

MARCH 2017



Gadgets of future past

It's that time of the year again for our very own little tech Oscars celebration. That's right, I'm talking about the HWM+HardwareZone.com Tech Awards. We're into our 8th year of the awards now and as customary, we'll be spending the next two issues commemorating our winners. While we were on the topic of best products and innovations, I thought it would be fitting to take a look at how the world always comes full circle, where retro becomes the new hip.

Even technology isn't spared this phenomenon. Sure, we have our ridiculously high-resolution displays, sensor-filled computerized cars (that are sometimes too smart for their own good), and ever growing digital standards that supposedly offer better, clearer, higher accuracy, more defined...everything. But, no matter the progress, there's always a trend to gravitate back towards the 'good old days', where things were more organic, more tactile and just had more soul.

In fact, as I sit here writing this note, I'm getting news notifications that HMD Global will be re-launching the classic Nokia 3310 at Mobile World Congress 2017. And the strategy seems to be working. There is more buzz around the return of the 3310, going by my feeds, than the actual new smartphones announced as part of the Nokia brand's comeback.

Who'd a thunk it?

Zachary Chan
Editor



ON THE COVER ART DIRECTION KEN KOH

All prices quoted in this magazine are in Singapore Dollars (SGD), unless otherwise specified.

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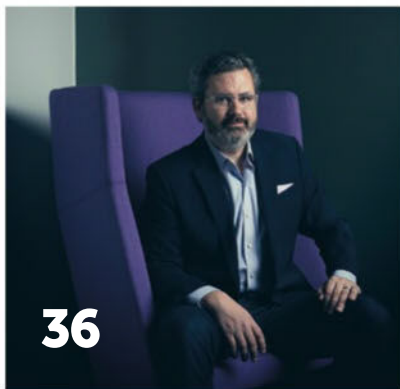


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BEOPLAY A2 ACTIVE

What's better than having a BeoPlay A2? A BeoPlay A2 you can take to the beach with you! The new BeoPlay A2 Active features dust and splash resistance, brand new NATO straps, and a 24 hour battery that can easily be recharged by the USB-C smart charging system so the party can just go on and on.



MORE INSIDE >

ASUS ZENWATCH 3 ROSE GOLD

Swanky round smartwatch, now in a female friendly color.

RESSENCE TYPE 1 SQUARED

Not a smartwatch, but not traditional either.

SONY BRAVIA A1

LG is finally getting some major competition with Sony's new range of OLED TVs.

ASUS ZENWATCH 3 ROSE GOLD

If you're into round-faced smartwatches, you'd be pleased to know that the ZenWatch 3 just got its new Rose Gold variant. The watch was previously available at launch, but only in Silver and Gunmetal. The watch itself uses a Qualcomm Snapdragon Wear 2100 processor and a 1.39-inch AMOLED display with 400 x 400 pixels resolution with up to 50 customizable watch faces.



SONY MDR-XB950N1

The latest Sony MDR-XB950N1 headphones pack 40mm drivers with active noise-cancelling features, a built-in mic, and support for their proprietary app. It also compatible with AptX and AAC audio codecs, and the wireless headphones can still function as a normal wired pair after it runs out of its expected 22-hour long battery life.





BESEYE PRO

The Beseye Pro surveillance camera records events with a 2.38mm 2-megapixel lens with HD resolution (720p), 125-degrees field of view, and an aperture of f/2.2 supported by digital zoom. Its biggest feature is the integrated Artificial Intelligence support, which gives the camera facial recognition, people detection, and soon, video summary functionality. Combined with machine-training, the Beseye Pro can recognize specific persons to detect unfamiliar trespassers, and notify the user via its smartphone app.



BANG & OLUFSEN COOL MODERN COLLECTION

The Cool Modern Collection reintroduces Bang & Olufsen classics in brass tones and royal blues. Inspired by contemporary interior design and Art Deco, this permanent collection blends the art of stylish living with the best of audio technology.

HP SPECTRE X360

The HP Spectre x360 that sports a 7th generation Intel Core i7-7500U CPU, with 16GB of DDR4 system memory. It also features NVIDIA GeForce GTX 940M graphics chipset with 2GB of DDR5 video memory. Its storage consists of a 256GB PCIe NVMe M.2 SSD. Its 15.6-inch, touch-enabled, ultra HD display sports a narrow bezel and has a maximum resolution of 3,840- by 2,160 pixels.



SONY BRAVIA A1

The Bravia A1 is Sony's first 4K HDR TV to use OLED technology. With no traditional speakers to be found anywhere (the whole screen vibrates to generate sound), super-tiny bezels, and a stand that's well hidden from view, all you can see on the A1 is what really matters most: the content.



DELL XPS 13 2-IN-1

It has taken a long while, but Dell has finally launched its premium convertible notebook in the form of the new XPS 13 2-in-1. This new notebook features Dell's signature InfinityEdge display with ultra-thin bezels, which makes it the most compact 13-inch convertible notebook available. The notebook also features Intel's newest Kaby Lake processor and Dynamic Power Technology, which automatically ramps up clock speeds for the times when you need extra grunt. Finally, the XPS 13 2-in-1 comes with two USB Type-C ports with support for Thunderbolt 3.





KLIPSCH R-15PM

With integrated Phono pre-amp and Bluetooth support as well as USB, digital optical and 3.5mm audio jack inputs, the R-15PM speakers from Klipsch are truly ready to rock right out of the box. Just hook up your favourite music source and you're good to go.

A photographer's camera

The latest cameras from FUJIFILM come with new 24.3MP sensors and improved autofocus.

01.

A NO-COMPROMISE CAMERA FOR EVERY ONE

The FUJIFILM X-T20 is a lot of camera for its size. While the X-T2 still holds the flagship title, it's a professional camera that might be overkill for everyday users (you don't really need a headphone socket, for example, if you're just shooting holiday videos). The X-T20 however, packs many of the same features, in a compact size that's easier to carry.

The X-T20 has the same high-resolution 24.3MP X-Trans III sensor and advanced autofocus system, plus it shoots UHD 4K video at up to 30fps. The 3" tilting touch-screen lets you shoot and playback images easily, with its intuitive touch controls.

The X-T20 also ships with a 2.36M-dot OLED viewfinder, an integrated pop-up flash, as well as built-in Wi-Fi to transfer images to your smart device.

FUJIFILM X-T20

01



02.

IN LOVE WITH THE MOMENT

The FUJIFILM X100F is the fourth-generation of the company's now classic X100 series cameras. The rangefinder-style fixed-lens camera is perfect for the street or travel photographer who prefers a lightweight, but powerful companion to capture candid pictures of perfect light and moment.

The X100F comes with the latest 24.3MP X-Trans III sensor and advanced autofocus system that's found in the flagship X-T2, with an increase of AF points from 49 to 91. An AF joystick makes a first appearance, a joy for photographers who need to switch focus points on the fly. The unique hybrid viewfinder has been improved, with real time parallax correction to enable precise framing and manual focusing.

FUJIFILM X100F

02



FUJIFILM
Value from Innovation

X-T20

QUALITY ON EVERY SHOT

Photo Credit:
MINDY TAN



X-Photographer
FUJIFILM

- 24.3 mp X-Trans CMOS III APS-C Sensor
- 2.36M dot organic EL electronic viewfinder
- 8.0fps continuous shooting and reduced blackout time
- 4K Video Recording
- 1.04M dot tilting touch screen LCD monitor



The X-T20 packs the latest technology into its beautifully designed compact and lightweight body so you get the most from your shots. Offering a full Manual Mode for creative control and a handy Auto Mode that makes it simple to capture a wide range of scenes. Additional features like the tilting LCD monitor and touch screen operation enhanced for intuitive shooting. The X-T20 also offers high-quality 4K video to capture precious occasions in superb detail. Perfect for experienced enthusiasts and beginners alike.



Sensor Processor

X-Trans CMOS III sensor for high quality image

Featuring Fujifilm's X-Trans CMOS III, a 24.3-megapixel APS-C sized sensor renowned for outstanding image quality. The sensor also offers excellent read speed, helps improve camera's response and high-accuracy AF tracking.



4K Video with Film Simulation Modes

Supports 4K video for amazing movie quality with minimal moiré and artifacts. Film Simulation modes are available even while recording 4K video. Settings such as aperture and exposure compensation can be changed during recording.



Tilting LCD & Touch Screen Monitor

Features a 3.0-inch 1.04M-dot tilting TFT color LCD monitor with a 3:2 aspect ratio. Easy to view, even in bright outdoor conditions. Intuitive Touch Screen can operate while shooting to help focus on objects to fast-forward during playback just by swiping the screen.

This is what transformation looks like

The Moto Z and Moto Z Play are more than they first appear.

01.

THIN BODY WITH DEEP POWER

Think thin – really thin. The Moto Z measures a mere 5.2mm deep, making it the world's thinnest premium smartphone. But it's also strong, being made from military aircraft-grade aluminum and stainless steel. The Moto Z's internal strength comes from a powerful Qualcomm® Snapdragon™ 820 processor with 4GB of RAM, and a stunning 5.5" Quad HD AMOLED display that's super fine. A fast f/1.8 lens on the 13MP camera, plus optical image stabilization and laser autofocus, help you take great images, even at night.

Moto Z

01



02.

PLAY THROUGH THE DAY AND NIGHT AND DAY

Built with Moto's longest lasting smartphone battery and powered by a 2.0GHz octa-core processor with 3GB of RAM, you can play your heart out with Moto Z Play. The 16MP camera with laser autofocus is the perfect everyday camera, and the wide-angle, front-facing camera is your best selfie buddy. Enjoy looking at the photos you've taken on the 5.5" Full HD Super AMOLED display, and get up to 45 hours of juice with the 3,510mAh battery that also supports TurboPower charging.

Moto Z Play

02



03.

WHEN THEIR POWERS COMBINE

Moto Mods magnetically combine with Moto Z and Moto Z Play to transform them into new devices. JBL® SoundBoost gives them powerful stereo sound, while the Moto Insta-Share Projector turns them into 70" movie projectors.

The Incipio offGRID™ Power Pack bestows up to 20 hours of additional battery life, and the Hasselblad True Zoom lets you capture images you'd normally miss, with 10x optical zoom and Xenon flash. Last but not least, expand your style with beautifully designed Moto Style Shells, made from materials like real wood and leather.

Moto Mods

03





hellomoto



Awarded to Moto Z™
for its game-changing
Moto Mods function
and design.

motoz with motomods

Instantly transform your Moto Z™ smartphone into an entirely new device.
A movie projector, pro camera, battery powerhouse, stereo speaker and more.

Moto Mods™ – transform your smartphone in a snap.

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NEX #04-55 • Mustafa Centre Basement 2 • Gadget Solution Parkway Parade #B-56, Eastpoint Mall #B1-06 • Hi-Tec Mobile Bugis Junction
#03-24 • Moby Shop Far East Plaza #02-52 • Gain City Marina Square #03-223 to 232

Lenovo



A next-generation router that's easy to set up

With the Linksys EA9500 router, you can get rapid internet speeds even if you're not an IT expert.

LINKSYS EA9500 MAX-STREAM AC5400 MU-MIMO GIGABIT ROUTER

If there's one thing everyone wants, it's a fast internet connection. Slower laptop? That's fine. Heavier tablet? Okay. Slow internet? No way!

To have fast and responsive internet however, you need both a quick internet connect as well as a swift router. The first is easily settled, but the second baffles many people, because traditionally, routers have been full of confusing acronyms and are difficult to set up.

That's where the Linksys EA9500 Max-Stream AC5400 MU-MIMO Gigabit Router comes in. We'll explain the technical jargon in a while, but all you really need to know is that the EA9500 combines the latest in next-generation Wi-Fi technologies – which mean fast internet speeds – and is easy to set up, thanks to the Smart Wi-Fi app.

Chances are, you have more than one device connected to your router, and these devices can be streaming video or playing video games at the same time. That's where MU-MIMO technology comes in useful. MU-MIMO gives each compatible device a dedicated, constant stream of data – almost as if each device gets its own router.

If you live in an apartment, the 2.4GHz channel is usually extremely crowded, which can interfere with your connection. That's why the Linksys EA9500 ships with not just a second, but a third high-speed 5GHz band for combined speeds of up to 5.3Gbps, up to double the AC performance of dual-band.

The Linksys EA9500 also comes with a whopping number of eight Gigabit Ethernet ports, which you can use to connect 4K TVs, game consoles, NAS, or printers, for wired speeds 10x faster than Ethernet.

That's the speed part. Thanks to the Smart Wi-Fi app's intuitive device, you can easily set up and maintain the Linksys EA9500, all from the convenience of your smart device.

“

Linksys MU-MIMO delivers up to 57% greater individual client throughput; up to 40% greater per-client average throughput.

- Tolly test report comparing the Linksys EA9500 to several competing tri-band wireless LAN solutions.



”

SEAMLESS WI-FI NO MATTER HOW YOU MOVE AROUND THE HOUSE

Have you ever been on a video call with your friends or family, moved around the house and experienced lagging, buffering – or worse, had your call dropped? That's an example of how moving between traditional routers and range extenders can cause your Wi-Fi connection to lag or drop.

When you pair the EA9500 with a Linksys Max-stream range extender, the unique Seamless Roaming feature will intelligently switch your device to the strongest Wi-Fi signal, and let you roam around without dropping your connection.

57% *FASTER* THAN THE COMPETITION -

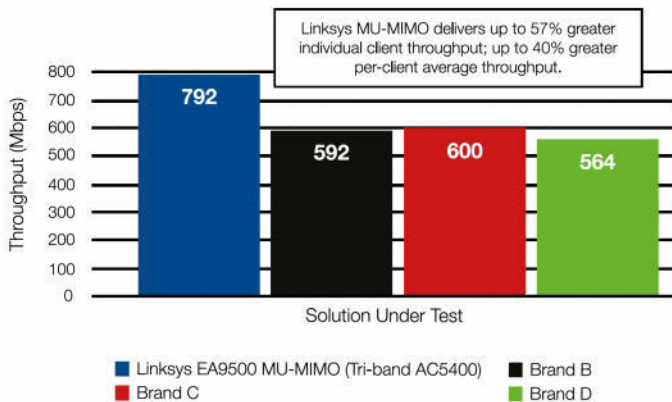
IDEAL FOR

4K/
HD TV



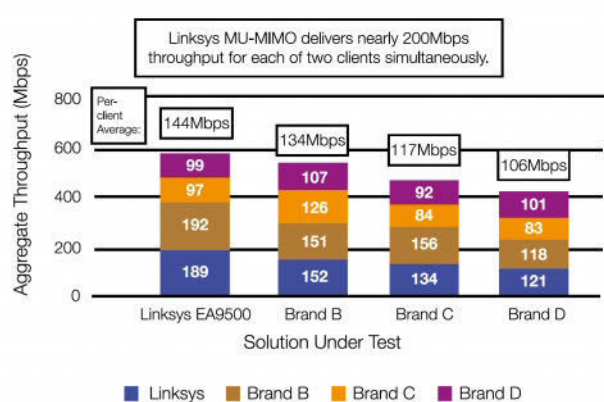
Wireless LAN MU-MIMO Multi-Client Downstream Performance

Four Clients, Line-of-Site Aggregate Performance,
(as reported by Ixia IxChariot v7.10 SP3)



Notes: Tri-band devices provide a single 2.4GHz radio and two 5GHz radios.
All testing used 5GHz band. Average of three runs.

Four Devices, Mixed Distance - Individual Client Performance
(as reported by Ixia IxChariot v7.10 SP3)



Notes: Tri-band devices provide a single 2.4GHz radio and two 5GHz radios.
All testing used 5GHz band. Average of three runs.
See Test Methodology for AP-to-client-distance information.

Source: Tolly, July 2016

1. ONE KEYBOARD TO RULE THEM ALL

The K375s keyboard lets you easily switch between three paired devices at the touch of a button, making it fast and easy to type on your computer, tablet and smartphone, all at the same time. There's even a built-in smartphone stand so you can setup a mobile office wherever you are. [LOGITECH K375S](#)

2. PLUSH NECKBAND, CLASSIC SOUND

The first Bluetooth neckband headphones from Klipsch, the X12X Neckband Bluetooth is perfect for the busy person on the go, with a lightweight steel frame and plush leather neckband for comfort. It uses a single custom KG-926 balanced armature driver that's ported and vented to deliver classic tube amplifier sound even when you're out. [KLIPSCH X12](#)



3. EMBRACING ALTERNATE REALITIES

The ASUS ZenFone AR is proof that not all Google Tango phones have to be hulking phablets. The slim and light 5.7-inch phone is also the first to support both Tango and Google Daydream, so you can skip out to alternate worlds, or augment the current one, if reality ever gets too boring. It is backed by a Snapdragon 821 chip and a whopping 8GB of RAM. [ASUS ZENFONE AR](#)

4. MAC COMES BACK

Well, this is perfect. Elago's W3 charging stand transforms your Apple Watch into the original Macintosh from 1984 (hands up if you were born before). The Watch's display lines up perfectly as the Mac's 'monitor' and is compatible with Nightstand mode. Made from silicone so it doesn't scratch your Watch. [ELAGO W3 APPLE WATCH STAND](#)

5. LUXURIOUS MINIMALISM

One of Mujjo's most popular designs gets updated for Apple's latest MacBook Pros. These sleeves are crafted from a unique combination of full grain vegetable-tanned leather and felt, with luxurious padding for the MBP. An integrated storage compartments keeps your documents, earplugs and other essentials safely. **MUJJO SLEEVE FOR MACBOOK PRO**



6. TRACK YOUR PACK

Bluetooth technology lets you link your mobile devices and your luggage wirelessly with the Incase Luggage Tracker. The app notifies you when your luggage moves out of range (i.e. being stolen) and you can specify the distance when your alarm will trigger. Works up to 50 feet away. **INCASE LUGGAGE TRACKER**



7. X MARKS THE OMEN

The HP OMEN X 35 curved display has a 21:9 aspect format with a maximum resolution of 3,440- by 1,440 pixels. The 35-inch gaming monitor supports NVIDIA G-Sync technology that prevents "tears" at high framerates. Its ultra-wide 1,800R curved AMVA panel has razor-thin bezels on its sides and top edges for more immersive gaming experience. **HP OMEN X 35**



8. SUPERCHARGE YOUR HOME NETWORK

The Synology RT2600ac is an AC2600-class router that supports speeds of up to 800Mbps on its 2.4GHz network and speeds of up to 1,733Mbps on its 5GHz network. But the nifty thing about this router is that it has SMART WAN, which means one of the Gigabit Ethernet LAN ports can double up as a second LAN port. It can act as a fail-safe or used to balanced loads. This is a feature seldom seen even on today's high-end routers. **SYNOLOGY RT2600AC ROUTER**

9. I WANNA GO FAST

The PowerShot G9 X Mark II keeps the same handsome retro look, but shoots at a faster 8.2 frames per second, thanks to a speed bump from the new Digic VII processor. It also adds better autofocus, image stabilization, low-light photo quality, with Wi-Fi, NFC and Bluetooth connectivity.

