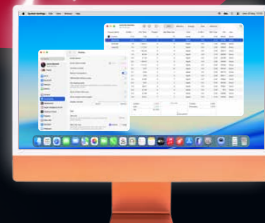


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Last year's tech Tomorrow's prices.

More than anything, my initial reaction was surprise that Valve just went ahead and released the Steam Machine at all. It costs at least a third more than a similarly performing DIY or even prebuilt PCs. Nobody will buy one, right? It will pass into history as a sad note in the tale of the late 2020's tech price crisis. Right?

Well, scalpers apparently know better... Steam Decks are now everywhere on Ebay and the rest of the online marketplaces too, and at astonishing markups. The 2TB model officially goes here for \$2,228 with a controller, which is ridiculous. We're being triple-slugged by the Australia Tax, the RAM crisis and Valve's cool cachet 'premium' pricing expectation. What flavour of fool would pay retail for this PC, let alone an inflated price?

Well, people are. On Ebay they're typically \$3,000-\$3,500 – sometimes more. What? It doesn't make any sense. And they're actually selling. Incomprehensible. Have a look at our review on page 26. We compared the Steam Deck to a far less cool but much more capable pre-built – the MSI MAG Infinite E1 PC, available all over the country and at pretty much every Officeworks. It's a monsterkill – the pre-built Officeworks PC easily decimated Steam Machine in the bechtests, and not by a little bit. The off the shelf PC has a much better CPU with more cores, a more powerful GPU and double the storage all for almost a third cheaper. And if you want to spec-up the MSI to match the price of the Steam Deck you're going to be enjoying a vastly better set of components.

We didn't cherry pick that Officeworks PC, either, it just happened to be one we had bechtest results for, and is currently widely available roughly in the same pricing ballpark. Any PC reseller will sell or build you a PC that will out-perform the Steam Deck and save you a bundle of money too.

I can't explain it. It defies common sense. All I can think of is that there are some well-heeled people out there that simply must own a Steam Deck, and will pay anything to get one. And, perhaps, Valve's own stock was so limited that the scalper's market becomes viable.

It's all a crying shame. The Steam Deck is a beautiful concept and should have been exactly the right product. But it came at the worst possible moment in PC history. What will its future be? A collector's curio? This century's Neo Geo – an elite luxury that isn't actually real-world relevant? I eagerly look forward to the return of sanity. ■

HOT TAKES

Data centres in space are possible, and at this point perhaps even likely – but they won't solve the computing crunch happening here on Earth.
Futures, page 22

The last 25 years of progress in haggard man-face technology are on full display in *Gothic Remake*, with an endless parade of men who look like they once brought home a puppy they bought in the pub for their kid, and then had a hell of a time explaining it to the missus. They look like Black Sabbath roadies teleported in from the '70s. They look like the one uncle you only see at Christmas.
Gothic Remake review, page 108

First the cryptominers wanted all our graphics cards, then AI companies wanted them. Then the AI companies wanted all our RAM and flash storage too. The surge in demand sent prices rocketing, and we're left like sooty-cheeked, thin little boys in a scene of Dickensian squalor, picking among the crumbs at the table where the tech bros feasted.

Tech tales, page 118

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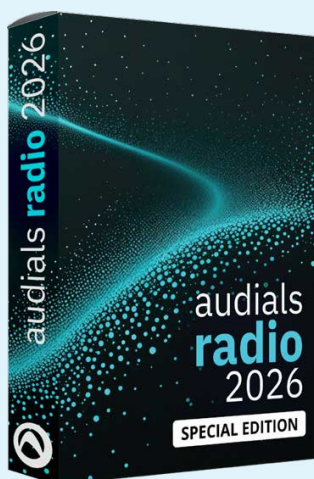


ASHAMPOO EASY PAINT

EFFORTLESS IMAGE EDITING FOR THE OFFICE.

Ashampoo Easy Paint is a user-friendly image editing program designed specifically for everyday office use. With its clear interface, users without prior experience can easily access essential functions like cropping, rotating, and resizing images. The software also supports adding text, notes, and annotations, allowing for quick commenting and labelling of images.