CANON POWERSHOT G9 X MARK II



10. SUPER CHARGED SKETCHING

Wish there was an easier way to digitize your sketches? With the new Intuos Pro Paper Edition, you can now literally clip a piece of paper to the board, draw and have it automatically converted to digital format when you connect it to a computer. The best part? The tablet itself stores up to 200 pages with unlimited layers, so you can sketch away without needing a computer. **WACOM INTUOS PRO PAPER EDITION**

10



11. STAND AND CHARGE

Wireless headphones are here to stay, and here's an elegant way to charge them. Twelve South's Fermata stand lets you rest your headphones on a soft, contoured leather saddle, and the cable built into the stand has a reversible micro USB connector that lets it charge your headphones easily.

TWELVE SOUTH FERMATA



12

12. PACK IN BLACK

The Citadel DSLR build from Black Ember combines its 25 liter Citadel pack with a 7 liter fanny-pack that's designed to carry and protect DSLR gear. Mods can be attached to the front, sides and shoulder straps of the pack to expand its capabilities.

BLACK EMBER CITADEL + DSLR

13. GREAT SOUND IN A TINY PACKAGE

Able to cover a wide frequency range of 5Hz to 45kHz, the ATH-CR100iS uses an aluminum stabilizer for greater control over the drivers' linear motion, resulting in a controlled response that's faithful to the original sound. Simply put, you get superior sound everywhere you go. **AUDIO TECHNICA ATH-CR70iS**



13

14. NEAT KEYBOARD CARRY

If mini tablet-sized keyboards cramp your style, check out the Canopy from Studio Neat. It's a thin and light cover for the Apple Magic Keyboard that wraps around it, then folds open to become a stand for your iPad. Made from a durable synthetic canvas, with a microfiber interior and classic leather strap. **STUDIO NEAT CANOPY**



14

15



15. FOR 4K BLU-RAY LOVERS

A 4K UHD Blu-ray player designed for the masses, the Sony UBP-X800 supports video streaming services and HDR, and even plays nice with Dolby Atmos and DTS:X compatible receivers. It's Hi-Res Audio certified, so audiophiles can listen their 192kHz/24-bit and DSD 11.2MHz tracks on it too. **SONY UBP-X800**

16. WINDOWS-POWERED MACBOOK ON STEROIDS

The original ASUS ZenBook 3 was billed as a worthy MacBook competitor, and 2017's ZenBook 3 Deluxe cements this position with new Intel Kaby Lake processors, a larger display, and more ports. The new model now features a 14-inch 1080p display and three USB-C ports, two of which support Thunderbolt 3. Key travel distance has also been improved, so you should enjoy a better overall typing experience. **ASUS ZENBOOK 3 DELUXE**



16

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COLOR OF LIFE

Spring is the season of life and renewal, and no color better represents this season than green. Get your wrists dressed for the season with these watches.

by **Kenny Yeo** • Photography by **Jasper Yu**
• Art Direction & styling by **Ken Koh**



**AUDEMARS PIGUET ROYAL OAK
EXTRA-THIN THE HOUR GLASS
LIMITED EDITION**

Dedicated to one of the island's top watch retailers, the Audemars Piguet Royal Oak Extra-Thin The Hour Glass Limited Edition is the first Royal Oak "Jumbo" to come in an 18k yellow gold case and bracelet. But what is really striking about the watch is its dark green dial that shimmers as light falls on it thanks to its unique "petite tapisserie" decoration. \$79,600

**IWC INGENIEUR AUTOMATIC
CARBON PERFORMANCE CERAMIC**

The Ingenieur Automatic Carbon Performance Ceramic is a sporty high-performance watch featuring a strong but light carbon fiber case and an ultra-tough black ceramic bezel. What makes this watch pop is the bright green minute markings on the flange, as well as the green stitching on its matching black rubber strap. \$30,400

**CASIO G-SHOCK
GRAVITYMASTER
GW-A1100KH-3A
MASTER IN OLIVE DRAB**

This G-Shock Gravitymaster GW-A1100 edition comes in a tough olive green resin case and was specially designed to be resistant to extreme g-forces. It is powered by solar energy and features a variety of functions such as world-time, digital compass, chronograph, and it can even receive atomic clock signals to ensure accurate timekeeping. \$879



ORIS DIVERS SIXTY-FIVE

The Oris Divers Sixty-Five is one of the most popular dive watches right now and the brand recently released in a new variant with a deep green dial that is possibly the most attractive yet. Combined with the creamy faux patina hour markers, this variant of the Divers Sixty-Five is dripping with vintage style and swag. \$2,750

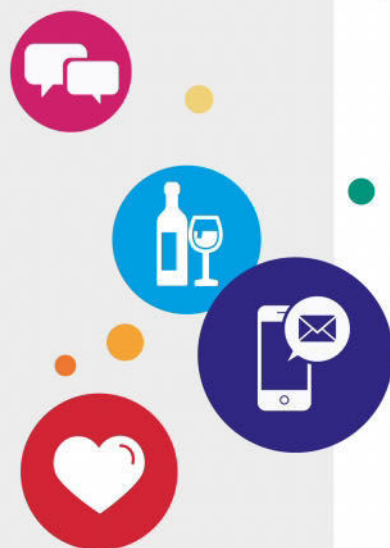
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WHO'S REALLY LISTENING?

When you fire off that text, how sure are you that no one else has their nose in your messaging history?

by Koh Wanzi

■ Last January, *The Guardian* published a piece on a supposed “backdoor” in the messaging app WhatsApp that would allow snooping by the government or other malicious agents. However, after a backlash from security experts, the newspaper amended the headline to refer to a “vulnerability” instead, a more accurate representation since WhatsApp had not actually left a way open for attackers.





However, *The Guardian* chose to leave its story intact, despite an open letter signed by 30 security researchers asking the paper to retract it.

According to these researchers, the article was misleading people into thinking WhatsApp was less secure than it really was, which might lead them to use more vulnerable messaging apps.

If there's one thing the episode showed us, it's that any mention of backdoors or security loopholes strikes a nerve. In the aftermath of the Snowden revelations and persistent headlines about hacking and data leaks, people are understandably concerned about being watched.

But the furor over WhatsApp was a whole lot of white noise that distracted from where the real threats really lie.

This past November, the UK passed the Investigatory Powers Act, a bill giving its intelligence agencies and police vast surveillance powers that are the most extensive in the western world. "It goes further than many autocracies," tweeted Edward Snowden, the NSA whistleblower.

What's disturbing is that the bill was passed quietly, with scant resistance from parliament or outside it. Its effect is the legalization of a wide range of tools for snooping or hacking, allowing security agencies to access stored

personal data and hack PCs and smartphones, even if an individual is not suspected of a crime. Passages within the bill even demand that telecom firms retain data on the web activity of British citizens for 12 months for authorities to access.

Across the Atlantic, the election and inauguration of Donald Trump has raised the specter of further encroachment of privacy. Trump

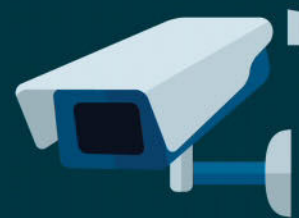
has made statements supporting mass surveillance of targets like mosques, and also previously called for a boycott of Apple's products after the company's refusal to compromise iOS security and help the FBI access the iPhone of the San Bernardino shooter.

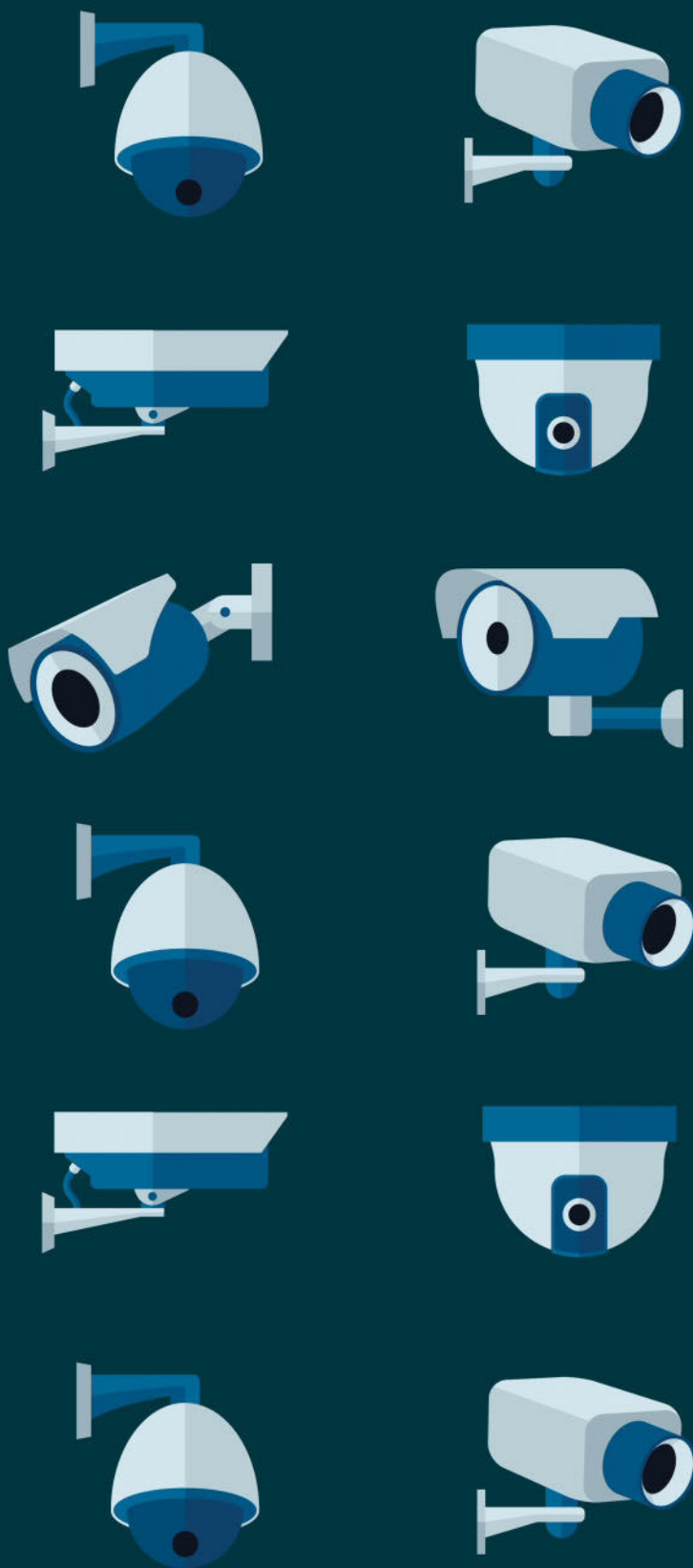
As president, he also has the power to introduce legislation that would give

law enforcement wider access to US citizens' private communications. Worried federal workers have even begun using Signal and other more secure communication tools to express dissent and organize.

Law-abiding private citizens may think they have nothing to worry about, but they'd be missing the point. While we're still a long way off from an Orwellian dystopia, we should be concerned when we find that privacy advocates now have to justify themselves to the government, instead of the other way around.

"Trump has made statements supporting mass surveillance of targets like mosques, and also previously called for a boycott of Apple's products after the company's refusal to compromise iOS security..."





No, you shouldn't stop using WhatsApp

WhatsApp is still the most secure messaging app for regular users today, thanks to its use of the open-source Signal protocol. Here's an example of how it works, and why *The Guardian* was calling it a backdoor in the first place:

1. John sends a message to Mary that is encrypted with Mary's key. We'll call this key K1.

2. The encrypted message is stored on the server until Mary goes online, downloads it, and decrypts it with the associated key.

3. However, if Mary loses her phone and has to get a new one, the new installation of WhatsApp will generate a new key, which we'll call K2.

Two things can happen in this case:

A: The server deletes the stored message since the K1 key no longer exists. Mary will not get to read the message, while John will be notified about Mary's new key, and be given the option to resend the message. This is what the Signal app does.

B: The server tells John's phone about Mary's new K2 key, and asks it to re-encrypt the message using it. This happens without John knowing, and Mary will automatically get the message. This is what WhatsApp does.

The problem is that it's possible to trick the server into thinking that Mary lost her phone, so third-parties could theoretically intercept messages with a new key. However, this is intended behavior on the part of WhatsApp, meant to improve the user experience and reduce the chances of lost messages. It is not a backdoor, and there is a very slim probability that such an attack will take place.



Watch

DO YOU HAVE MERIT?

by Koh Wanzi



Equal opportunity. Meritocracy. Fairness. What if these core tenets of modern, liberal societies no longer applied? That's exactly what 3%, Netflix's first Brazilian original series, sets out to answer.

In 3%, youths who turn 20 have a shot at being part of the three per cent that make it to the Offshore, a utopian haven of wealth and abundance. All they have to do is pass the Process, a grueling trial that tests for intelligence, wits, and cunning. Fail and they're sent back to the Inland, where poverty, squalor, and violence run rampant.

Candidates are brought up to believe that the Process is just and fair, and give thanks for being given the chance to participate. The crux of the matter is that the Process separates the wheat from the chaff, a literal expression of a world that believes there are only two types of people – those with merit, and those without.

Ultimately, 3% raises pertinent questions about our own world. We profess to be equal societies, but are we really? We think we're a classless society, but that's probably not really true either. And while everyone technically has a chance at betterment, the hoops those at the bottom have to jump through are so trying, that those who make it may as well be only three per cent.



THE WORLD MOVES CLOSER TO ZERO DARK

The Doomsday Clock is the closest it's been to calamity in over 60 years.

by Alvin Soon

Every two years a board of scientists, nuclear and climate experts meet to manage the Doomsday Clock, a symbolic instrument that reflects how close humanity is to catastrophe.

In January, the group moved the Clock's minute hand from three to two and a half minutes before midnight, the hour when everything goes dark. It's the closest the Clock has been to the last hour since 1953, the year after the United States and the Soviet Union conducted thermonuclear weapon tests.

After the end of the Cold War between the US and the USSR, the clock had steadily ticked backwards away from danger. But in recent years, it's crept closer to midnight. In 2015, the clock struck three minutes to midnight, the closest it'd been since 1984.

In past years, the board has warned that world leaders were failing to act responsibly on the threats posed by climate change and nuclear war. This year, the board decided to advance the clock closer to midnight largely because of one Donald J. Trump.

As the newly elected US president, the group writes that Trump has "made ill-considered comments about expanding and even deploying the American nuclear arsenal," and "expressed disbelief in the scientific consensus on global warming." The board cautioned that they have never advanced the clocks based on a single person, but when that person is the president of the United States, "his words matter."

Here's hoping we're all still around in 2019, when the board reconvenes to move the Doomsday Clock again.

“The interesting tectonic shift that I saw this year that hasn’t been fully realized, is mobile devices beginning to support RAW capture.”

**Tom Hogarty, Director
of Product Management,
Adobe**



PHOTOSHOP AND THE FUTURE OF PHOTOGRAPHY

What's the next big thing in photography technology?

by **Marcus Wong**

Do you think photographers have a love-hate relationship with Photoshop? On the one hand it makes their life easier, but on the other hand it takes out some of the skill of photography.

I think we've come along at just the right time. Because the art and craft and mastery of learning every tool has somewhat been eroded by people's desire for quick and easy. Expectations around user experience and simplicity have decreased tolerance to spend time on the craft for photographers.

It's subjectively my perception of the industry. But I think our simplification has aligned with people's desire for a simpler Photoshop, so that people can focus on the business of being a photographer, the creativity of being a photographer and not training on how to use software.

What do you see in the near future for photography then?

The interesting tectonic shift that I saw this year that hasn't been fully realized, it's mobile devices beginning to support RAW capture. I think what you'll start to see in the next year is a regeneration of the conversation we had in 2001 to 2002 on what's the value of RAW?

And why should I shoot RAW versus JPEG?

We'll see a whole other generation go through that process. And as we saw with the DSLR market, once people who cared about the quality of their images started shooting to the format, they got hooked. Because the latitude and the things you can do with a RAW file is just outstanding.

And the use of 3D over photography?

I think that's just a natural evolution and we saw it with our own Project Felix. Photographers will probably just pick it up as one more tool; it's the fundamental knowledge of light and composition that they can apply to video or 3D.

Finally, what's the one tool in Lightroom that everyone should know?

One tool that everyone should know... I think the targeted adjustment tool is very powerful. I'm assuming everyone knows how to use the basic thing, because the power of the tonal controls is incredible. But the next thing after that – moving hue or saturation a little bit for specific tones or for doing black and white conversions? It's a really powerful solution.

EAT, COFFEE, DRINK

A meet-up app for the savvy professional.

by Liu Hongzuo

How would HeyMeet be more advantageous than its rivals?

We try to be the fastest way, from digital to real-life communication, by making it very simple. We focus on three event types: Eat, Coffee, and Drink – things we do every day. Our clear target group is the business district, and that's what we do. Unlike other apps, we focus on business professionals because we feel they have a high willingness and motivation to network for different purposes.

Is a six-hour RSVP time limit for confirming meet-ups sufficient?

The longer you wait, the higher the cancellation rate. I think busy people wouldn't plan lunch or coffee for tomorrow, they'd look at the schedule and go, "For once, I have no lunch plans today, so why don't I create an event and see who's available?" It is more adaptive to their style and how they live, which is very short term, and making easy to fit into their schedules when they need it, without the planning.

While HeyMeet facilitates easier meet-ups, how does it minimize the chance of a bad date or networking session?

A bad meeting would be if you believed that you had the opportunity to use the time in a better way. The investment for me is time, because that's what you bring when you go for Eat, Coffee, and Drink events. If you feel, "I've

went for this event and met these people, and I would have been better off eating on my own at my desk, or meeting my usual colleagues", then, fair enough. For me personally, the events I've gone to, I've met people whom I'd never have met otherwise, and we had interesting conversations.

HeyMeet focuses on F&B establishments for meet-ups and there are tie-ups. Can you explain how it all works?

It works in two ways. One, F&B establishments can put up deals for people who create HeyMeet events at their place, making it more interesting for our users to choose certain locations for their meetings. Two, we allow the F&B establishments to create their own events. They can take up to 10 people per listing, set it at a certain time, give discounts, add a theme.

Are your users more inclined towards casual meet-ups, or do they favor networking for work?

We've only been out for less than a month – we're very happy with the pickup (rate) so far, downloads were a bit above expectations. We obviously know that a casual meet-up through an app is a better-known concept, right? That's what people adapt to in the beginning. We see a majority of our users trying out casual meet-ups at the moment, and we have a clear target: to establish HeyMeet for the business world.



“Unlike other apps, we focus on business professionals because we feel they have a high willingness and motivation to network for different purposes.”

***Erik Lorenz, Founder,
HeyMeet Pte Ltd***

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WHEN RETRO IS BETTER

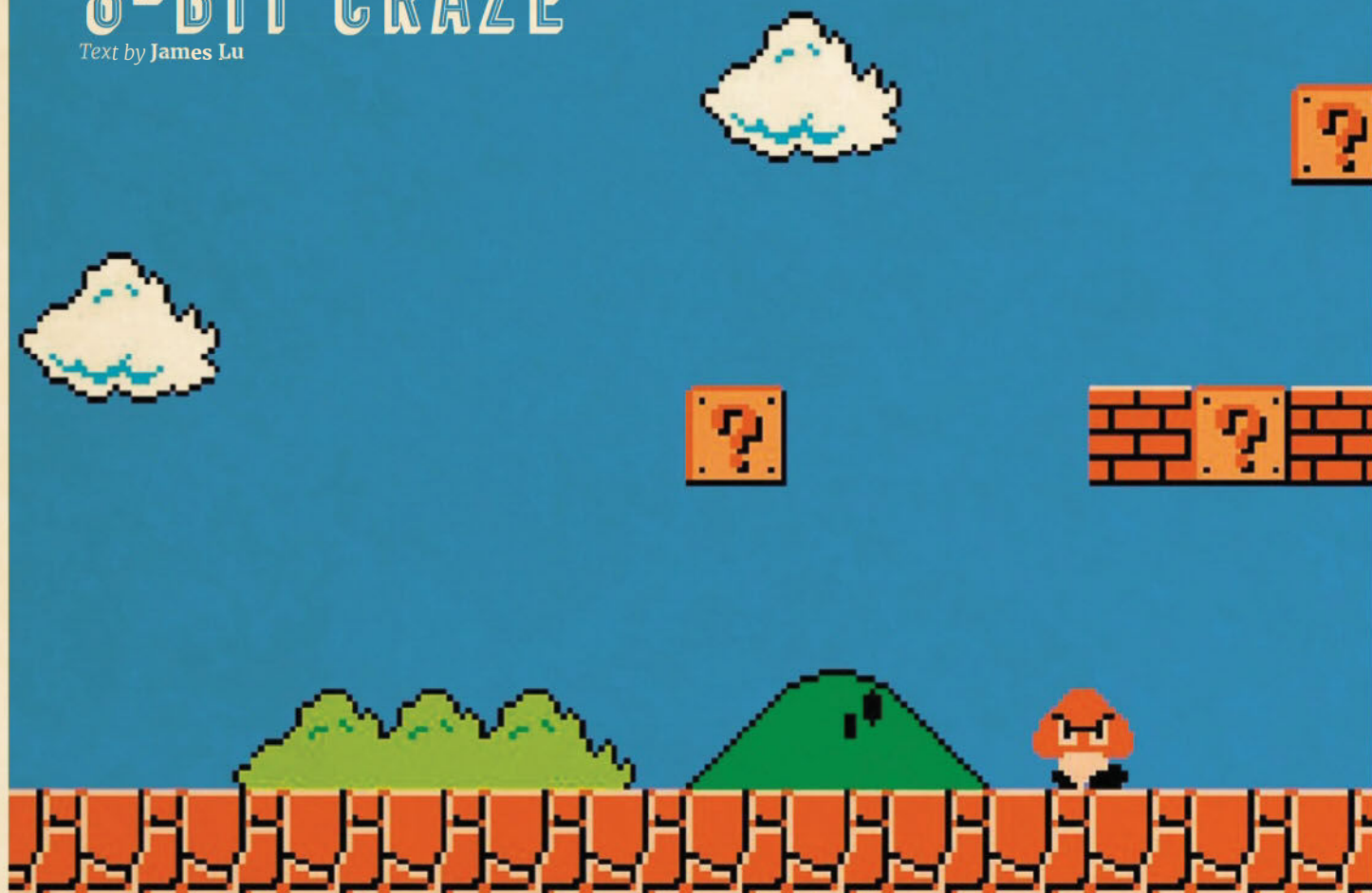
*Why old tech is more
cherished than
ever before.*

by Team HWM

Progress means that newer is better, right? But what if newer doesn't make you happier, instead, it's older tech that warms you up inside? From retro games to vinyl records, from film cameras to manual cars, these old technologies have that certain 'something' that diehard fans are still stubbornly in love with.

8-BIT CRAZE

Text by James Lu



It's a good time to be a gamer. Virtual reality headsets, augmented reality apps, seamless online connectivity, 4K displays delivering billions of pixels a second at 60FPS - video games have never been more realistic or immersive. And yet, one trend can't be denied: retro gaming is on the rise.

Nintendo's miniature-size NES Classic Edition was one of the hottest Christmas presents of 2016, selling out nearly everywhere, with re-sale prices soaring. Meanwhile, rare Atari 2600 and NES cartridges routinely sell for four-figure sums on eBay and an extremely rare copy of Nintendo's Stadium

Events recently sold for a record US\$35,100. But what's the appeal of retro gaming? How can eight bits compete with billions of pixels per second?

For the past decade or so, the top three best-selling games of the year have remained nearly unchanged: *Call of Duty*, *Battlefield*, *FIFA*. You've probably bought at least one of them yourself.

Now think back to your favorite Sega or Nintendo games. From platformers like *Sonic* and *Mario*, to RPGs like *Zelda* and *Final Fantasy*, and even lost genres like side-scrolling fighters like *Golden Axe* or puzzle adventure games like *Monkey Island*, there was a much wider range of games available.

You can still occasionally find games in these genres, but they're mostly relegated to small indie titles from independent studios.

One of the reasons gaming has become so dominated by FPS and sports titles is because these games are ideal for multiplayer, and it's hard to find a game today that isn't made with multiplayer gaming in mind.

Call of Duty and *Battlefield* have single-player campaigns, but they're generally around six or seven hours in length, and the bulk of the game is the multiplayer experience. Some triple A titles like *Titanfall 1* forego the single player campaign altogether.

But look back a few decades

"NINTENDO'S MINIATURE-SIZE NES CLASSIC EDITION WAS ONE OF THE HOTTEST CHRISTMAS PRESENTS OF 2016, SELLING OUT NEARLY EVERYWHERE, WITH RE-SALE PRICES SOARING. MEANWHILE, RARE ATARI 2600 AND NES CARTRIDGES ROUTINELY SELL FOR FOUR FIGURE SUMS ON EBAY."

when online connectivity wasn't a thing and you'll find a completely different experience. Entirely single player games like *Zelda* and *Legend of Mana* delivered some of the deepest and most tightly tuned gaming experiences ever.

Even when a modern game does focus on the single player experience, that experience has changed. It costs a lot of money to make a video game, so it makes sense that developers want that game to appeal to a wider, more casual audience.

Consider this: in the original *Super Mario Bros*, you had three lives; you could gain more from 1ups scattered around levels, but once you lost them all, that was

it, you had to start all over again.

In *New Super Mario Bros Wii*, if you die eight times in a row, a green '!' block appears, hit that and a system-controlled Luigi will arrive to escort you through the rest of the level.

This isn't necessarily a bad thing, but with the exception of certain titles like *Dark Souls*, modern games are less challenging to serious players, and without that challenge, you don't get the same sense of achievement when you beat the game. And of course, video games are all about achievements.

Best of both worlds - modern video games with retro vibes

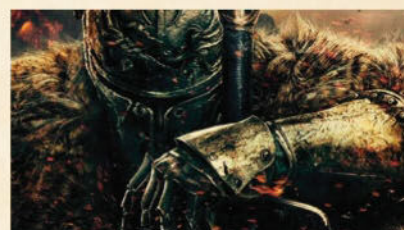
DOOM (2016)

Forget regenerating health, cover systems and friendly AI squad mates, *Doom* is a throwback to old school FPS gaming where it's just you, some huge guns and a limited amount of ammo against the hordes of hell. For extra nostalgia, each level has a hidden lever you can pull to access one of the classic levels of the original 1993 *Doom*, rebuilt in all of its pixelated glory.



DARK SOULS

The *Dark Souls* series has built a reputation as one of the hardest modern video games around. But just like notoriously difficult old school video games *Ninja Gaiden* and *Contra*, the seemingly unbeatable bosses actually have predictable movesets. Master those patterns and they'll go down easily.



OBDUCTION

Obduction is a throwback to point and click exploration puzzle games like *Myst*. *Obduction* may seem slow-paced by today's standards with no weapons, nothing to kill and not even a way to die yourself, but the atmospheric slow burner's gorgeous environments and mysterious setting offers an entirely different style of gameplay.



It's pretty obvious that digital photography has landed heavy blows on film and left it for dead, but it appears that film still has some fight left in it. At CES 2017, for example, Kodak Aliris announced that it was relaunching Ektachrome, a color reversal film that was discontinued in 2012.

While film sales are a mere fraction of what they once were, Kodak, Fujifilm and Harman Technology (which makes the Ilford Photo films) told *Time* magazine that film sales have actually been growing, albeit slowly, in the last two to three years.

What's more surprising is that Fujifilm's instant photography cameras have outsold their digital cameras in recent years. In 2015, Fujifilm estimated it sold 5 million Instax cameras, more than the 1.4 million digital cameras it sold in the same period. The company is estimating that film sales actually went up in 2016, with more than 6.5 million Instax cameras sold.

For some photographers, film never went away. When *National Geographic* asked photographers to pick their favorite cameras, three out of ten picked a film camera. They cite common

reasons; shooting film forces them to slow down, to spend more time observing the scene and connecting with their subjects.

For other photographers who started in digital, it's the joy of discovering a whole new medium of photography. There's just something about the look of film that you don't get in digital; the highlights roll off smoothly rather than blowing into hard white, grain is chaotically imperfect rather than algorithmically patterned, and the colors are more reminiscent of paintings than digital footage.

FILM IS (NOT) DEAD

Text by Alvin Soon



PICTURE LOMO

Film, of course, has its limits. It's more expensive than digital per shot, you can shoot far less on a single roll than on an SD card, you can't preview your images to see if you've nailed your exposure or are blowing it, and it takes far more time to develop than plugging in your camera to a laptop.

For all the nostalgia about going back to film, it isn't going to make a critical dent in film's trending decline. Ektrachrome may be coming back, but Kodak's popular Kodachrome isn't. Fujifilm seems to be killing off more classic films every year. And the infrastructure

required for a healthy film industry; developers, expert labs, etc., has gone away and isn't going to return.

So, film isn't dead, but it's not the robust force it once was. And yet, for all its imperfections — some say, *because* of its imperfections — there's just something about film that you can't get with digital. Whether for nostalgia, aesthetics or as a niche business, film is still hanging on in there with its ardent practitioners.

"THERE'S JUST SOMETHING ABOUT THE LOOK OF FILM THAT YOU DON'T GET IN DIGITAL; THE HIGHLIGHTS ROLL OFF SMOOTHLY RATHER THAN BLOWING INTO HARD WHITE, GRAIN IS CHAOTICALLY IMPERFECT RATHER THAN ALGORITHMICALLY PATTERNED."

Get started with film

NIKON FM2

First released in 1982, the FM2 is a professional film camera with a reputation for being a tough workhorse. It's fully manual, so be prepared to go hands-on. The FM2n or the FM2T are slight variations of the camera.



LEICA M7

If you have the coin for them, Leica still makes brand new film cameras. The M7 is a 35mm film rangefinder, which means that you compose via a separate viewfinder, not through the lens like an SLR.



MAMIYA RZ67 PRO II

Digital medium format cameras still cost an arm and a leg, but film medium format is far more affordable. One way to start is with the Mamiya RZ67 Pro II, it's heavier than a twin-lens reflex, but lets you swap lenses.



LOMOGRAPHY LC-A+

Lomography cameras are a fun and relatively inexpensive way to start taking funky, experimental film shots. The classic LC-A+ has a solid metal body and comes with the original Minotar-1 glass lens.



WORSHIPPING AT THE CHURCH OF THE THIRD PEDAL

Text by **Kenny Yeo**



Last year, Porsche released a limited edition variant of its best-selling 911 sports car called the 911 R. It was priced at around £136,901 and only 991 were made. It sold out very quickly. Now the car is exchanging hands for triple or even quadruple its original price. Some are even believed to have been sold for over £1 million. This sort of appreciation is unheard of for a new car. So what is it about the 911 R that makes it so desirable? The reason is quite simple: of all the new 911 models, it is the only one that comes with a naturally aspirated engine and a manual transmission.

The combination of a naturally

aspirated engine and a manual transmission is one that many petrolheads cannot resist. For those whose main concerns are 0-100km/h timings and flat out top speed, it is hard to understand why. After all, many of the fastest cars in the world today, like the McLaren P1, Bugatti Veyron, and Koenigsegg One:1, are all a) turbo-charged and b) have automated dual-clutch transmissions. That said, purists would argue that there are few things in this world that are as enjoyable as driving a naturally aspirated sports car with a manual transmission.

Even so, there can be no debate that modern automated

transmissions can shift gears faster. In fact, given the same car but with different transmissions, the one with the automated dual-clutch transmission will almost always get to 100km/h first. This is especially true for high performance sports cars. Porsche, for example, says its dual-clutch transmission will be, on average, about 0.4 seconds faster to 100km/h. So why do some drivers insist on the outdated manual transmission?

It all boils down to the level of engagement and interaction when driving. Manual transmissions are completely reliant on their human operators to work. If you don't put the gear stick into first, the car will

"IT ALL BOILS DOWN TO THE LEVEL OF ENGAGEMENT AND INTERACTION WHEN DRIVING. MANUAL TRANSMISSIONS ARE COMPLETELY RELIANT ON THEIR HUMAN OPERATORS TO WORK."



never move. Likewise, if you don't change gears and put the stick into second, the car will always be in first gear. Some drivers crave for this kind of control.

Sure, many automated transmission systems today have some form of a manual-select mode that allows drivers to select gears, but it only gives the illusion of control. Many cars will often take the initiative and limit the gears that the driver can select, or, more annoyingly, override the driver's input if it thinks that the choice of gear is questionable.

It is for these reasons that diehard driving purists love cars with manual transmissions. Want

to move off in second gear instead of first? No problem. Want to accelerate from 20km/h in sixth gear? As you wish. Want to redline through town in second gear at 3am and wake everyone up? Sure thing. Want to damage your engine by shifting down a gear at a higher than appropriate speed? Go ahead.

In a world of increasing rules and regulations, where we are always being told what is best for us and what to do, driving a car with a stick and a third pedal is as refreshing as an ice cold beer on a balmy, hot afternoon.

Our Manual Wish List

HONDA CIVIC TYPE-R

Power output: 306hp / 400nm of torque
0-100km/h: 5.2 seconds

Fans were worried that Honda's latest Civic Type-R would only be offered with a dual-clutch transmission, but Honda ultimately stuck with a six-speed stick shift. Unfortunately, in place of Honda's legendary high-revving naturally aspirated VTEC engine, fans got a high torque, high power turbocharged one instead. But there is a silver lining; thanks to turbocharging technology this is the fastest Civic Type-R ever.



PORSCHE 911 CARRERA S

Power output: 420hp / 500nm of torque
0-100km/h: 4.3 seconds

The Porsche 911 Carrera S might be quicker to 100km/h with the company's insanely fast PDK double-clutch transmission, but who cares when you are having boatloads of fun with the 7-speed stick shifter. Besides, a healthy 420hp and a momentous 500nm of torque is more than enough to make up for your inefficient stick shifting.



SUZUKI SWIFT SPORT

Horsepower: 134hp / 160nm of torque
0-100km/h: 8.7 seconds

The Suzuki Swift Sport is a rarity in today's market, sporting a naturally aspirated engine and a slick shifting 6-speed manual. It might only have 134hp, but its century sprint time is decent and whatever it lacks in power is made up for by its effervescent and perky nature.



Before the world of portable music players, compact discs and cassette tapes, there was vinyl. But despite the wave of digital audio, this age-old format is coming back strong, rather than dying out.

With both analog and digital audio, the recording process involves a microphone turning air pressure differences (sound) into an electrical analog signal that is then recorded. The vital difference though, is in the representation of sound in the medium.

With vinyl, sound is imprinted by cutting a groove into tracks on a record as it rotates; an analog process which is repeated for every copy of the recording made.

This means that the signal from a good vinyl recording can, in theory, perfectly match the recorded source wave.

With digital, the same sound is converted into a series of ones and zeros, resulting in a stepped representation. Obviously this means that some information from the source wave is lost, but today's high resolution audio formats minimize this by using extremely high bit rates (at least 24bit /96kHz) making the gap between steps so small it's indistinguishable.

Technical details aside though, this difference in representation methods is why fans of vinyl claim that it gives a much warmer

sound. And the proof of this is in the numbers. According to *The Guardian*, sales of vinyl records hit a 25-year high in the UK in 2016, with more than 3.2m LPs sold. And that's not even including sales of used records!

In America, regular retail chains like Barnes & Noble, Urban Outfitters and even Whole Foods now stock vinyl records for sale. And you'll find many recent releases are now available in vinyl; some with download codes so you get the digital version too, giving you the best of both worlds.

There are multiple reasons for this, and as with all things audio, it's not all empirical. Being a physical medium, vinyl records are

BACK TO BLACK: WHY VINYL IN TODAY'S HIGH-RES AUDIO WORLD

Text by **Marcus Wong**



PICTURE SONY

subject to scratches and warping – defects that will appear upon playback. To some, these hisses and pops add to the experience, and the imperfection is part of a charm that you will never get from digital.

Listening to vinyl is also as much a physical process as it is aural. You have to first take the record out of its sleeve, physically place the record on the player, and set the stylus on the right track to get it playing. Shifting tracks isn't as simple as just pressing a button, so you're more likely to listen to the entire album the way the artist intended you to.

A listening session is a much more involved process, as it's

not as simple as just hitting play. Every part of the audio chain – from the stylus to the phono preamplifier to the final speakers/headphones can be selected to your liking, so the audio is just the way you want it.

You're also not going to be walking around distracted when listening to a record. So listening to an album is truly that – a listening session that has you immersed in sound. In today's hectic world of multi-tasking, that's a welcome reprieve that should ensure vinyl continues to stick around.

"EVERY PART OF THE AUDIO CHAIN – FROM THE STYLUS TO THE PHONO PREAMPLIFIER TO THE FINAL SPEAKERS/HEADPHONES CAN BE SELECTED TO YOUR LIKING, SO THE AUDIO IS JUST THE WAY YOU WANT IT."



3 turntables for every budget

AUDIO TECHNICA AT-LP60

The AT-LP60 from Audio Technica is built into an anti-resonance die-cast platter and comes with a switchable phono pre-amp that allows you to connect it to a computer, home stereo, or powered speakers. It comes with a copy of Audacity and a USB cable so you can record the vinyls you play straight to your computer.



SONY PS-HX500

Like the AT-LP60, the Sony PS-HX500 also features an integrated phono preamp. What makes it unique is that it has an integrated analog-to-digital processor, so you don't have to rely on the audio card in your computer. Record tracks on the vinyl straight to DSD format! This connects to your computer via USB or to an amplifier via line output, giving you the best of both worlds.



REGA PLANAR 1

Finally, there's the Rega Planar 1, a user-friendly turntable that is stylishly designed. It features a Rega Carbon moving magnet cartridge that is known for tracking records well and producing sound with good detail. If you already have a set of speakers hooked up to an amplifier, all you'll need is a preamp, some records, and you'll be good to go.



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CELEBRATING THE BEST OF THE BEST

We've tested, punished and put 135 products through their paces. So here are the best tech products of 2016, according to us, of course.