Thanks to export options in PDF and PSD formats, edited content can be shared effortlessly. A key feature includes specialised tools for fast marking, numbering, and highlighting of image content, as well as a function to obscure sensitive information. This makes Easy Paint ideal for office users who want to efficiently enhance documentation and presentations with annotations, without needing complex software.

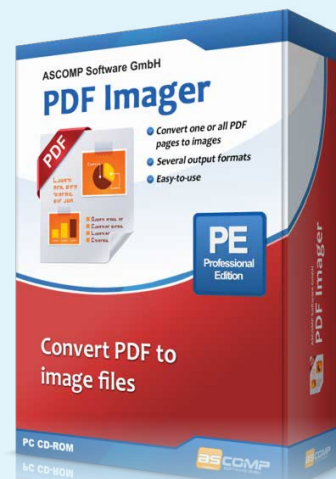


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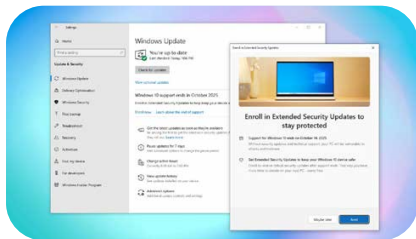
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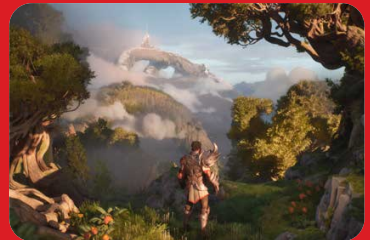
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TECHNOTES

Everything you need to know from the month in tech



Getty

APPLE CEO WARNS AI-DRIVEN PRICE INCREASES ARE UNAVOIDABLE

Says company is trying its best but “the situation has become unsustainable”.

Apple CEO Tim Cook has warned in an interview with the *Wall Street Journal* that price hikes on Apple products are unavoidable, because the price of memory has increased to a degree that the company must now pass on increases to customers.

He noted that Apple had attempted to offset rising component costs and protect customers from higher prices, but indicated in the interview that the company could no longer absorb the increases indefinitely. While Cook declined to discuss timing or the magnitude of the planned price hikes, some Apple products may see higher prices sooner rather than later. The company already raised the base price of its Mac Mini last month and eliminated its highest-end model.

BONUSES FOR SK CHIP WORKERS FLAGGED AS A NATIONAL INFLATION RISK

Memory boom payouts worth up to \$655,000 may hurt SK economy.

The Bank of Korea has named performance bonuses at Samsung Electronics and SK hynix as a risk to the country's inflationary stability, warning in a price-stability report that payouts worth several hundred thousand dollars per worker could push wages higher across the wider economy. The central bank found that special pay in the IT sector increased by 60.6% year over year in the first quarter, while wage growth elsewhere ran at just 2.1%, a gap wide enough that two chipmakers are now featured in national monetary policy. The payouts can of course be traced back directly to the AI-driven memory supercycle that has sent DRAM and NAND contract prices climbing through 2025 and 2026.



Microsoft

Microsoft ‘resets’ Xbox

Cutting 3,200 jobs this year, divesting five game studios.

Microsoft’s gaming division, Xbox, will eliminate approximately 3,200 jobs over its 2027 fiscal year in an attempt to turn around its floundering business. The cuts include offloading four studios with plans to spin off another, though no announced first-party games are being cancelled.

“We are operating at margins that are 3-10x lower than comparable platform and publishing businesses,” Recently appointed Xbox CEO Asha Sharma wrote in a note to Xbox employees, pointing out that investments in studios and Game Pass did not add as much value as expected. She wrote that the business typically loses 64 cents for every dollar invested. “As that happened, our core business weakened, and we added more teams, more investment, and more time, hoping for a better outcome. And now the industry is facing the most severe hardware crisis in its history. We must reset Xbox.” She wrote that she has a goal for Xbox to reach more than a billion people per day.