Text by **Team HWM**
Art Direction **Ken Koh**

TECH AWARDS 2017

EDITOR'S CHOICE

- BEST NOISE CANCELLING HEADPHONES
- BEST SPORTS ACTIVITY TRACKER
- BEST 360 CAMERA
- BEST SOLID STATE DRIVE



BEST NOISE CANCELLING HEADPHONES

SONY MDR-1000X

Sony's MDR-1000X handily matches and in some situations, beats the noise-cancelling capabilities of the Bose Quiet Comfort 35s, and is amongst the best in the group in terms of sheer audio quality, with only the Sennheiser PXC 550 Wireless offering slightly better audio quality overall. Thus, it comes up tops as the best noise-cancelling headphone for this year.

NOMINEES

AKG 60NC • Audio Technica ATH-MSR7NC • Bang & Olufsen BeoPlay H8
• Beats Studio wireless • Bose QuietComfort 35 • JBL Everest Elite 700
• Plantronics BackBeat Pro2 SE • Sennheiser PXC 550 Wireless



BEST SPORTS ACTIVITY TRACKER

FITBIT CHARGE 2

The Fitbit Charge 2 pulls ahead with a clean execution in features and accuracy. We consider Fitbit's features as well-rounded, accessible, and sensible because of how it's presented, on top of how users can easily find out more about their features through Fitbit – this helps to appeal to a broader range of fitness behaviors and it eases people into adopting a healthier outlook, beyond the gamification of personal high scores.

NOMINEES

Xiaomi Mi Band 2 • TomTom Touch • Samsung Gear Fit2

BEST 360 CAMERA

RICOH THETA S

The Ricoh Theta S wins because it gives you great images in low-light, and handles flaring from bright sources fairly well. The in-camera blending also handled the best, with consistent exposure across images from both front and back cameras, unlike with the competition. It also comes with 8GB of internal memory, so you literally pick it up and start shooting straightaway.

NOMINEES

LG 360 Cam • Samsung Gear 360



BEST SOLID STATE DRIVE

SAMSUNG SSD 960 PRO

For the last few years, Samsung has offered drives with very high performance and cost ratios and the new SSD 960 Pro continues this tradition. Thanks to Samsung's brand new penta-core Polaris SSD controller, the SSD 960 Pro is the ultimate SSD for discerning users with deep pockets. It may be pricey, but it offers unassailable performance, support for hardware encryption, and very high endurance.

NOMINEES

ADATA XPG SX8000 • Plextor M8Pe • OCZ RD400



TECH AWARDS 2017 EDITOR'S CHOICE

- BEST SMARTWATCH
- BEST GAMING GRAPHICS CARD
- BEST MID-RANGE SMARTPHONE
- BEST WIRELESS HEADPHONES
- BEST BUSINESS PROJECTOR
- BEST PORTABLE EXTERNAL DRIVE

BEST SMARTWATCH

APPLE WATCH SERIES 2

The Apple Watch Series 2's feature set is the most comprehensive amongst all smartwatches and its two case sizes and choice of finishes, means there's an Apple Watch to suit all styles. In terms of software, Watch OS 2.0 is both functional and easy to navigate, and there are thousands of third party apps available for it.

NOMINEES

ASUS ZenWatch 3 • Fitbit Blaze • Motorola Moto 360 Sport • Pebble 2 • Samsung Gear S3



BEST GAMING GRAPHICS CARD

ASUS ROG STRIX GEFORCE GTX 1080 OC

Custom NVIDIA GeForce GTX 1080s exist in quite a crowded market, but the ASUS ROG Strix GeForce GTX 1080 takes the lead thanks to its aggressive factory overlocks, attractive looks, and additional user-oriented features like the two 4-pin fan headers. The onboard Aura lighting can be synced with another ASUS motherboard, so you can get a fully color-coordinated rig.

NOMINEES

MSI GeForce GTX 1080 Gaming X 8G • Palit GeForce GTX 1080 GameRock Premium Edition



BEST MID-RANGE SMARTPHONE

ONEPLUS 3T

While previous OnePlus phones had to include some compromises to keep the price low, the OnePlus 3 is flagship-quality through and through, with a premium metal and glass design, powerful top-of-the-line processor, high-end AMOLED display and quality front and rear cameras. OnePlus has also done away with the troublesome invite system, so you won't have any difficulty buying one.

NOMINEES

Huawei Mate 8 • Oppo R9s • Motorola Moto Z Play • Samsung Galaxy A7 (2016) • Sony Xperia XA Ultra • Xiaomi Mi 5 • ZTE Axon 7





BEST WIRELESS HEADPHONES

SENNHEISER MOMENTUM WIRELESS ON-EAR

The Sennheiser Momentum On-ear Wireless stood out with its overall audio quality and features. It produces great detail, especially in the mid-range, and has ample bass oomph too. We loved how it handled classical and jazz pieces, and were surprised at how well it worked with rock pieces. Add to that great comfort as well as excellent battery life and you have an easy winner.

NOMINEES

Beats Solo2 • JBL Everest Elite 300 • Onkyo H500BT • Parrot Zik3.0
• Pendulumic Tach T1

BEST BUSINESS PROJECTOR

NEC MC331W

A 3,300-lumen LCD projector with a 1.2x zoom lens, the NEC MC331W is equipped with two D-Sub and two HDMI inputs. It has a loud 16W speaker, and you project with a flash drive by using its onboard USB port. Image quality-wise, data projections look great and it doesn't suffer from rainbow effects like DLP projectors. If you're looking for a great sub-\$1K projector, this is it.

NOMINEES

Casio XJ-V110W • Sony VPL-DW240



BEST PORTABLE EXTERNAL DRIVE

ADATA SD700

The ADATA SD700 is a rugged, portable external SSD that is dust proof and can stay submerged in up to 1.5 meters of water for an hour. It also passes military-grade MIL-STD-810G516.6 shockproof requirements. These features are handy in a portable external SSD. Beyond its durability, it is also the speediest portable external SSD that we have ever tested.

NOMINEES

Samsung T3



TECH AWARDS 2017

EDITOR'S CHOICE

- BEST WIRELESS ROUTER
- BEST 4K TV
- BEST GRAPHICS CHIP
- INNOVATION AWARD

BEST WIRELESS ROUTER

LINKSYS EA9500 MAX-STREAM AC5400 MU-MIMO GIGABIT ROUTER

The Linksys EA9500 Max-Stream AC5400 MU-MIMO Gigabit router is the winner because of its unbeatable combination of performance and features. On the performance front, it recorded very respectable and consistent numbers across all tested ranges. On the features front, the EA9500 router benefits from having Linksys' excellent Smart Wi-Fi software stack. It also has a whopping 8 Gigabit Ethernet LAN ports.

NOMINEES

D-Link DIR-895L AC5300 Ultra Wi-Fi Router • TP-Link Archer C5400 AC5400 Wireless Tri-Band MU-MIMO Gigabit Router



PICTURES LINKSYS, LG, NVIDIA



BEST 4K TV

LG SIGNATURE G6 OLED TV (65-INCH)

A super-slim OLED TV with a clever integrated folding soundbar, the LG Signature G6 offers stunning picture quality too. Its black level and contrast performances obliterated the best LED-lit LCD TVs out there, and its support for Dolby Vision HDR means your huge investment won't become obsolete so fast. Until HDR titles become commonplace, for everyday movie and TV watching, the G6 is hard to beat.

NOMINEES

Panasonic Viera DX900 • Samsung KS9000 SUHD • Sony Bravia Z9D

BEST GRAPHICS CHIP

NVIDIA GEFORCE GTX 1080

The NVIDIA GeForce GTX 1080 may be capable of blistering performance, but it has also proven itself to be a supremely power efficient card. The higher performance-per-watt figures versus the AMD Radeon RX 480, a card based on a Polaris architecture tweaked for power efficiency as well, only further cements its place as the best graphics card of 2016.

NOMINEES

AMD Radeon RX 480



INNOVATION AWARD

LG GRAM 15

The LG Gram 15 is worthy of our Innovation Award because of its impressive design and incredible portability. Even though it is a 15-inch notebook with Full HD display and all the ports you would need, it weighs a mere 980g and at its chunkiest point, it is just 16.8mm thick. These are numbers that would put some 13-inch notebooks to shame.

TECH AWARDS 2017

EDITOR'S CHOICE

- GAME OF THE YEAR
- BEST PREMIUM SMARTPHONE
- BEST SOHO COLOR LASER/LED MFP
- INNOVATION AWARD
- BEST PORTABLE GAMING NOTEBOOK
- BEST MOTHERBOARD

GAME OF THE YEAR

OVERWATCH

Blizzard is without equal when it comes to taking a complicated genre and making it accessible. They did it with MMOs (World of Warcraft) twelve years ago, and now they've done it for a team-based shooter. In essence, Overwatch is a shooter where you don't really need to be good at shooting, as it's a game with dozens of different ways for you to successfully compete. Kudos to the designers for pulling this off without substantially limiting the skill ceiling for the best players.

NOMINEES

Battlefield 1 • Uncharted 4: A Thief's End



BEST PREMIUM SMARTPHONE

APPLE IPHONE 7 PLUS

While the iPhone 7 Plus may not look that different from its predecessor, Apple has upgraded nearly everything on the phone: the display is brighter, the processor is faster, it has stereo speakers and a waterproof build, useful dual rear cameras, and a larger battery. If you can get over the lack of a headphone port, no phone offers more.

NOMINEES

ASUS ZenFone 3 Deluxe • LG V20 • Samsung Galaxy S7 Edge • HTC 10, Huawei Mate 9 • Microsoft Lumia 950 XL • Motorola Moto Z • Sony Xperia XZ



BEST SOHO COLOR LASER/LED MFP

FUJI XEROX DOCUPRINT CM315 Z

At \$900, the Fuji Xerox DocuPrint CM315 z isn't cheap, but it compensates by offering a lot of features and a great performance. It prints at up to 28ppm for both mono and color, has a useful 4.3-inch touchscreen, and offers one-pass scanning through its duplex ADF. Its default 600 dpi output looks great, but it can up the game further by simulating 1,200 x 2,400 dpi.

NOMINEES

Canon Imageclass MF729Cx • Oki MC363dn



PICTURES: BLIZZARD ENTERTAINMENT, APPLE, FUJI XEROX, SONY, AORUS, ASUS



INNOVATION AWARD

SONY BACKLIGHT MASTER DRIVE

In early 2016, Sony showed off a Backlight Master Drive-enabled TV capable of 4,000 nits peak brightness. While that particular prototype isn't ready for market yet, we've a taste of what's to come in the Bravia Z9D. Hitting 1,500 nits without breaking a sweat, the Z9D is arguably the best TV you can get to watch HDR. As BMD improves, it's only a matter of time until we can have a 4,000-nit TV in our living room.

BEST PORTABLE GAMING NOTEBOOK

AORUS X5 V6

The Aorus X5 v6's class-leading performance and slim and light chassis combine for a winning combination. It features an overclockable Intel Core i7-6820HK processor, 16GB of DDR4 RAM, and an NVIDIA GeForce GTX 1070, all in a 2.5kg package. Portability is often one of the trade-offs of high performance, and the deft navigation of this relationship by Aorus helps it edge ahead of its competitors.

NOMINEES

Acer Predator 15 • Aftershock S-15 • Alienware 15 • ASUS ROG GL502VM • Gigabyte P35X v6 • HP Omen 15 • MSI GS63VR 6RF Stealth Pro



BEST MOTHERBOARD

ASUS ROG RAMPAGE V EDITION 10

The ASUS ROG Rampage V Edition 10 takes a zero-compromises approach to performance. Its rich feature set leaves almost nothing out, and it boasts strong overclocking performance and an impressive attention to detail in its efforts to make things easier for overclockers. From things like the dedicated OC Zone to thoughtful inclusions like 3x3 802.11ac Wi-Fi and five-zone RGB lighting, ASUS checks all the right boxes.

NOMINEES

ASRock X99 Taichi • Gigabyte X99 Designare EX • MSI X99A Godlike Gaming Carbon

TECH AWARDS 2017

EDITOR'S CHOICE

- BEST MID-RANGE INTERCHANGEABLE LENS CAMERA
- BEST AIO COLOR INJET PRINTER
- BEST ONLINE GAME
- BEST 2-IN-1 NOTEBOOK

BEST MID-RANGE INTERCHANGEABLE LENS CAMERA

FUJIFILM X-T2

The Fujifilm X-T2 consistently turned in better images with better detail and less noise than the competition in all the situations we put it in. We liked that it got both the internal upgrades from the X-Pro2 and the interface upgrades, as the focus-selector joystick certainly helps in terms of selecting focus points and in navigating menus, making it even easier to use.

NOMINEES

Canon EOS M5 • Nikon D500 • Olympus EM-1 Mark II • Sony a6500





BEST AIO COLOR INKJET PRINTER

HP OFFICEJET PRO 8730

The HP OfficeJet Pro 8730 prints at a fast rate of 24ppm in mono and 20ppm in color. Output quality is equally good, with well-formed text and graphics that don't smudge easily. Other highlights include a 50-sheet ADF that supports one-pass, two-sided scanning, and HP Web Jetadmin, a free software product designed for easy administration of network printers.

NOMINEES

Canon Maxify MB5470

BEST ONLINE GAME

OVERWATCH

Overwatch is a complex, but accessible, team shooter that made a big impact this year. The near-future, paramilitary, pseudo-superhero world of Overwatch that Blizzard chose to tell us about was exhilarating. One of its greatest strengths is its presentation. It's as clean and colorful as a Pixar movie (with murder), with expressive animations in every character, gun model, and ability effect. There's no corner of any map that hasn't been made to feel like a cohesive part of Overwatch's politically fraught cartoon world. And oh, those Loot boxes.

NOMINEES

Pokemon Go • World of Warcraft: Legion



BEST 2-IN-1 NOTEBOOK

HP SPECTRE X360

The HP Spectre x360 is a refined 2-in-1 notebook that has very few weaknesses. It is slim and light, and since it is one of the first notebooks to embrace Intel's new Kaby Lake processors, that has given it a slight edge in terms of performance. It also enjoys a long battery and has a wonderful keyboard.

NOMINEES

Acer Switch Alpha 12 • ASUS Transformer 3 Pro • Dell Inspiron 13 5000 2-in-1 • Lenovo Yoga 910



TECH AWARDS 2017 EDITOR'S CHOICE

- BEST XBOX ONE GAME
- BEST PROFESSIONAL INTERCHANGEABLE LENS CAMERA
- BEST PLAYSTATION 4 GAME
- INNOVATION AWARD

BEST XBOX ONE GAME

FORZA HORIZON 3

Forza Horizon 3 is the culmination of Turn10 and Playground Games' recent efforts to offer the finest racing game to date. Its impeccable level of detail, plethora of events – from the outrageous to the more grounded – and extensive roster of cars are but a few of the masterfully crafted components that make it the ultimate racing game on the Xbox One.

NOMINEES

FIFA 17 • Gears of War 4 • Titanfall 2



BEST PROFESSIONAL INTERCHANGEABLE LENS CAMERA

NIKON D5

While the Canon EOS-1D X Mark II is a great all-around performer, the accuracy of the autofocus system in the Nikon D5 was the real distinguishing factor. There hasn't been another camera we've tested that can track so accurately even in dim lighting conditions, and when you need to be absolutely sure that every image captured is in focus, that's indispensable.

NOMINEES

Canon EOS-1D X Mark II

BEST PLAYSTATION 4 GAME

UNCHARTED 4: A THIEF'S END

Uncharted 4's thematic strength is supported by technical marvels accrued through Naughty Dog's time with the series. Facial animations are stirring human, maps are open and gorgeous, yet level design always points you towards your goal. The entire journey is a lesson in greatness. An impeccable farewell to an iconic adventure series, Uncharted 4's brilliant direction and unmitigated reflection will be remembered for years to come, and is bravely worthy of being the Best PlayStation 4 Game of 2016.

NOMINEES

Dark Souls III • Final Fantasy XV • The Last Guardian • Titanfall 2



PICTURES: MICROSOFT STUDIOS, NIKON, SONY, XIAOMI

INNOVATION AWARD

XIAOMI MI MIX

The Xiaomi Mi Mix is the same size as an Apple iPhone 7 Plus, but its edge-to-edge design lets it pack a massive 6.4-inch display for an incredible 91.3 percent screen to body ratio. To achieve this, Xiaomi had to engineer a ceramic audio driver that converts electric signals to mechanical energy to convey sound waves and an ultrasonic proximity sensor placed behind the display itself!



TECH AWARDS 2017

EDITOR'S CHOICE

- BEST GAMING MONITOR
- INNOVATION AWARD
- BEST PC GAME
- BEST GAMING CONSOLE



BEST GAMING MONITOR

ASUS ROG SWIFT PG279Q

The ASUS ROG Swift PG279Q gets the edge over its competitors thanks to a combination of color superiority, build quality and an easy-to-use menu system. Thanks to that IPS screen, colors look great even from off-angles. The base is sturdy (and allows for lots of tilting, pivoting, and height adjustments) and the bezel is fairly thin, which is nice for a 27-inch monitor that's already taking up a good deal of space.

NOMINEES

Acer Predator XB271HU • AOC AGON 271QG • BenQ Zowie XL2735 • ViewSonic XG2703-GS



INNOVATION AWARD

LENOVO MOTO Z

The Moto Z isn't limited to itself because of the Moto Mods attachments that make up a huge chunk of its user experience. There's also a decent selection of modules and all of them play nicely with the Moto Z device. It's the best modular design smartphone we have seen so far, with a full hot-swappable experience - if you're willing to pay the price.

BEST PC GAME

BATTLEFIELD 1

2016 was a wonderful year for shooters, and a big reason for that is because everyone tried something different. DICE's Battlefield 1 is a prime example of that. The franchise has been faltering for a while now, but the studio took its technical know-how to World War I, and focused on personal stories to do something that is fresh in this genre. The result is a brilliant game that recreates the visceral feeling of being in the war.

NOMINEES

Civilization VI • Doom • Overwatch



BEST GAMING CONSOLE

PLAYSTATION 4 PRO

The PlayStation 4 Pro is, without a doubt, the most powerful console in the world right now. Besides supporting native 4K and HDR that the original console could not, the PS4 Pro also brings along other tangible benefits such as improved framerates and visual improvements, even for older PS4 games. It's also worth knowing that many renowned third-party developers such as Bioware (Mass Effect: Andromeda) and Kojima Production (Death Stranding) will be creating games that are best experienced on the PS4 Pro.

NOMINEES

Microsoft Xbox One S



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**MORE
INSIDE >****PLANTRONICS
BACKBEAT PRO 2**


Solid follow up for active noise canceling fans.

HUAWEI MATE 9

This phone is made for mobile entertainment.


NEC M331W

The projection workhorse you can't go wrong with.



As the end of 2016 approached, more fitness bands with heart rate monitoring and other unique features plied the hearts, minds, and bodies of people who would look back on festive feasting tenderly. Here are our top choices for those who want to get fit in 2017.

Text by **Liu Hongzuo**
Photography by **Frenchescar Lim**
Art Direction by **Ken Koh**



VS
FITBIT CHARGE 2
•
SAMSUNG GEAR FIT2
•
TOMTOM TOUCH
•
XIAOMI MI BAND 2

BANDING TOGETHER FOR FITNESS

FITBIT CHARGE 2

The Fitbit Charge 2 has a band-like form factor with rubberized, interchangeable straps flanking a core that holds its hardware and display. It uses an OLED screen that's four times larger than the Charge HR's. Having a larger display makes it comfortable to read, and it now shows both the current time and some cursory fitness data. A slimmer strap width than the Charge HR helps the Charge 2 look sleeker, so it's less of an eyesore.

The wearable has a raise-to-wake function that makes the information available at a glance, although it's nowhere as colorful or easily readable as the Gear Fit2 by Samsung. This is noticeable when you're flitting through the various options within both bands, and when you need to view stats while under sunlight.

The new Charge 2 not only packs an optical heart rate monitor, but also the ability to track multiple sports like biking and hiking (no swimming for this sweat-proof device, though). It doesn't have its own GPS despite all its tracking features,

but there's Connected GPS that allows the Charge 2 to pull GPS data from your smartphone.

If you're familiar with Fitbit's app, you'll be pleased to know that they kept the friendly and easy-to-understand interface. One new feel-good tool they have is a Cardio Fitness Score. By taking a combination of numbers from the resting heart rate measurement, existing exercise data, and profile information, Fitbit will assign a heart-health 'score' that tells the user if they are healthy for their age. It's based off the VO2 Max measurement that runners use to check their cardiovascular fitness in a snapshot.

We consider Fitbit's features well-rounded, accessible, and sensible because of how it's presented. This helps to appeal to a broader range of fitness behaviors and it eases people into adopting a healthier outlook, beyond the gamification of personal high-scores. It also has a simple, effective design, good enough accuracy, and a UI that communicated the metrics in a digestible manner.

AT A GLANCE

DISPLAY

1.5-inch OLED

WATERPROOFING

Sweat-proof

BATTERY

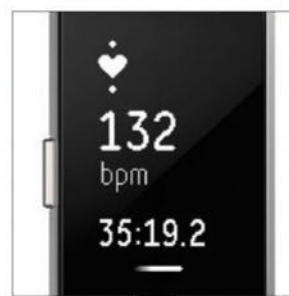
Up to 5 days

WEIGHT

35g

PRICE

\$248



With a display four times the size of its predecessor, you get more despite its slim profile.



A well-rounded band, with essential features and an intuitive app.



Black-and-white display seems bland for such a pretty band.

AT A GLANCE

DISPLAY

1.5-inch touch curved AMOLED (216 x 432 pixels resolution)

WATERPROOFING

IP68

BATTERY

200mAh (Up to 4 days)

WEIGHT

30g

PRICE

\$298



Its 1.5-inch, 216 x 432 pixels resolution AMOLED display is easily the best thing about the Fit2.

SAMSUNG GEAR FIT2

Out of the fitness trackers here, the Samsung Gear Fit2 has to be the bulkiest. Most of the bulk comes from its 1.5-inch AMOLED display and the parts that lie underneath, including its optical HRM and processor. The rest of the band is made up of elastomer removable straps.

Having a great Gorilla Glass 3 display that's readable even under sunlight is only half of the formula though. The Gear Fit2 interface really pushes the usability of its display with a matching UI. Not only can you raise your arm to wake it, the touchscreen is very responsive and intuitive, coupled with menus that flowed from app to app very well. There was no confusion on metrics-reading, and moving between different readings.

Up until early January 2017, the Samsung Gear Fit2 was only compatible with Android OS, but the Gear Fit app has finally found its way into Apple's App Store, putting the Gear Fit2 on an equal playing field against its competition.

The iOS interface is neat and clean,

with each metric easily expanded upon by tapping each category. We had to reset the band when un-pairing the wearable from the Samsung Galaxy S7 Edge and the older data didn't make it to our iOS trials. Both Samsung and iOS interfaces are similar; our only concern was the lack of any fitness tips for either platform.

The biggest upgrade on the Gear Fit2 is the inclusion of a barometer, which the previous Gear Fit did not have. Tracking-wise, the device was accurate enough for day-to-day use, and it's capable of recording distances accurately. The optical heart rate monitor gave relatively accurate readings that came within 5BPM of my average heart rate during rest.

A big caveat about the Samsung Gear Fit2 is the unreliability of its connection. It posed problems during day-to-day use – if you wanted to use a Bluetooth headset, it would mean disconnecting the Gear Fit2 from its menu, and that in turn would render the tracker incapable of re-connecting until a soft reset is done.



TOMTOM TOUCH

The TomTom Touch is your typical fitness tracker with a twist – a bioelectric sensor that provides a body fat estimate. With this, TomTom hopes that their Touch will stand out in the growing market of similar-looking fitness bands.

The Touch itself was extremely simple to operate, since it comes in a basic bracelet form factor that's easy to understand and operate. It uses an oblong display and a circular, front-facing metal sensor for all input. The metal sensor wakes the band up, and you swipe a finger along the greyscale display for different menus. Simply tap or hold a finger to the metal sensor to confirm your selection. While it's a simple device, it lacks a raise-to-wake feature – the wearable won't display the time until you touch its metal button.

The key feature is none other than its fabled body fat measurement that works via its coin-shaped bioelectric sensor. The front sensor can measure your body's fat and muscle percentage

by reading your organic electrical pulses. To complete its cellulite 'circuit', the rear sensor comes into contact with your wrist.

Is the body fat percentage reading from the Touch accurate? While we don't have alternate reading from a proper device, mine said I had 17% body fat, whereas an online body fat calculator said I was at 20.3%, which was considered 'average' for males of my age. At \$239, this pits the TomTom Touch squarely against other trackers of similar price points, while its headlining feature doesn't have the critical touch it needs to make users move on from their current wearable.

The 24/7 passive HRM measures your heart rate at regular intervals decided by the fitness band. You'll only know your average resting HR, and a snapshot of your resting HR before you start a run. It's accurate enough as a gauge, but the TomTom Touch's HRM isn't the most accurate among wearables in general.

AT A GLANCE

DISPLAY

5.58 x 22.38mm

WATERPROOFING

IPX7

BATTERY

Up to 5 days

WEIGHT

10g

PRICE

\$239



If you like to be reminded how unfit you are, the TomTom Touch is the only one with a bioelectric sensor.



Interesting body fat sensor.



Needs to have better accuracy in general.

AT A GLANCE

DISPLAY

0.42-inch OLED

WATERPROOFING

IP67

BATTERY

70mAh (up to 20 days)

WEIGHT

19g

PRICE

\$55



The 0.42-inch OLED screen is the main difference from its predecessor, but that's not the only trick up Mi Band 2's sleeve.

XIAOMI MI BAND 2

Display-wise, the Mi Band 2 is similar to the TomTom Touch's sensor, thanks to its oblong shape, greyscale OLED display, and circular touch button. Even its thermoplastic elastomer strap also looks really similar to the Touch.

To navigate around the band's controls, simply tap the circular button and the Mi Band 2 will take you through its menus. You can opt to show or hide certain stats (adjusted via the Mi Fit app). We picked the current time, steps, heart rate, and its battery life, while excluding stuff like distance and calories. Hiding the metrics doesn't mean that the Mi Band 2 stops tracking those values – you can view it all in its accompanying app later.

The Mi Band 2 shows improvement from the Mi Band Pulse, and you can now use the phone's GPS to monitor your jogging path. This also fixes the old problem where the Pulse wasn't very good at detecting if a person is walking or jogging automatically. The wearable also buzzes when you've been sedentary for an hour, so it's helpful for folks who lose themselves to desk work or gaming.

The Mi Band 2 lacks passive HR, but does offer active HR tracking, and this is done by visiting the HR option on the wearable itself. Surprisingly, this newer model seemed quite inaccurate. The Mi Band Pulse we previously reviewed did not have this issue.

The Mi Band 2 shares the same proprietary app with previously released Xiaomi wearables. Data's easy to understand, but it doesn't make it helpful. For example, heart rate is displayed as individual data points, but there's no graph to show a summary or a graph on how HR fluctuated over the day. Battery life is decent, lasting me a week with 65% left – Xiaomi claims a 20-day battery life – which is quite impressive.

All in, the Mi Band 2 is a simple tracker. At \$55, it brings affordability to the table when other alternatives with similar features are four to five times more expensive. It's not very much different from its predecessor though, and the cheaper Pulse even had more accurate HR readings, but you do get an updated OLED screen and connected GPS.



Affordable yet decent, friendly for casual users.



HRM isn't as sharp as its predecessor.



STEPS**(Closer to 100 % - better)**

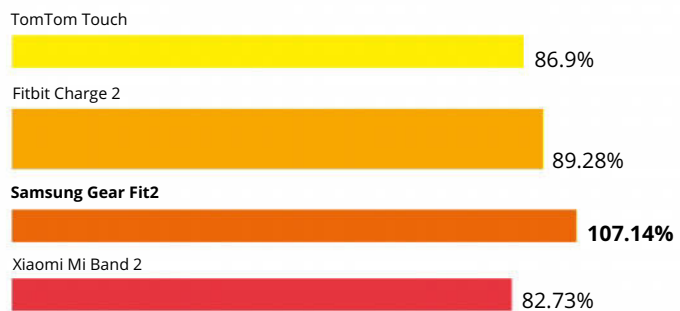
We determine if the tracker is relatively more accurate than the rest by comparing its value against a control factor (iPhone 6s Plus in-built Health app), over multiple days. The percentage represents how accurate the tracker is; a higher accuracy rate would be closer to the 100% mark, while lower accuracy would be further from 100% mark.

**DISTANCE****(Closer to 100 % - better)**

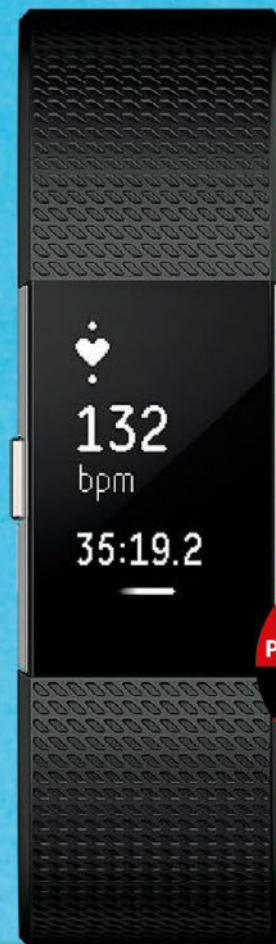
Like the Steps benchmark, we determine if the tracker is relatively more accurate than the rest by comparing its value against a known distance (1.47km, neighborhood estate). The percentage represents how accurate the tracker is; a higher accuracy rate would be closer to the 100% mark, while lower accuracy would be further from 100% mark.

**HEART RATE****(Closer to 100 % - better)**

The Heart Rate benchmark is unique to wearables with a Heart Rate Monitoring function. We determine if the tracker is relatively more accurate than the rest by comparing its value against the readings provided by a blood pressure monitor (readily available from online stores or from a pharmaceutical store). The percentage represents how accurate the tracker is; a higher accuracy rate would be closer to the 100% mark, while lower accuracy would be further from 100% mark.



THE BEST FITNESS TRACKER IS...



FITBIT CHARGE 2

The Fitbit Charge 2 pulls ahead with a clean execution in features and accuracy. The Samsung Gear Fit2 was its closest rival, but it had repeated pairing issues across different smartphone OSes despite its beautiful display, accurate tracking, and intuitive controls. The Xiaomi Mi Band 2 had it all down, but it doesn't measure up because of its less accurate heart rate monitoring, while the Xiaomi app is a handful of tweaks from being nearly as friendly as Fitbit's. The TomTom Touch's was simple to understand too, but the un-intuitive metallic sensor was unfriendly for workouts, its key fat measurement feature wasn't accurate enough to be relied on, and its accompanying app felt convoluted to gather information from.

GAMING IN THE SWEET SPOT

15-inch gaming notebooks sit somewhere between beastly desktop replacements and paltry ultrabooks. While packing powerful hardware, they're still relatively portable too. The only question is, which one should you get?

Text by **Koh Wanzi**
Photography by **Frenchescar Lim**
Art Direction by **Ken Koh**

VS
ACER PREDATOR 15

•
AFTERSHOCK S-15

•
ALIENWARE 15

•
AORUS X5 V6

•
ASUS ROG GL502

•
GIGABYTE P35X V6

•
HP OMEN 15

•
MSI GS63VR 6RF STEALTH PRO





ACER PREDATOR 15

Acer's Predator 15 looks every bit like its name, and everything from its red accents and huge heat exhaust vents down to the chunky power button just screams for attention.

The RGB backlit keyboard has four discrete lighting zones, but it is the deep key travel distance that really helps provide an enjoyable typing experience.

Still, this look may not appeal to everyone; I'm not exactly a fan of this garish aesthetic.

Acer does deliver on the hardware front however, and its quad-core Intel Core i7 processor combines with an NVIDIA GeForce GTX 1070 and 16GB of RAM for very strong gaming performance. This is a laptop that can handle most of the latest titles at 1080p with settings maxed out.

In addition, it boasts a 1080p G-Sync display, which affords you a tear-free and more fluid gaming experience. And because this is a 60Hz panel, it stands to benefit more from G-Sync as the notebook is capable of frame rates well above the screen's refresh rate.

One nice feature is the built-in PredatorSense overclocking utility, which automatically overclocks the GPU to higher presets. This netted a small five per cent increment in 3DMark Fire Strike.

In order to keep things cool, Acer included its Predator FrostCore module. This is an ODD-sized fan module that provides extra cooling to key components, and it managed to lower CPU temperature by 3°C in our tests. It replaces the ODD that ships with the laptop, and swapping one for the other is as easy as pushing a latch on the notebook's bottom.

However, all these add-ons mean that the Predator 15 is extremely thick and heavy, coming in at 38.5mm tall and 3.7kg in weight. It is the least portable of all our tested notebooks, and is definitely not very amenable to being carried around. We still expect 15-inch notebooks to be reasonably portable as they aren't quite desktop replacements yet, so the Acer's thick profile and weight drags it down by quite a bit.

+
Strong gaming performance. Built-in GPU overclocking utility.

—
Extremely heavy and chunky.



AT A GLANCE

DISPLAY

1,920 x 1,080-pixel IPS G-Sync

PROCESSOR

Intel Core i7-6700HQ

MEMORY

16GB DDR4 RAM

GPU

NVIDIA GeForce GTX 1070

STORAGE

512GB SATA SSD; 2TB HDD

PRICE

\$3,598



The Predator FrostCore module can replace the ODD drive for additional cooling.



The keyboard features dedicated macro keys for power users.

AT A GLANCE

DISPLAY

1,920 x 1,080-pixel IPS

PROCESSOR

Intel Core i7-6700HQ

MEMORY

8GB DDR4 RAM

GPU

NVIDIA GeForce GTX 1060

STORAGE

128GB SATA SSD; 1TB HDD

PRICE

\$2,158



There's a single USB port located at the back.



There's a row of system status LEDs on the front-facing edge.

AFTERSHOCK S-15

Aftershock's S-15 flies in the face of most gaming laptops with its staid, utilitarian design. Some might call it plain, but this is a functional and practical look.

The S-15 is actually intended to offer the greatest bang for your buck, and Aftershock is gunning for value rather than performance. As a result,

it is equipped with just an NVIDIA GeForce GTX 1060 (although there's an option for a 1070) and 8GB of RAM.

There should be few issues in running the latest games at playable frame rates on its 1080p IPS display, but you probably will have to turn the detail level down. However, one thing to note is that we found gaming performance to lag behind other GeForce GTX 1060-equipped notebooks in certain benchmarks, perhaps due to firmware optimizations and lower RAM as well.

It is also missing luxuries like G-Sync, and its 128GB SSD is smaller than that offered on its pricier rivals.

That said, the S-15 takes care to include features that you'll get the most

use out of, like a wide range of ports and connectors. This includes two USB 3.0 ports, one USB 3.1 port for faster data transfers, and also a USB-C port for the newest devices and peripherals. You'll even get two mini DisplayPort 1.2 connectors and an HDMI output.

However, while the other GeForce GTX 1060 made a slim and light chassis a top priority, the S-15, which is based on an OEM Clevo chassis, is comparatively thick and heavy. Fortunately, its dimensions and weight are still within reasonable limits, at 25.4mm tall and 2.49kg respectively.

One strong point is its keyboard, which features what Aftershock refers to as tactile keys. This means 2mm of key travel distance, making the S-15 keyboard one of our favorites here.

Finally, the keyboard boasts customizable RGB backlighting and support for programmable macros, showing that the S-15 isn't that drab-looking of a machine after all.

+
Great value for money.

-
Gaming performance lags behind competitors.



ALIENWARE 15

Alienware is something of a pedigreed brand, even if it now lives under the Dell umbrella. The Alienware 15 is one of the most feature-rich laptops in this shootout, with a 120Hz G-Sync display and Tobii eye-tracking technology. The high refresh rate display is a welcome upgrade from the usual 60Hz screens, and when combined with G-Sync gives you an extremely smooth gaming experience. Tobii eye-tracking is a little more gimmicky, but it does enable support for Windows Hello face authentication and can perform nifty tricks like automatically turn off the screen when you leave.

There's also a good selection of ports and connectors, including two USB-C ports, one of which supports Thunderbolt 3.

The RGB backlit keyboard can be customized with a mind-boggling array of effects, and the trackpad itself can even be set to glow in your favorite color. However, it lacks per-key lighting, and the keyboard is instead divided into five discrete zones. In total, there are 12 customizable zones you can tweak in the pre-installed Alienware FX utility, including

the power button and the light rails on the edges.

There is a good amount of key travel distance, which made typing quite enjoyable. It is missing a number pad however, but you do get a dedicated column of programmable macro keys on

the left. This leaves thick borders of underutilized space on the sides, which may or may not appeal to you.

Needless to say, gaming performance was excellent given the top-end hardware, so you're likely to spend more time thinking about what game to play instead of whether or not it will run.

Still, nothing's perfect, and this is among the thickest and heaviest notebooks reviewed

here, just behind the Acer Predator 15. However, what you get from this is some seriously impressive build quality, courtesy of all that anodized aluminum, magnesium alloy, and the steel plate that sits below the keyboard. There is almost no flex to the chassis, and everything feels reassuringly solid.

+
**Comprehensive
featureset and
strong performance.**

—
**Thick, heavy, and
expensive.**

AT A GLANCE

DISPLAY

1,920 x 1,080-pixel
120Hz G-Sync IPS

PROCESSOR

Intel Core i7-6700HQ

MEMORY

16GB DDR4 RAM

GPU

NVIDIA GeForce GTX
1070

STORAGE

256GB NVMe SSD;
1TB HDD

PRICE

\$3,752



The display hinge has been set forward to make way for cooling components in the rear.



The trackpad can be set to glow or pulse in your color of choice.

AT A GLANCE

DISPLAY

2,880 x 1,620-pixel
G-Sync IPS

PROCESSOR

Intel Core i7-6820HK

MEMORY

16GB DDR4 RAM

GPU

NVIDIA GeForce GTX
1070

STORAGE

256GB NVMe SSD;
1TB HDD

PRICE

\$3,799



This is an impressively thin notebook for the hardware it packs.