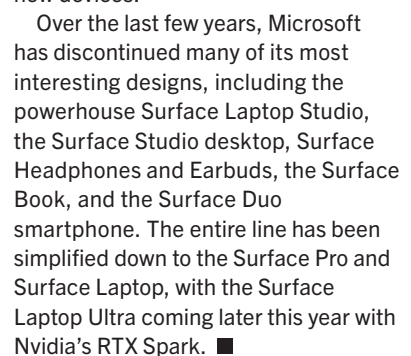
Xbox is selling Compulsion Games (*South of Midnight*) and Double Fine (*Psychonauts, Kiln*), back to their management as independent studios, along with their catalogues,

intellectual property, and funding for their next games. Meanwhile, Ninja Theory and Undead Labs are being sold to unidentified “new ownership” and will continue to work on *Senua and State of Decay 3* with Xbox, respectively.

The fifth studio, Arkane, is entering consultation to review options due to France’s strict labour laws. The company is currently working on *Marvel’s Blade* and previously worked on *Redfall* and *Deathloop*.

In Sharma’s letter, she wrote that changes will come to Activision, Bethesda and ZeniMax, Blizzard, King, Mojang, and Xbox Game Studios. Some will focus more on popular franchise games. Bloomberg reports that ZeniMax will focus specifically on its biggest names, such as *Fallout*, *Doom*, *The Elder Scrolls*, *Quake*, and *Wolfenstein*.

“These changes are about a bigger future for Xbox, not a smaller one,” Sharma wrote. “The next decade of gaming will be larger, more global, and more creative than anything we’ve seen before. This year, we’ll invest as much in Xbox as we ever have, but we’ll invest with greater focus, greater discipline, and greater clarity, all in service of making Xbox where the world plays and creates.”



Windows 10 holdouts are already calling on Microsoft to extend support beyond 2027

Critics on Microsoft extending Windows 10 support for free through 2027: “Are they admitting Windows 11 isn’t good enough 5 years later?”

On October 14, 2025, Microsoft officially ended support for Windows 10, despite widespread pleas from millions of users still relying on the operating system. The move risked leaving nearly 400 million PCs without updates, effectively rendering them obsolete. However, Microsoft ultimately extended Windows 10’s lifespan through its Extended Security Updates (ESU) program, giving users continued access to critical patches beyond the end-of-support date.

The Restart Project group, which helped co-develop the “End of 10” toolkit to support Windows 10 users who can’t upgrade to Windows 11, claimed that Microsoft’s move to continue pushing security updates to Windows 10 beyond its end-of-support feels like a last-minute snooze button, which only acts as a band-aid on a bleeding system.

It’s no secret that Microsoft has

been pushing users to upgrade to Windows 11, but soaring RAM prices have driven hardware costs sky-high, making the transition even more difficult. This is on top of the operating system’s strict hardware requirements and arguments of flawed design elements.

In France, critics even staged a symbolic “funeral” for Windows 10, protesting Microsoft’s push toward Windows 11 and what they see as planned obsolescence. Yet, as recent developments suggest, the company may finally be listening. Microsoft quietly extended Windows 10’s ESU program by another year. As a result, users enrolled in the program will continue receiving support until October 14, 2027. The extension is free for those who sign in to Windows 10 with a Microsoft account, ensuring critical updates remain available beyond the original cutoff.

Groups like End of 10 have been pushing users to transition to

Linux following Windows 10’s end-of-life. The campaign encourages steadfast Windows 10 users to ditch the Windows ecosystem entirely and switch to a version of Linux on any outdated devices, using a lack of ads and telemetry tracking as the key selling points to get users to switch camps.

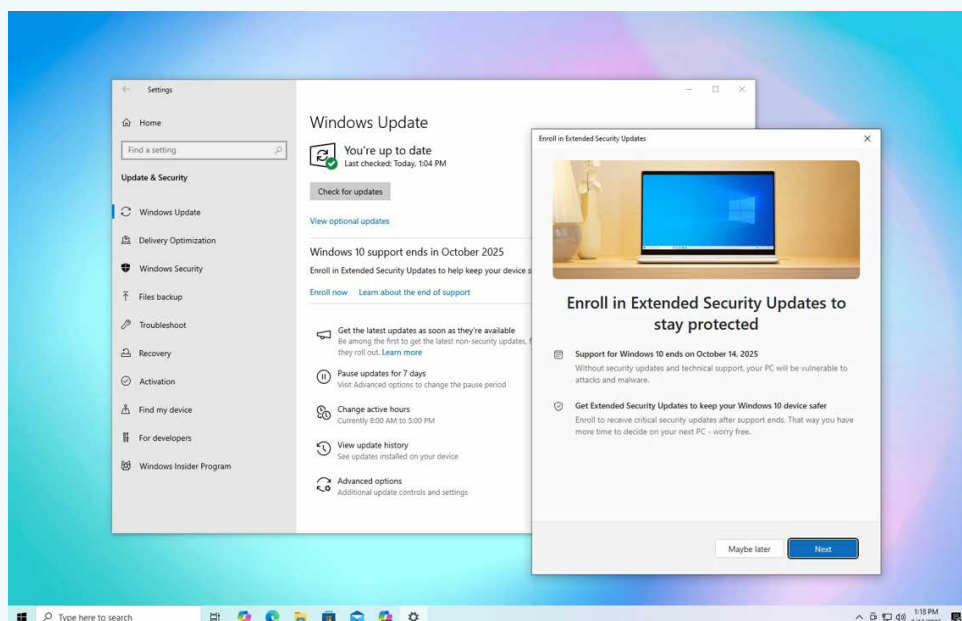
For context, a recent HP survey found that 3 out of 10 HP PCs are still running Windows 10. This was a slight decrease from September 2025, when HP and Dell indicated that up to 50% of PCs were still running on the operating system, prompting the PC makers to suggest that users won’t upgrade to Windows 11 overnight, and the process could even roll over into 2026.

Some even claimed that Microsoft’s decision to extend Windows 10’s support beyond 2026 is an outright admission that it’s better than Windows 11. “So are they finally admitting that Windows 11 isn’t good enough almost 5 years later?”

To that end, it remains unclear how Microsoft extending support for Windows 10 via its ESU program to 2027 will impact Windows 11’s market share. The operating system had just started gaining some momentum and even surpassed Windows 10 as the most dominant desktop operating system in the world in July, 2025.

In the interim, you can take advantage of Microsoft’s extended support for Windows 10 by enrolling in the ESU program for free (tinyurl.com/APC561esu) by signing in with a Microsoft account, or pay for access via 1,000 Microsoft reward points or US\$30. ■

Kevin Okemwa



The AI tokenmaxxing party is crashing over spiralling costs

Leaked consulting firm audio suggests no one is sure how to measure AI effectiveness.

The era of AI tokenmaxxing may be well and truly over. Alongside stories of Amazon cutting its AI leaderboard and an unknown company blowing through \$500 million worth of tokens in one month, leaked audio has emerged from consulting firm Accenture as it tries to figure out how to rein in rampant token spend at client companies, 404Media reports.

In leaked audio, Accenture acknowledges that certain trivial

encouraging employees to use it so much that if they didn't, they risked missing out on promotions. But that seems like a policy destined for the AI history books, as Accenture is now clearly aware that it's overspending on AI, and many of its clients are too.

For much of the past year, many companies have charged full speed into an AI-heavy business strategy. Amazon had an AI leaderboard, and Nvidia's CEO Jensen Huang said he'd be

workflows and automation and then enterprise-wide deployment of some of these tools like Copilot, Claude Code, and Codex."