The trackpad has been spruced up with the Aorus logo.

AORUS X5 V6

Gigabyte's premium gaming brand brings quite a compelling argument to the table. This slim and light Aorus X5 v6 even manages to outmuscle an already competitive field in terms of specifications, so you get class-leading performance too.

For starters, this is the only laptop here to feature the overclockable Intel Core i7-6820HK processor, which comes overclocked to 4.0GHz by default. This translates into as much as an 18 per cent improvement over the next best performer in some benchmarks.

The display's resolution also beats out its rivals, and Aorus X5 v6 sports the highest resolution screen with 2,880 x 1,620 pixels. There is G-Sync support as well, so you stand to enjoy crisp and fluid gameplay.

In addition, the five system status LEDs double as a battery indicator when the power is off, and pressing the right mouse button will instantly show the battery level.

Still more impressive is the svelte, lightweight chassis, which is only 22.9mm thick and 2.5kg heavy. The Aorus manages

to be the most powerful notebook reviewed here, while boasting one of the most portable profiles, and that's not a feat to be taken lightly.

Battery life isn't even that abysmal despite the overclocked processor (it even lasted longer than the Alienware), thanks to the large 94.24Wh battery Aorus crammed on board.

One complaint would be the trackpad, which can feel imprecise and slightly erratic. The typing experience also feels a bit shallower than the thicker gaming notebooks, so that's probably one of the trade-offs you'll have to make if you want a thinner laptop. However, you do get per-key RGB lighting and dedicated macro keys, so there should be enough

for most folks there.

We also noticed that the fans could get quite noisy under load, but since you're likely to have headphones plugged in while gaming, this isn't too big of a problem. Thankfully, the laptop is reasonably quiet under normal conditions.

+
Slim, light, and
capable of excellent
performance.

-
No Thunderbolt 3
port.



ASUS ROG STRIX GL502VM

The ASUS ROG Strix GL502VM is an attempt at injecting something new into the established ROG design language. With bright neon orange highlights and a slim design, it's intended to be an affordable option for a younger, more style-conscious audience.

Because it's aimed at a slightly lower budget, it ships with a GeForce GTX 1060. That means that performance is handicapped right from the outset against the GeForce GTX 1070-equipped notebooks, but the GL502VM makes up for it with a more palatable price and attractive design.

Build quality feels wonderfully solid, with little give to the main body. You'll be surprised to learn that majority of the chassis is actually made of plastic, which is how ASUS keeps the weight down.

We particularly like its 2.24kg weight, which stands it in good stead among the rest of the notebooks in terms of portability. Unfortunately, it's dragged down in this area by its small 64Wh battery and sub-par power efficiency, which saw it consuming more power than similarly equipped notebooks.

That said, performance is by no means weak, and you'll still be able to run the vast majority of games at playable frame rates on its 1080p display. It also supports G-Sync, a much-appreciated inclusion, and the benefits should be readily

perceivable on the 60Hz display.

ASUS has also taken care to include more ports than you'll need, including three USB 3.0 ports and one Thunderbolt 3 port. Some of the more expensive notebooks, like the Aorus X5 v6, don't include Thunderbolt 3 ports, so this is a welcome feature.

The notebook features dual heatpipes to cool the CPU and GPU separately, but despite the large pure

copper thermal module, it seems like temperatures still remained quite toasty. Fortunately, this did not translate into excessive heat on the palm rest areas or any discernible performance throttling.

One final gripe is the amount of bloatware the GL502VM comes with. This means a ton of ASUS-branded programs that you have no use for and which pop up intermittently, so you'll have to take time to uninstall them individually.

+
Good price-to-performance ratio.

-
Ships with a lot of bloatware.



AT A GLANCE

DISPLAY

1,920 x 1,080-pixel
G-Sync IPS

PROCESSOR

Intel Core i7-6700HQ

MEMORY

16GB DDR4 RAM

GPU

NVIDIA GeForce GTX 1060

STORAGE

128GB SATA SSD; 1TB HDD

PRICE

\$2,498



The WASD key cluster has been colored neon orange.



The notebook supports Thunderbolt 3, a welcome addition.

AT A GLANCE

DISPLAY

1,920 x 1,080-pixel IPS

PROCESSOR

Intel Core i7-6700HQ

MEMORY

16GB DDR4 RAM

GPU

NVIDIA GeForce GTX 1070

STORAGE

512GB NVMe SSD

PRICE

\$3,399



There's a legacy VGA port here which you probably won't find much use for.



System status LEDs are located along the front.

GIGABYTE P35X V6

Gigabyte's P35X v6 is a more mainstream alternative to the Aorus X5 v6. This means it's dispensed with much of the fancy design trappings in favor of a far plainer look. But while we appreciated Aftershock's utilitarian approach, the Gigabyte somehow feels a lot more dated.

This impression isn't helped along by the mediocre build quality, with obvious flexing around keyboard and display. This is despite its metal finish and the fact that it actually costs over \$3,000. Furthermore, the keyboard itself could use some tweaking as well, and shallow key travel is an unwelcome change from the excellent typing experience offered on some of the other notebooks.

Yes, this is a rather svelte machine, but MSI's GS63VR 6RF Stealth Pro is thinner and yet has a better keyboard. The trackpad feels supremely inaccurate as well, even after attempts at adjusting the settings. For its price, we definitely expect something that feels better put together.

Gigabyte justifies the price with competitive specifications that are mostly

on par with its rivals, including a quad-core Intel Core i7 processor and an NVIDIA GeForce GTX 1070. So while the notebook isn't much of a looker, it isn't lacking in terms of performance.

It also features a Blu-ray combo

drive, a holdover from its predecessor and something of an anachronism in a time of 4K video streams. That said, this drive can be swapped for an additional hard drive to complement the existing 512GB SSD.

But while the notebook's construction could be improved on, there's no disputing the fact that this is still an impressively thin and light laptop. It weighs a mere 2.3kg and is just 20.9mm thick, making it the slimmest and lightest

notebook here to have a GeForce GTX 1070 card.

Battery life was especially good as well, and the notebook lasted the longest out of all the models with NVIDIA Pascal GPUs. This isn't a case of just having a relatively large 75.81Wh battery as it also managed to outlast the Acer Predator 15 that has a bigger 88Wh juice pack.

+
Thin, light, and portable.

-
Poor build quality and keyboard.



HP OMEN 15

We should point out that the HP Omen 15 is something of an outlier in a field of NVIDIA Pascal-equipped laptops. Despite being refreshed in 2016, the Omen 15 still comes with an outdated NVIDIA GeForce GTX 965M GPU, which reminds us of the time when HP was still using a GeForce GTX 860M when everyone else had already moved on to Maxwell.

Unsurprisingly, the GeForce GTX 965M didn't fare well against the other notebooks with the latest generation GPUs. While Pascal cards like the GeForce GTX 1060 can quite handily run most modern titles, the GeForce GTX 965M ended up scrapping by with merely playable frame rates in games like Tom Clancy's The Division.

Interestingly, HP does have a 17-inch model with a Pascal GPU, so the Omen 15 appears deliberately aimed at very casual gamers who just want an affordable system. This is of course the cheapest system of the lot and the only one to cost less than \$2,000.

As a relatively budget offering, the

Omen 15 also lacks many gaming features like a customizable RGB backlit keyboard. Instead, it has gone with a single-color red backlighting that you can toggle on or off.

There are also fewer USB ports than we're used to, with just two USB 3.0 ports and one USB 2.0 ports. There are no USB-C connectors either, and you get a single full-sized HDMI port for display outputs.

This is a little disappointing considering that the MSI notebook is even thinner and has more ports, but this is probably to be expected given the price of the Omen 15. Still, the pricier MSI laptop really

puts the Omen 15 to shame in terms of design, because it manages to be a good 400g lighter despite being so much more powerful.

Finally, there's the awkward fact that you only need to pay \$259 more to get the Aftershock S-15 and the far more powerful GeForce GTX 1060, which raises the question as to why you'd even consider the HP in the first place.

+
Good battery life
and very affordable.

-
Outdated GPU and
feature set.



AT A GLANCE

DISPLAY

1,920 x 1,080-pixel IPS

PROCESSOR

Intel Core i7-6700HQ

MEMORY

16GB DDR4 RAM

GPU

NVIDIA GeForce GTX 965M

STORAGE

128GB SATA SSD; 1TB HDD

PRICE

\$1,899



The Omen logo on the lid stands out against the faux carbon fiber exterior.



Heat is exhausted through vents on the sides and back.

AT A GLANCE

DISPLAY

1,920 x 1,080-pixel IPS

PROCESSOR

Intel Core i7-6700HQ

MEMORY

16GB DDR4 RAM

GPU

NVIDIA GeForce GTX 1060

STORAGE

128GB NVMe SSD;
1TB HDD

PRICE

\$3,199



The notebook features a Thunderbolt 3 port, which allows daisy-chaining of up to six devices.



The power button is located in an awkward position on the right edge.

MSI GS63VR 6RF STEALTH PRO

The MSI GS63VR 6RF Stealth Pro is a freakishly thin and light gaming laptop. Its petite dimensions are its strongest selling point, and there are few notebooks out there that rival it if you're gunning for maximum portability.

As a result, its hardware specifications aren't the most powerful, and it comes with a GeForce GTX 1060 instead of the beefier 1070. However, it is a little underwhelming for the laptop's stiff \$3,199 price tag. The other GeForce GTX 1060-equipped notebooks retail for far less, with the ASUS ROG Strix GL502VM costing just \$2,498.

MSI hasn't even included G-Sync support, which we think to be quite a glaring omission for this price bracket.

If you like the brand, you're essentially paying for the premium design, good looks, and class-leading portability. However, if performance-per-dollar matters more to you, look elsewhere.

Yes, this is one good-looking and well-built notebook. The magnesium-lithium

alloy chassis sports a beautiful brushed metal finish, and the notebook feels very solid despite weighing only 1.8kg.

One welcome inclusion is the Thunderbolt 3 port, which joins three USB 3.0 ports and one USB 3.1 port in

providing you with a wide range of connectivity options. There's also a DisplayPort and HDMI connectors for video output. MSI hasn't taken its slim profile as an excuse to omit vital ports, a plus point worth highlighting.

The RGB backlit keyboard is divided in three customizable zones, and the backlight shines through the translucent edges around each key. Typing experience felt quite good, and the trackpad was pleasantly accurate.

We did encounter some problems with audio, with a ton of crackling and distortion until we did a clean install of the audio drivers. That aside, audio quality was unremarkable, although you do get to make tweaks through the Nahimic 2 audio software.

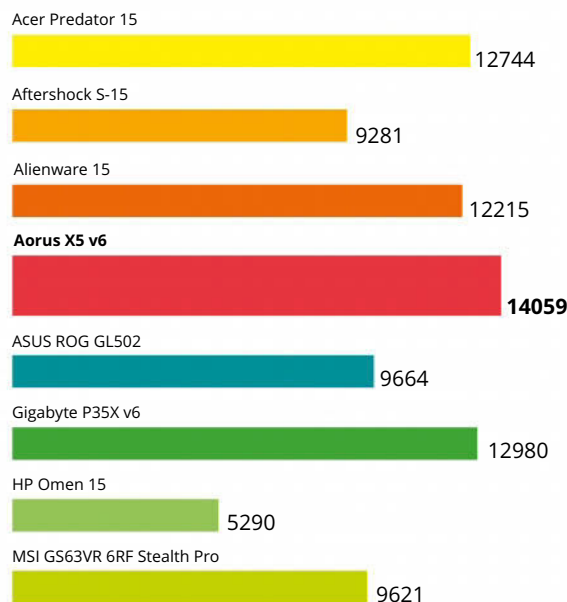
+
Extremely portable
for a gaming
notebook.

-
Expensive for its
specifications and
feature set.

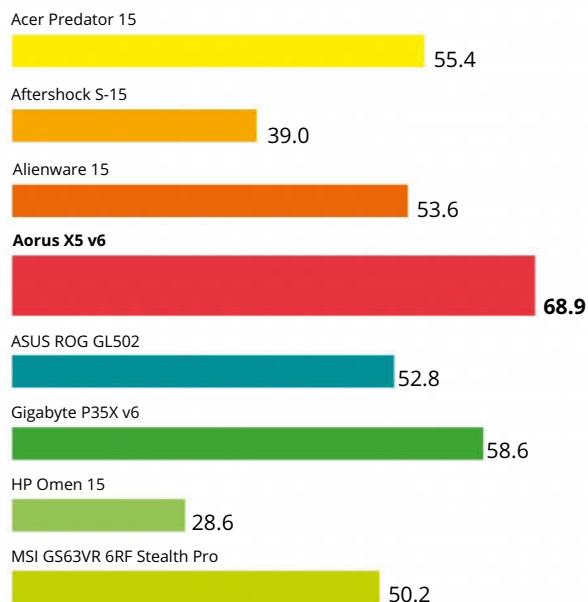


3DMARK (2013)**(Higher is Better)**

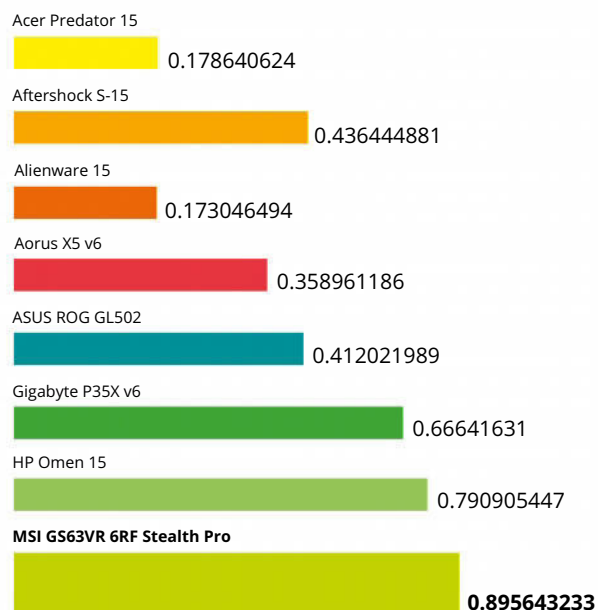
There's a clear performance divide between the GeForce GTX 1060 and 1070 notebooks (the HP Omen 15 doesn't even warrant a comparison). All similarly configured laptops performed rather close to each other, and it's clear that the GeForce GTX 1070 actually adds quite a bit of graphics horsepower – as much as 34 per cent in some cases. Naturally, the Aorus X5 v6 took the lead in every single benchmark, thanks to its overclockable Intel Core i7-6820HK processor.

**ASHES OF THE SINGULARITY****(DIRECTX 11) (Higher is Better)**

The same was observed in Ashes of the Singularity as well, where the Aorus powered ahead on the back of its more capable CPU. It's clear here that the CPU is the limiting factor, as there's less of a difference between the GeForce GTX 1060 and 1070 notebooks. That said, you can see how the Aftershock S-15 oddly falls even further behind its counterparts here, due to its lower RAM or some firmware optimization.

**PORTABILITY INDEX****(Higher is Better)**

Our portability index is an objective measure of how portable a notebook is, taking into account factors like size, weight, and battery life. The MSI GS63VR 6RF Stealth Pro did very well here, coming ahead as the undisputed leader. The Aorus lagged slightly behind, but it still did a lot better than its Acer and Alienware counterparts, the two notebooks which are arguably its closest competitors in terms of features and performance.



	ACER PREDATOR 15	AFTERSHOCK S-15	ALIENWARE 15	AORUS X5 V6
Display	1,920 x 1,080 pixels G-Sync IPS	1,920 x 1,080 pixels IPS	1,920 x 1,080 pixels 120Hz G-Sync IPS	2,880 x 1,620 pixels G-Sync IPS
Processor	Intel Core i7- 6700HQ	Intel Core i7- 6700HQ	Intel Core i7- 6700HQ	Intel Core i7- 6820HK
GPU	NVIDIA GeForce GTX 1070	NVIDIA GeForce GTX 1060	NVIDIA GeForce GTX 1070	NVIDIA GeForce GTX 1070
Memory	16GB	8GB	16GB	16GB
Storage	512GB SSD; 2TB HDD	128GB SSD; 1TB HDD	256GB SSD; 1TB HDD	256GB SSD; 1TB HDD
Dimensions (mm)	391 x 299.5 x 38.5	385 x 271 x 25.4	389 x 305 x 25.4	390 x 272 x 22.9
Weight (kg)	3.7	2.49	3.49	2.5
Price	\$3,598	\$2,158	\$3,752	\$3,799

	ASUS ROG GL502	GIGABYTE P35X V6	HP OMEN 15	MSI GS63VR 6RF STEALTH PRO
Display	1,920 x 1,080 pixels G-Sync IPS	1,920 x 1,080 pixels IPS	1,920 x 1,080 pixels IPS	1,920 x 1,080 pixels IPS
Processor	Intel Core i7- 6700HQ	Intel Core i7- 6700HQ	Intel Core i7- 6700HQ	Intel Core i7- 6700HQ
GPU	NVIDIA GeForce GTX 1060	NVIDIA GeForce GTX 1070	NVIDIA GeForce GTX 965M	NVIDIA GeForce GTX 1060
Memory	16GB	16GB	16GB	16GB
Storage	128GB SSD; 1TB HDD	512GB SSD	128GB SSD; 1TB HDD	128GB SSD; 1TB HDD
Dimensions (mm)	390 x 266 x 23.5	385 x 270 x 20.9	382 x 253 x 24.5	380 x 249 x 17.7
Weight (kg)	2.24	2.3	2.2	1.8
Price	\$2,498	\$3,399	\$1,899	\$3,199

THE BEST 15.6-INCH GAMING NOTEBOOK IS...



AORUS X5 V6

Aorus is Gigabyte's premium gaming brand, and the X5 v6 is quite clearly designed to appeal to this crowd. At \$3,799, it is the most expensive laptop here, but it justifies its price with monster hardware in a truly slim and light chassis.

It is the only notebook to feature an overclockable Intel Core i7-6820HK processor. In addition, it features an NVIDIA GeForce GTX 1070 GPU and 16GB of RAM, and manages to cram all that in a chassis that is just 22.9mm thick and weighing 2.5kg. Other notebooks like the Acer Predator 15 and Alienware 15 boast similar specifications but are an entire kilogram heavier. Don't forget it also boasts the highest resolution G-Sync display and per-key RGB backlighting.

ASUS ROG STRIX GL502VM

The ASUS ROG Strix GL502VM sits in something of a sweet spot. It is equipped with a GeForce GTX 1060, costing far less than the GeForce GTX 1070 notebooks, and yet still serves up a decent level of performance.

Its value proposition is made even more attractive by the fact that MSI's GeForce GTX 1060-equipped GS63VR 6RF Stealth Pro happens to cost \$3,199, while the ASUS retails for just \$2,498, while still boasting competitive specifications like 16GB of RAM, NVIDIA G-Sync support and a Thunderbolt 3 port. The MSI (and some of the GeForce GTX 1070 laptops) doesn't even have G-Sync. While the ASUS model isn't quite as thin and light, it is still very portable at 23.5mm thick and 2.24kg in weight. Furthermore, it performs quite a bit better than the Aftershock S-15 and edges it out with more features and a lighter build.