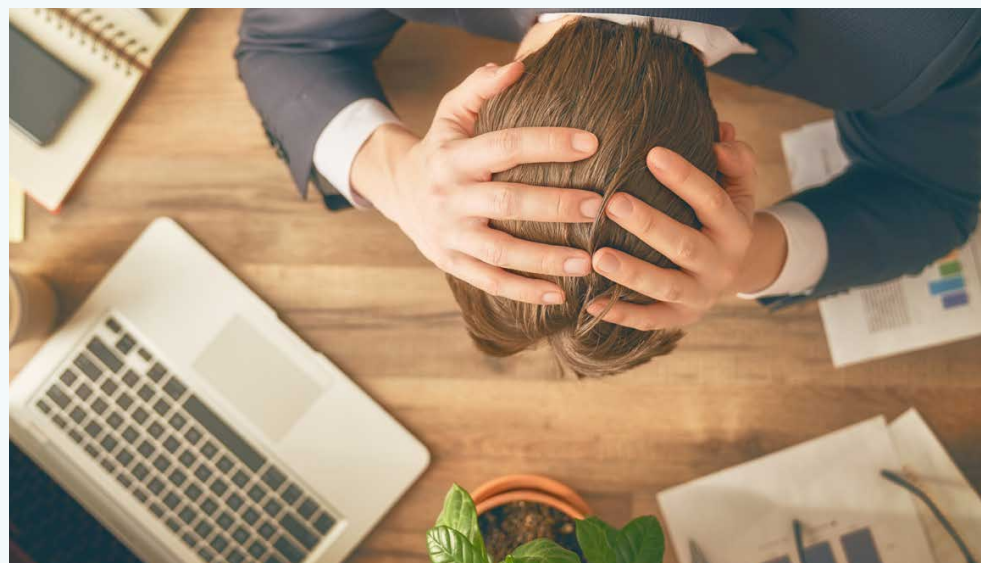
This isn't something that will be contained to just a few firms, either, he said. "It's really not a niche problem. It is a problem that every enterprise will face if they are bullish on AI, if they haven't already," he said, adding that token spend was increasing, "exponentially, as more and more people are starting to use AI."

But that may be starting to change. Amazon canned its AI leaderboard – it's rumoured to be the mystery company with a half-billion dollar AI spend in one month – Uber is capping AI use to cut costs, and Axios reported at the end of May that a number of CEOs and companies were switching to more affordable models, and more closely monitoring employee usage.

This all comes in the aftermath of the move by many of the major AI providers to token-based billing. Where previously subscriptions offered very favourable rates for AI use, suddenly companies were having to pay for the tokens they input, and the tokens the AI output – even when it was verbose, or made mistakes, or required follow-up correction.

What's clear from the Accenture leak and actions of some of the major tech companies, which have previously been so bullish on AI use, is that the finances of mass AI adoption at the per-token scale don't line up. Without a clear way to measure the return on AI investment, we may find even the most tokenmaxxing companies look to restrict access and spend through the rest of 2026 as they re-address AI strategy. ■

Jon Martindale



"Amazon had an AI leaderboard, and Nvidia's CEO Jensen Huang said he'd be alarmed if engineers weren't spending at least 50% of their annual salary on AI tokens."

tasks being offloaded to AI are causing massive token overspend, especially when agentic AI is part of the mix. The staff in the meeting clearly recognises that not only is AI spend growing out of control at companies heavily adopting the technology, but that there is very little way to predict how much any tasks would cost, or whether there is real value in using AI to complete them.

Accenture has previously been incredibly bullish on AI, even

alarmed if engineers weren't spending at least 50% of their annual salary on AI tokens.

This is leading to runaway token spending, something Accenture is seeing in its client data. Accenture's agentic AI strategy lead, Justive Kwak, was quoted in the audio saying: "What we're seeing right now is just rapid escalation in AI token spend [...] as companies start to scale AI, moving from like simple chatbots into use cases that feature agentic



The unintended effect AI is having on the PC industry

With Computex 2026 less about consumers and more about businesses, Mark Williams is worried about how long the industry can bear this.

It seems AI hysteria has also affected the PC industry's premier showcase event, Computex, held in Taipei in June. While it went off without a hitch, many attendees commented on the show's subdued nature compared to previous years. Not only were there fewer products on display, but stalwarts of the PC industry were being actively forced out of the event's main hall.

With prolonged pressure from AI demand on the PC ecosystem, sales are tougher for some than for others, forcing them to adapt and pivot to meet AI demand rather than try to ride out the bubble from the outside. Boutique water-cooling companies, for example, are shifting toward designing server rack cooling solutions for businesses rather

than consumers to stay afloat in the current market and make a quick buck while the boom continues.

That answers why there's a glut of consumer products from the show, but it also explains why PC industry icons were forced into secondary halls and ancillary locations around the event: it turns out the Computex organisers were giving preference to companies with AI products in the main hall over those without.

As a result, larger companies like Asus, with diverse portfolios, were able to maintain a presence in the main hall, but companies like Silverstone and Cooler Master were located elsewhere in favour of AI startups that had barely any products to show, few of which were consumer-facing.