The future of audio is wireless

Apple AirPods

by Kenny Yeo



AT A GLANCE

CONNECTION

Bluetooth

BATTERY LIFE

5 hours

WEIGHT

5g

PRICE

\$238

Apple's new AirPods look like regular EarPods without the wires. They are only available in white and come in a special charging case. A single charge is good enough for around five hours of listening or two hours of talk time, which, though short, is actually quite decent for headphones of its class.

If you run out of battery, simply placing them into the charging case for 15 minutes is enough to give the AirPods three hours of additional listening time or one hour of talk time. The charging case alone holds enough charge to provide over 24 hours of listening time.

The AirPods contain Apple's new W1 chip, which was designed for wireless audio and allows for many wonderful things. For

example, simply opening the AirPods near your iPhone is enough to initiate the pairing process. It took me less than 10 seconds to get the AirPods paired with my iPhone and raring to go.

The W1 chip also controls and monitors the AirPod's accelerometers and sensors. For example, taking the AirPods out of your ear will automatically cause music playback to be paused, and putting them back into your ears will automatically resume playback.

You can also double tap on the AirPods to activate Siri without taking your

phone out of your pocket. You can ask Siri to make phone calls, turn up the volume, play playlists, or even ask for directions or the weather, and more.

So, the AirPods are pretty

nifty, but how do they sound? To begin, the Bluetooth connection was steady and I never encountered problems with connection dropping. There

were, however, a couple of instances where audio skipped.

Overall, the AirPods have a fun sound signature with a U-shaped response that will appeal to most mainstream

CONCLUSION

Wonderfully compact and easy to use, the AirPods are ideal for Apple's newest iPhones.

listeners. Bass is slightly over-emphasized, much like the highs. The mid-range, on the other hand, sound a little too recessed for my liking. As a result, vocals tend to be a little soft and distant.

If you have one of Apple's newest iPhones, the AirPods will easily be one of the most convenient wireless options out there, if you can stomach the high asking price.



The AirPods pair instantly with an iPhone and is easy to see how much battery it has left.

TESTED & RATED

8.0_{/10}

HWM
SINGAPORE

A data projector that does a lot

NEC MC331W

by Ng Chong Seng



AT A GLANCE

TECHNOLOGY
LCD

RESOLUTION
1,280 x 800

BRIGHTNESS
3,300 ANSI lumens

LAMP LIFE
4,000 – 10,000 hours

PRICE
\$979

The NEC MC331W is an LCD projector equipped with features that office and classroom users will find appealing. For a start, setup is fuss-free: it starts up quickly in six seconds, is able to perform keystone correction automatically, and will monitor signal availability to auto power itself off.

You get the usual variety

of terminals points, but there's also a USB-B port for PC mouse control or to send a PC image across via a USB cable. Presentation sans PC can be done via USB memory stick into the other USB-A port and the projector's built-in image viewer.

Ethernet connectivity is onboard too, though to get wireless, a separate \$129 dongle is required. Projecting via wireless LAN or access point mode can be done using NEC's free Image Express Utility Lite (Windows and Mac) or Wireless Image Utility (iOS and Android). NaViSet Administrator2, a piece of software that enables centralized

monitoring, asset management and control of multiple devices, also comes free with the projector.

With the High-Bright preset, I found the 3,300-lumen MC331W

about as bright as Sony's VPL-DW240, which is rated at 3,000 lumens. With eco mode disabled, NEC says the lamp will last up to 4,000 hours; at the most conservative eco setting where brightness drops about 40%, lamp life shoots up to

10,000 hours.

For data-images, the quality from the MC331W is on a par with Sony's DW240: text look pin-sharp and colors vibrant. The 1.2x manual zoom offers a bit of placement flexibility,

but you still need about a meter between the screen and the projector. Video performance is admirable, though Sony's model gave a more film-like rendition and pulled in more shadow details at times. But I've to say the MC331W is better suited for classroom use, thanks to its more powerful 16W monaural speaker and the fact that one of its D-Sub terminals doubles as a monitor output.

The NEC MC331W is an all-round data projector that will play nice in most mid-size meeting room and classroom settings. Its high brightness output makes it suitable for daytime use, with good data-image quality, and in typical NEC fashion, packs more features (e.g., louder speaker, better connectivity) than similarly priced competition.

CONCLUSION

Good data projection performance and better features than most in its class.



The projector has two HDMI as well as two D-Sub inputs.

TESTED & RATED

8.5 /10

HWM
SINGAPORE

Good MFP for a managed environment

Canon Imageclass MF729Cx

by Ng Chong Seng

Creating better paper pickup or roller designs and more efficient toners are some of the areas printer makers are focusing on improving. The MF729Cx is no exception to this trend, and its headline “on-demand fixing” tech, simply put, is what enables the printer’s 20ppm print speeds. It also reduces energy use and improves the printer’s general responsiveness, which is immediately obvious from a quick 23-second warm-up and 14.5-second first printout timings.

In addition to Canon’s

UFR II LT print language, the MF729Cx is compatible with the more standard PCL protocol as well as PostScript 3. The main paper tray accepts 250 sheets but you can add another to bring total capacity to 550 sheets. I like that you can easily scan to PC, USB host or network, and that there’s built-in support

for wired and wireless networking. There’s also a 50-sheet duplex ADF for more efficient two-sided scanning.

All these old-school features blend in well with modern features like NFC support, a free app for mobile printing and scanning, and a generous 3.5-inch color touchscreen that lets you position your favorite settings as shortcuts. With onboard secure

printing and the ability to integrate with Uniflow (Canon’s print and scan management platform), the MF729Cx fits well in a managed print environment, too.

Excluding processing time, the MF729Cx’s print speeds match up to Canon’s claims: I got 20.5ppm, be it mono or color printing. For what it’s worth, it took roughly 30 seconds (starting from the moment I hit the Print button on my Intel Core-quipped Windows test machine) to spit out a 4-page Word document. And replicating the same document with the copier took 38 seconds.

The quality of black text from the MF729Cx is excellent: dark, crisp, and with nary a fill problem. Graphics output is good too, with vivid colors and only very minute dithering steps. I noted some banding in photos, but that’s really

CONCLUSION

Print speed isn’t the fastest in class, but output quality is excellent and it has a very useful DADF.

AT A GLANCE

FUNCTION

Print, scan, copy, fax

A4 PRINT SPEED

20ppm (mono/color)

CONNECTIVITY

USB 2.0, Ethernet, wireless, NFC

POWER

300mw into 16 Ohm

PRICE

\$699

par for the course for laser printers. For most business documents, I think the default 600 x 600 dpi print resolution should suffice.

Canon has struck a good balance of performance and features with the Imageclass MF729Cx. If your print rate is a couple of thousand of pages a month, it’s well worth your consideration.



As with most MFPs in this class, it can read and print documents residing on USB flash media.

TESTED & RATED

8.0_{/10}

HWM
SINGAPORE



PICTURES CANON

New looks, (slightly) different sound

Plantronics BackBeat Pro 2

by Marcus Wong

Plantronics rather surprised us when they released their first BackBeat Pro in 2014, giving us a package that delivered a well-rounded set of features with impressive audio quality. The company then followed up with an equally capable on-ear headset (BackBeat Sense) and a flashy new set of in-ears (BackBeat Go 3), as well as a version meant for quality audio streaming from a computer source (BackBeat Pro+).

Fast forward to this

year, and we have the BackBeat Pro 2, with a more streamlined design, but the same great assortment of features that made the original BackBeat Pro so compelling.

Listening to the unplugged version of Eric Clapton's Layla, we thought the BackBeat Pro 2 reined in the bass line a

little too much, making the bassist sound thin.

Moving on to a recording of Fireopal by Ottmar Liebert, we got the sense that clarity is now also slightly improved compared to the BackBeat Pro+. On this particular piece, the bass seemed to

be just right, but the highs came off as a little sharp, reflecting a shift in the tuning.

On our formal test tracks, we thought the headphones did best on Hotel California by The Eagles and Buckethead's Sail on Soothsayer. With the former, the headphones demonstrated good detail in the trebles and mids. There's a nice ring to the guitars on this piece, and the headphones' slightly warmer sound suits it well.

The later was what suited the BackBeat Pro 2 the best though, as the headphones were able to reproduce good detail in the mids and highs, bringing Buckethead's heavy distort guitar to life. The intro was nicely delivered and we do think the tightened bass response worked well with this piece.

CONCLUSION

Solid audio performance at a price that puts some of its competition to shame.

AT A GLANCE

FREQUENCY RESPONSE

20-20,000 Hz

SENSITIVITY

93dB

IMPEDANCE

32ohm

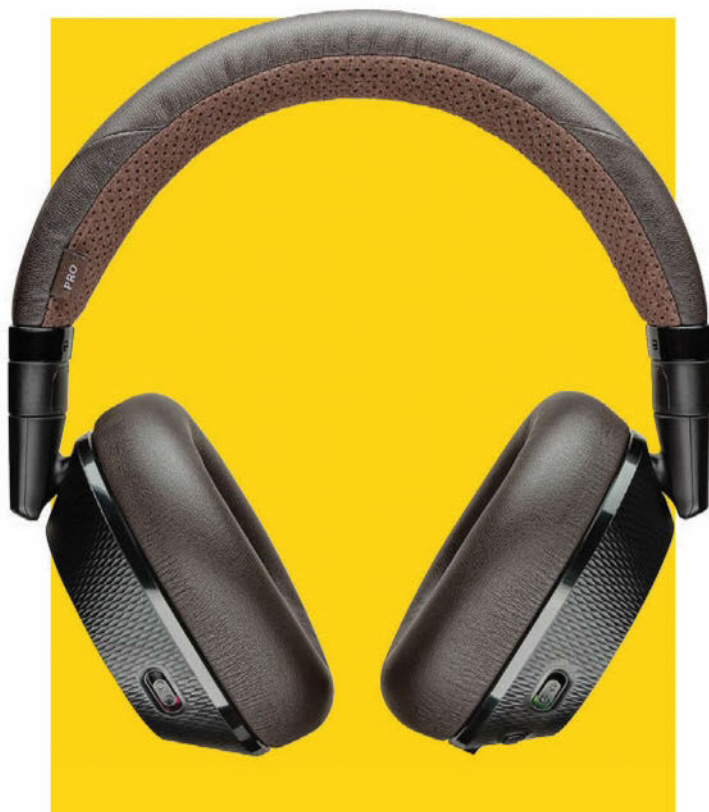
WEIGHT

289g

PRICE

\$319

Overall, it handled all genres of music quite well, is comfortable enough to wear for long periods, and has a great 24-hour battery life. At \$319, you'd be hard pressed to find better sounding headphones that offer the same feature set. Heck, we'd even recommend this over the BackBeat Pro+.



The row of battery light indicators now subtly runs on the side of the right earcup.

TESTED & RATED

8.5_{/10}

HWM
SINGAPORE

PICTURES: PLANTRONICS

Playing to what gamers want

Creative Sound BlasterX Vanguard Ko8

by Koh Wanzi



AT A GLANCE

ACTUATION FORCE

45g

ACTUATION / TOTAL TRAVEL DISTANCE

1.5mm / 3.5mm

DIMENSIONS

215 x 465 x 37.6mm
(w/o wrist rest)

149 x 465 x 37.6mm

PRICE

\$269

Creative is a brand best known for its wide range of audio products, including speakers, sound cards, headphones, and even amplifiers. Its Sound BlasterX line comprises mainly gaming headphones, but that family has now diversified to include Creative's first ever mechanical keyboard.

The Vanguard K08 keyboard has dispensed with the more common Cherry MX switches in favor of custom ones designed together with Omron. Dubbed PRES, short for Perceive-React-Execute-Switches, they are rated for a total of 70 million keystrokes, compared to the 50 million on Cherry MX switches.

One of the main selling points of these switches is the shorter actuation and travel distances – 1.5mm and 3.5mm respectively – which Creative says helps reduce key response times

and enables you to perform more actions per minute. This is actually in line with what other brands have done with custom gaming switches. For instance, Razer's own Green, Orange, and Yellow switches and Logitech's Romer-G also boast shorter travel distances.

In fact, the PRES switches appear identical to their Romer-G counterparts, the latter of which were also designed by Omron. They both feature the same surface-mounted LED in the center, which shines up directly through the keycap and enables brighter and more even illumination.

The PRES switches are also linear, so there's no tactile bump midway. They have a 45g actuation force,

and are probably best described as feeling closest to Cherry MX Reds.

Creative has put this to good use here, and the Vanguard is capable of some quite brilliant RGB lighting effects. There's even support for per-key customizations,

which opens the door to nearly limitless combinations. If not, there's a good range of preset effects that make for quite a visual spectacle.

The lighting customizations are done through Creative's Sound

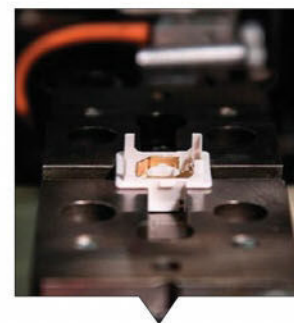
Blaster Connect software, and while it's intuitive enough to use, one glaring omission is the ability to bind custom commands to the row of five macro keys. This means you can bind them to specific controls only in the game settings

CONCLUSION

A well-built keyboard with plenty of features to satisfy avid gamers.

menu.

Other features include dedicated media keys and a volume wheel, which can come in quite handy if you spend a lot of time on Netflix or Spotify.



The PRES switch allows for quicker response times thanks to its shorter actuation distance.

TESTED & RATED

8.0_{/10}

HWM
SINGAPORE

Go big, go long

Huawei Mate 9

by James Lu



Huawei has been making well-crafted devices for a number of years now, and the Mate 9 is no exception. Having said that, it's not the most exciting design out there, especially because it looks so similar to the Mate 8 (which was only released nine months ago). The frame now has rounded sides, similar to the iPhone 6 and 7, and the back finish is glossy instead of matte. The phone's left edge houses a dual-SIM tray, and one of the

slots doubles up as a microSD card slot. On the right, you'll find both the power button and volume rocker. On the bottom, the micro-USB port has been replaced with a USB-C port, while on the top edge you'll find a 3.5mm headphone jack.

Despite having one of the largest displays on the market, the Mate 9 only has a Full HD (1,980 x 1,020 pixels) resolution display, which gives it a relatively low 373ppi. Clarity is

acceptable though, and the IPS LCD panel is one of the better ones out there, with rich colors and reasonably good contrast. The screen also gets very bright, with a maximum of 677 nits, making it easy to view even under the brightest lighting conditions.

On the back of the device, Huawei has once again teamed up with Leica to co-engineer its imaging system. The Mate 9 has a dual-lens system on its rear, however, it's a bit different from

AT A GLANCE

OPERATING SYSTEM

Android 7.0 Nougat with EMUI 5.0

PROCESSOR

Hisilicon Kirin 960 Octa-core (4x 2.4GHz Cortex-A73 & 4x 1.8GHz Cortex-A53)

DISPLAY

5.9-inch 1,920 x 1,080 pixels IPS LCD (373ppi)

CAMERA

Dual 20-megapixel (monochrome) + 12-megapixel (RGB), f/2.2, OIS, Leica optics, phase detection, laser autofocus, dual-LED flash

PRICE

\$898

most other dual-camera phones like the LG V20 and iPhone 7 Plus. Instead, the Mate 9's dual cameras are split into monochrome and color sensors, with the 12-megapixel sensor capturing RGB data and the

20-megapixel sensor capturing monochrome information. The idea is you can combine them together to deliver richer colors and finer details.

Because the monochrome lens has a higher resolution than the color one, Huawei says it can do "hybrid zoom." While this may sound like a combination of optical and digital zoom, as far as I can tell, there's nothing optical about it. Huawei's Hybrid Zoom seems to just be digital sensor cropping, where a photo is taken at a higher resolution and then cropped, something that we've seen before from the old Nokia Lumia phones, and more recently Sony.

Overall picture quality on the Mate 9 is decent, with photos taken under good lighting coming out sharp with good detail reproduction and accurate colors.

Some pictures do look a little over processed, and the auto-HDR is a little aggressive for my taste, but it does the job. Due to the relatively narrow f/2.2 aperture, low-light photography isn't the best, and even though the sensor has 6-axis optical image stabilization, pictures tend to be a hit-or-miss if there's not enough light.

The Mate 9 runs on Android 7.0 Nougat with Huawei's Emotion UI 5.0 on top of it. EMUI has several differences from stock Android, with the most obvious being the removal of the apps drawer. Instead, all of your apps live on the home page similar to iOS. Interestingly, there's now an option to restore the app drawer, but it's hidden in the Settings menu. This time round, Huawei has also adopted more of Google's features rather than force its own version of the same thing on you. For example, the Mate 9 now uses Google's default split-screen multitasking feature rather than its own solution like previous Huawei devices.

As usual for Huawei, the Mate 9 uses an in-house Kirin SoC. The Kirin 960

uses four of ARM's new Cortex-A73 cores and four low-powered A53 cores. It's also the first processor to ship with the new Mali G71 MP8 GPU. Benchmark performance was decent, with the 960 generally scoring in the vicinity of Qualcomm's Snapdragon 820.

Qualcomm's Snapdragon 821, Samsung's Exynos 8890 and Apple's A10

processors were all significantly more powerful.

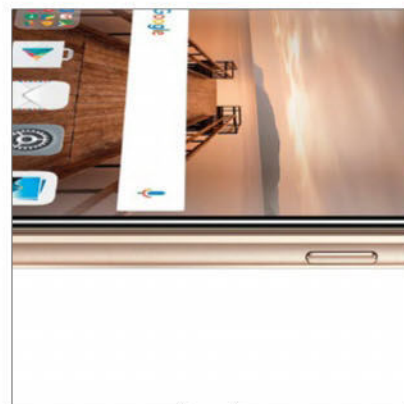
The Mate 9 has a massive 4,000mAh battery, giving it one of the highest capacity batteries out there. In combination with its Full HD display, this resulted in excellent battery life, lasting nearly fifteen hours in our video looping battery benchmark.

Ultimately, despite all of the technology Huawei has crammed into the Mate 9, its two best features are its

huge display and excellent battery life. While that makes it perfect if you spend all of your time watching videos on your phone, for \$898, we expect more.



The Mate 9 has a dual rear camera setup engineered by Leica.



The phone's ultra-thin bezels give it a compact footprint.

CONCLUSION

A decent, large display smartphone with outstanding battery life.

TESTED & RATED

7.5_{/10}

HWM
SINGAPORE

The data projector that goes on and on

Casio XJ-V110W

by Ng Chong Seng



AT A GLANCE

TECHNOLOGY
DLP

RESOLUTION
1,280 x 800

BRIGHTNESS
3,500 ANSI lumens

LIGHT SOURCE
LIFESPAN
Up to 20,000 hours

PRICE
\$1,399

A member of Casio's Core series of budget-friendly business projectors, the XJ-V110W uses a non-traditional laser and LED light source. Versus a conventional mercury lamp, this hybrid light source has several advantages, chief among them being a very long 20,000-hour lifespan. Coupled with a dust-resistant design and the fact there's literally no filter to replace, it seems to hit home with those looking for a low maintenance projector.