Last year we were complaining about the word AI being slapped on every consumer product just to join the fad; now it's beginning to hit hard on actual consumer product innovation as it sucks the R&D and sales attention away from consumers to focus on business products.

With PC sales down due to the AI-induced memory crisis, which is affecting all that make PC components, let's hope AI demand doesn't last so long as to cause consumer-focused companies to disappear altogether. ■

Mark Williams is an IT professional with a strong interest in voiding warranties.

Shop Talk

WHAT PRODUCTS FROM COMPUTEX GOT YOU EXCITED?

Richard, Aftershock PC: "The standout to me was the amount of screens on everything over there. Fans, coolers, GPUs, chassis, etc all are coming with a lot of screen space. While there have been some expensive options on the market here for quite some time, it seems like it will shortly become mainstream to have a PC filled with little screens. It will be interesting to see if it's just the current trend or if it will last for the long term.

There were some pretty cool anniversary edition components coming out from various

brands. I imagine these will be very limited, but it will be great to be able to offer these when they get released.

It seems we will have to wait for quite some time before we see new GPUs, CPUs and anything to do with RAM / SSDs getting some sense back into the market."

Dejae, Umart: "The breakthrough architecture showcased this year proved that AI is no longer a bolt-on feature — it is the foundational engine of the modern PC.

We were particularly thrilled by the massive leaps in AI PC with local NPU performance and hybrid compute frameworks that allow sophisticated AI models to run on-device securely and efficiently.

We are looking forward to providing our customers with complete, intelligent environments rather than just standalone products. Hardware is the canvas, but the broader technology ecosystem is the actual experience we are delivering to our customers."



Microsoft's latest Xbox layoffs reveal a shallow, callous corporation with no entertainment smarts

It's the best endowed company in the games industry, but it can't help but fail.

When Microsoft purchased ZeniMax Media in 2021 – the parent company of Bethesda Softworks, id Software, Arkane Studios, and more – the refrain from Xbox leadership was that it would be business as usual for the teams operating under that umbrella. Of course, no one believed them, and if you did you're a fool.

Still, from the vantage point of 2021, it would have been hard to imagine things getting this bad. During its most recent round of mass layoffs numbering over 3,200 staff, with 1,600 to go immediately, and more to follow during FY 2027, Microsoft has gutted some of the industry's most storied

id Software was one of the most performant studios under ZeniMax: its modern *Doom* trilogy has sold astonishingly well and revived a long-dormant IP. id Software did exactly what a triple A game studio is meant to do: it released big blockbuster games with bleeding edge graphics tech every four years. While there's a ruthless kind of business sense in Microsoft fobbing off Double Fine, or Compulsion, or Undead Labs, its demolition of id Software demonstrates that these layoffs are being made by a company either hostile towards or oblivious to the market it purports to serve.

"Former Activision boss Bobby Kotick, in a classic case of "the worst person you know makes a good point", put it succinctly when he told Phil Spencer that Microsoft is not a creative company."

game development studios.

In early July, Microsoft effectively closed id Software after 25 years. Effectively, because while the studio is still technically "open", 136 of its 185 staff have been laid off. According to now former id developer Derek Best, "Collective decades of knowledge was wiped out of the studio." Other reports suggest the team working on the id Tech engine – whose first iteration powered the original *Doom* – has been entirely disposed of.

Former Activision boss Bobby Kotick, in a classic case of "the worst person you know makes a good point", put it succinctly when he told Phil Spencer that Microsoft is not a creative company.

In other cuts: half of ZeniMax Online Studios (*Elder Scrolls Online*) has been sacked, calling into question the MMO's ongoing sustainability. Accessibility leadership has been canned. Obsidian, a veteran RPG studio who puts out big ambitious blockbuster games at a steady cadence, has lost a quarter

of its team and has reportedly been forced to pivot away from its own IP to work on *Fallout*. Blizzard hasn't been touched, but anything can happen this financial quarter.

In an interview with *Wall Street Journal*, Xbox boss Asha Sharma said that "a healthy Xbox could weather the shock of the hardware crisis". She went on: "With an unhealthy Xbox, it becomes really challenging, and it accelerates a lot of the changes we need to make."

What she doesn't mention is that the AI rush has triggered this RAMpocalypse, an AI rush Microsoft is fully invested in. She also said, in a separate statement, that she wants "Xbox to be one of the few companies that entertains more than a billion people each day", which is delusional, and with expectations like that (Steam, for example, gets around 140 million monthly active users) I can't imagine Xbox ever being healthy. It's not in the company of making games or fostering the teams that create them. Overall, its effect on the industry has been overwhelmingly negative and, given its lofty ambitions, that's unlikely to change. ■

Shaun Prescott is an Australian editor for PC Gamer and GamesRadar, and writes for APC, TechRadar and more.



Apple unintelligence

Apple's Siri AI announcement was a kick in the teeth for loyal fans.

WDC 2026 gave me déjà vu. After all, we've seen Apple's artificial intelligence (AI) promise before. Two years ago now, Apple unveiled Apple Intelligence, which the company deemed 'AI for the rest of us', but most of those promises lacked any substance, and Apple's artificial intelligence strategy quickly started to unravel.

Two years later, Craig Federighi, Apple's SVP of engineering, and co are back, and this time the Cupertino company has partnered up with Google to bring Siri AI, an AI copilot for your Apple ecosystem that looks like it will actually fulfil the promises of yesteryear. So, why, if my dreams of a true AI sidekick in my iPhone are closer than ever to reality, do I feel so downbeat about Apple's latest suite of software announcements?

Well, for starters, if you watched Apple's WWDC keynote, you'll have noticed the company decided to double down on its high horse and refuse to acknowledge its AI shortcomings. Just a reminder, this is a company that sold the iPhone 15 Pro as the best iPhone for AI without actually shipping any of the AI

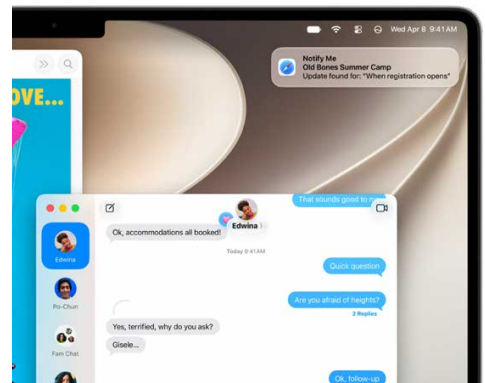
features people were purchasing the smartphone for.

In a near two-hour presentation, not once did Apple show some humility and self-awareness to state how it had failed customers over the last few years, instead showcasing what looks like a reskinned version of Gemini. Two years ago, Apple told us its AI image generation was intentionally limited – a principled choice, it implied, to avoid disrupting creative industries. It was a neat piece of spin that let the company dress up a technical shortcoming as a moral stance. Now, in 2026, Apple is shipping what I can only assume is Google's latest Gemini model under a new coat of paint, and the idea of limitations out of respect for craft has disappeared with no acknowledgement.

At one point in the presentation, a presenter said, "Siri can even understand my spelling mistakes," at which point I scoffed because every AI chatbot can understand spelling mistakes, yet we're meant to see this as Apple innovation.

Don't get me wrong, I'm excited to have a version of Gemini running natively on my iPhone with indexed access to my smartphone's filesystem, and I believe it will make the iOS, iPadOS, and macOS experience better. But WWDC 2026 was also a chance for Apple to win back the customers it had failed over the last couple of years, and instead, it just pushed them further away.

I sit here after WWDC 2026, thinking about the future of the tech industry as a whole, and honestly, I feel pretty disheartened. We've come a long way since the original iPhone launched nearly



With Notify Me, Safari can monitor a webpage for updates, so you can be notified of date changes, price drops, and so on.

two decades ago, but it feels like the last two years have really seen the consumer tech industry stagnate. AI is sold as the present and the future, but how are we meant to get excited about seeing the same tools repackaged and skinned across different platforms?