Under the hood, the XJ-V110W uses a single 0.65-inch DLP chip with a native resolution of 1,280 x 800 pixels. It goes up to 3,500 ANSI lumens in brightness and has a pretty generous 1.5x zoom lens. Both zooming and focusing have to be done by hand, which is par for the course for entry-level projectors. A single HDMI connection is found on the back, along with D-Sub for legacy devices and 3.5mm audio I/Os.

There's no native wired or wireless networking support on the XJ-V110W however, so if you want to project wirelessly from mobile devices, you've to turn to third-party add-ons, such as EZCast's Wi-Fi display dongles. Lack of in-built Wi-Fi aside, you also won't find niceties like a USB port

for sans PC image playback using a flash drive.

Getting the XJ-V110W up and running is a simple affair. It takes about six seconds to reach a full

and stable brightness; and if you need to move it quickly from one room to another, just press the power button again, pull the cord and go.

Picture quality-wise, the XJ-V110W is capable of very sharp text - I could read all

the way down to 6 points on a 60-inch screen with the projector placed about 1.7 meters away. Light output is high for a DLP projector, plus colors are for the most part vibrant and pleasing. If I looked hard enough, I could still see rainbow artifacts—unsurprising for a single-chip DLP projector—but most people probably won't notice it. My other gripe is that the

projector has no built-in speaker. Along with the lack of a monitor output, the usefulness of the XJ-V110W in a classroom setting and for video playback is diminished. If you project mostly static images like Office documents, I've no qualms recommending it.

CONCLUSION

A no-frills projector that will keep on working for years, but best used for data only images.



The projector has one HDMI and one RGB inputs.

TESTED & RATED

7.5_{/10}

HWM
SINGAPORE

What's this Blockchain I keep hearing about?

How Bitcoin's decentralized cryptocurrency technology could be the answer to world peace, or at least a more transparent and secure digital world.

by Zachary Chan

So you've heard of Bitcoin as this form of digital currency, but don't really understand how it works, where to use it, or even how to get hold of some. Not surprising really since you can't exactly waltz into any bank and exchange for some Bitcoins or buy groceries from the wet market down the street with it. Whenever people talk about Bitcoin, another buzzword often pops up, and that's Blockchain. Why is that?



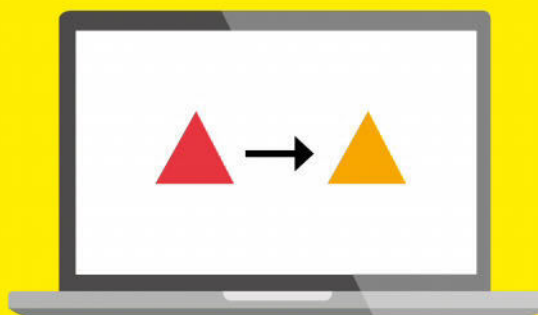
Well, that's because Bitcoin is the first digital currency to make use of blockchain technology as a form of secure transaction verification. In Bitcoin, a blockchain is a distributed database of transactions that is duplicated throughout a decentralized network. Compared to the traditional centralized server model, blockchain offers two major benefits: durability and transparency.

Every computer (node) in a blockchain network always carries a full identical copy of the database that's constantly reconciled across the network, therefore there is no one master copy sitting on some server somewhere. This means that your data cannot be owned by any one authority (or company) and is also protected against any single point failures in the network. When a transaction happens, all the nodes in the network concurrently verify and authenticate the transaction, then appends a permanent record of said transaction onto the database as the next "block", thus forming a "chain" of events that is publicly, independently auditable and virtually impossible to corrupt or manipulate without bringing down the entire blockchain network.

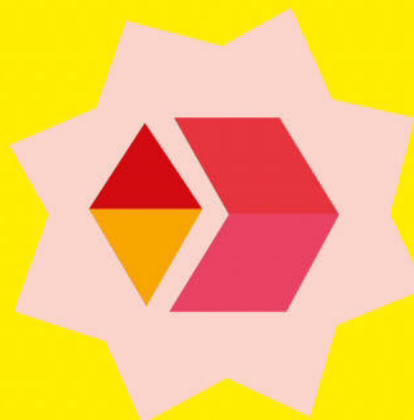
Did you know?

The development of Bitcoin, and by proxy the first blockchain is attributed to a Satoshi Nakamoto based on a whitepaper published in 2008 called Bitcoin: A Peer-to-Peer Electronic Cash System. The name however turned out to be a pseudonym, and to date, the real person(s) behind Satoshi Nakamoto is still being speculated.

HOW IT WORKS:

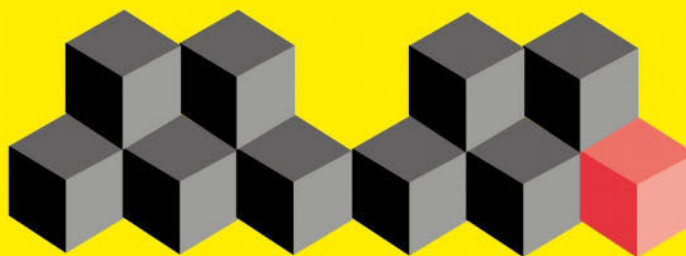


Someone requests a transaction



Once verified, the transaction is combined with other transactions to create a new block of data for the ledger.

The new block is then added to the existing blockchain, in a way that is permanent and unalterable.



**Blockchain is awesome,
I want to jump onto the
bandwagon right now!**

ACRONIS NOTARY

www.acronis.com

Acronis introduced the Notary feature into their consumer True Image 2017 backup software in January 2017 as part of its premium New Generation offerings. This function allows you to sign, notarize and authenticate digital files and documents using blockchain technology, creating proof of integrity that files haven't been tampered with, timestamping and tracing document movements or other digital rights management uses.

BLOCKSTACK / ONENAME

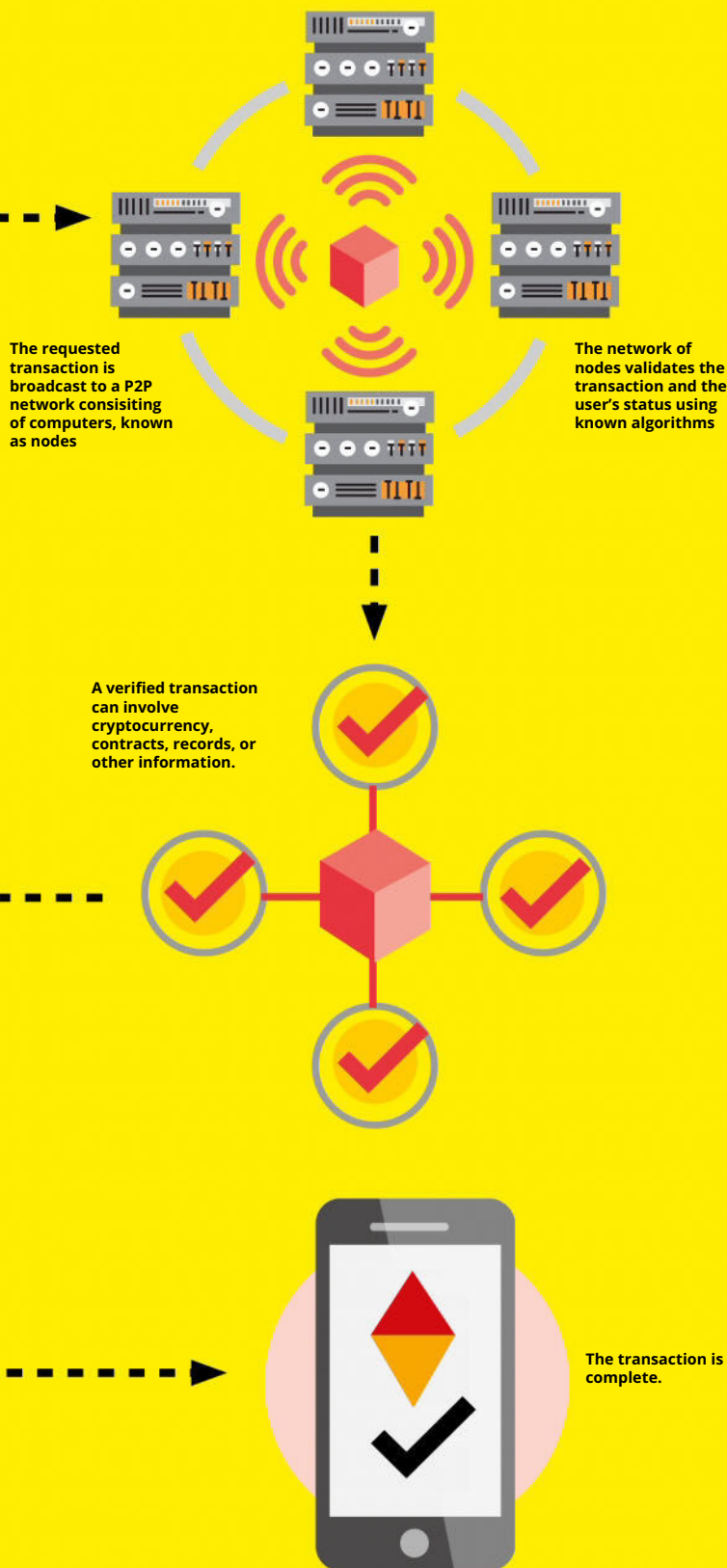
blockstack.org / onename.com

If you're a developer, Blockstack lets you build apps on its decentralized and server-less network. Its creators call it the new internet, where "there are no middlemen, no passwords, no massive data silos to breach, and no services tracking us around the internet." Even if you've no interest in developing apps, you can take advantage of Onename to create a blockchain ID for yourself which can be used to prove your online identities or digitally sign documents.

STORJ

storj.io

Storj (pronounced as storage) is a cloud storage service that uses a distributed P2P network to store your files instead of their own servers. If this seems familiar to you, it's because it's basically how Bittorrent works. Except, instead of sharing files with everyone, you're storing files with them. Data is protected with end-to-end encryption using blockchain technology so no one but you can open your files, plus you can even earn some money by renting out extra storage space.



The untold secrets of AppleCare+

Or why some people have stopped buying iPhone cases these days

by Ng Chong Seng



I've now more than a handful of people telling me they've been using their iPhone "naked" because they've bought the best protection available for the handset. It's not some titanium case or some 3D screen protector – what they've opted instead is AppleCare+.

Priced at \$228 for the iPhone 7/7 Plus and iPhone 6s/6s Plus, AppleCare+ basically extends your warranty coverage to two years from the date of purchase, and adds up to two incidents of accidental damage coverage, each subject to a service fee of \$42 for screen damage, or \$148 for any other damage.

More importantly, there's Apple's

Express Replacement Service. A benefit of AppleCare+ coverage, when you request for ERS, Apple will promptly send you a replacement device in exchange for your faulty device. To prevent scams, Apple will temporarily authorize for a charge equivalent to the full price of the device on your credit card until it receives your damaged device. Note: You may still need to pay related costs (such as the \$148 fee for accidental damage), but only when they apply. ERS is great if you don't want to deal with service centers; and remember, you keep the as-good-as-new replacement device. Nice!

2 MUST-DOS BEFORE SELLING YOUR IPHONE



☐ Selling your iPhone online to a total stranger or handing it down to a family member? Whichever's the case, it's imperative to backup and erase your personal data the right way.

For backup, I recommend doing an encrypted backup using iTunes. (Find the 'Encrypt iPhone backup' checkbox Under Summary > Backups.) Security aside, this method backs up more info, such as your saved passwords, Wi-Fi settings, website history, and health data.

Erasing your data is as simple as going to Settings > General > Reset, and hit 'Erase All Content and Settings'. You'll be prompted to enter your password to turn off Activation Lock and remove the device from Find my iPhone.

App Attack: MEET PEOPLE, CHIT CHAT, MAKE MONEY

by Zachary Chan



AGENTBONG

iOS, Android
Free



Agentbong lists itself as a home based professional service that connects

homeowners with helpers for a wide range of jobs. Some of the services you can request from the app include babysitting, elderly care, cooking and home cleaning. So if you're good with kids, think you're a great cook or perhaps just generally handy with household chores, you can earn some money through some freelance work by applying as a helper.

PAWSHAKE

iOS, Android
Free



So maybe you're not a real people person, but you're great with pets. Pawshake lets

you sign up as a pet sitter where you can spend time quality time taking care of other people's furkids when they're indisposed or on vacation. Services can range from dog walking and day care to boarding and house sitting. As a pet owner, you can browse through verified pet sitter profiles, community reviews, and get daily photo updates of how your pet is doing.

AIRFROV

iOS, Android
Free



Instead of blowing your bonus on an impulsive shopping spree on

vacation, earn some pocket money shopping for other people instead. You can even treat it like an adventure where you're a high-flying personal shopper, hunting for exclusive merchandise for your discerning clientele. As a customer, you're matched with travellers already going to the country your item is in, so they can shop for you without inconveniencing their holidays.

HEYMEET

iOS, Android
Free



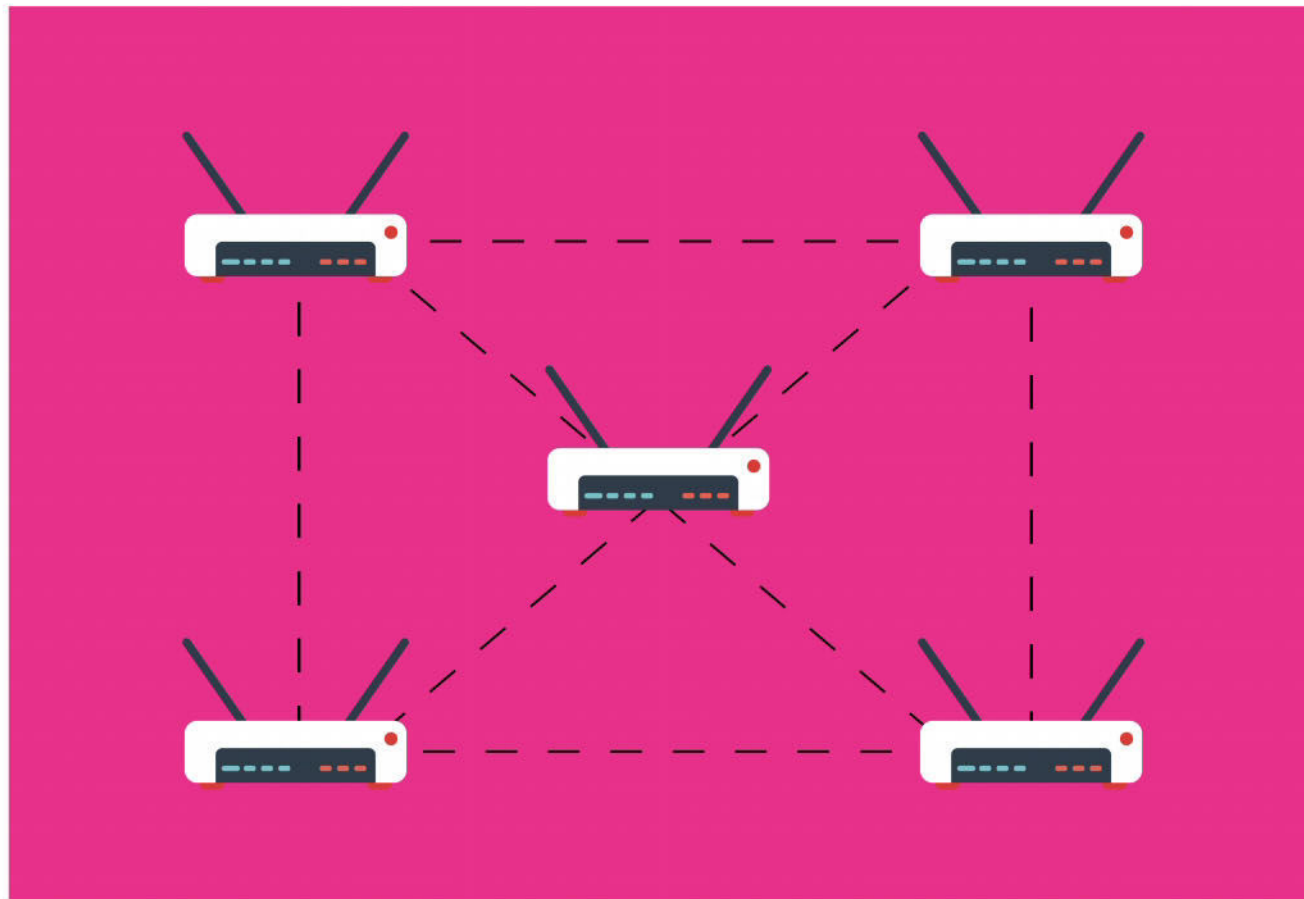
Forget hookup apps like Tinder or Paktor if you want to organize a power lunch

and talk shop. Perhaps your calendar suddenly freed up or you were hoping to spark some fresh ideas with hipster-like pop-up networking events. If hanky panky is the furthest thing from your mind, HeyMeet is a new social app specifically designed for professionals to create spontaneous casual or business lunch events.

ASK ME ANYTHING

by Alvin Soon

Have a burning question? Email it to editorial@hardwaredmag.com



Q: What are mesh Wi-Fi routers?

Instead of one Wi-Fi router trying to engulf an entire home from a single location, think of mesh Wi-Fi as several devices, or ‘nodes,’ spread out over a home to blanket the entire space.

Only one wired node needs to be connected to the internet modem. That node shares its internet connection wirelessly with the other nodes nearby, which then pass their connections to other nodes near them.

The more nodes, the further your mesh Wi-Fi spreads, and the more internet you get around the house.

It’s the perfect solution for big spaces with dead zones that a single router can’t reach.

Is mesh Wi-Fi for you? If you have a house smaller than 2,000 square feet, you might actually be better off with a good router that’s strategically placed, with a Wi-Fi extender for those hard to reach areas.

That’s because mesh Wi-Fi systems, from companies like Eero, Netgear and Linksys, are expensive compared to regular routers. Google Wifi is one of the cheapest mesh Wi-Fi systems around, and it still costs US\$299 for a pack of three.

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Elbphilharmonie, Hamburg, Germany

by Alvin Soon

■ The Elbphilharmonie just opened its doors for the first time in January. The outer façade of the building is astonishing in itself, with a wavy glass exterior sitting on top of solid concrete, but it's the central auditorium that's a marvel of science and art.

The auditorium's interiors are lined with 10,000 acoustic panels, each one designed by an algorithm, each one uniquely different. One million 'cells' altogether are carved onto the panels to shape sound, their unique shapes give the panels the appearance of seashells.

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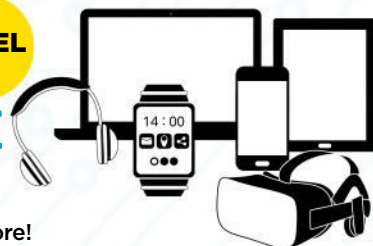
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