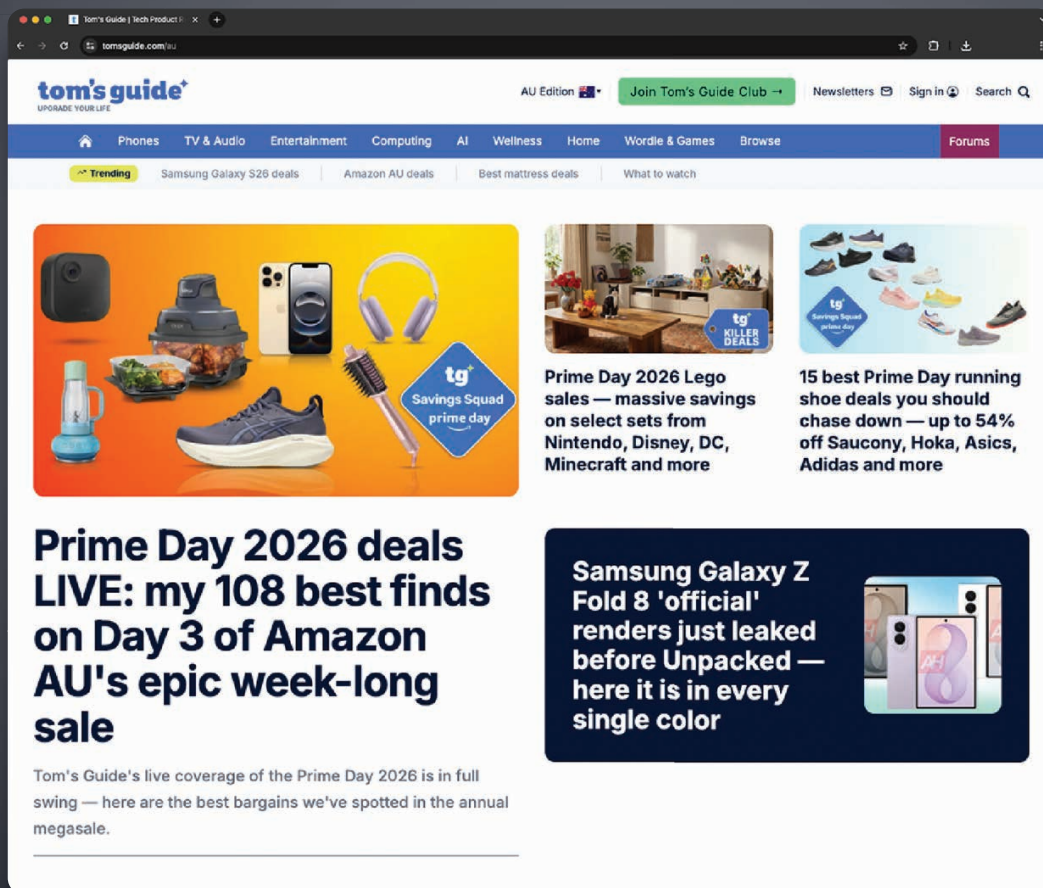
Cool, Siri can tell me what World Cup matches are on this weekend, create a menu, and send a text message to my huge friend group to organise a massive party. But who's actually doing that? The uncomfortable truth is that Apple spent two years failing to deliver on AI, and when it finally showed up, it brought someone else's technology, refused to admit any of it happened, and expected a standing ovation. ■

John-Anthony Disotto prides himself on his ability to make technology easy to understand.



The angle for the AI announcements was 'innovation' but in reality it's more like 'delayed completion'...

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GADGETS

Unnecessary but desirable things



XBOX SERIES X25

PRICE \$TBC **WEB** [xbox.com](https://www.xbox.com)

Remember when Microsoft used to be cool and edgy? When the company surprised people with designs that set trends? It's easy to forget how much the original Xbox shook up the game industry – probably because it was launched a really long time ago. Microsoft's debut console brought the power of PC gaming to a plug-and-play console that looked like it had tumbled out of a UFO, and packaged it with a more mature gaming mascot in the form of *Halo's* Master Chief that opened up

the audience and appeal to adult gamers.

The Xbox Series X25 Console and Controller harken back to 2001, with OG Green translucent casings that showcase the internal LEDs to full effect. The controller includes retro-style coloured buttons and bumpers that recall the utterly rage-proof original 'Duke' pad, while the console packs the full power of the Xbox Series X and includes 1TB of storage. This strictly limited run will launch in November.

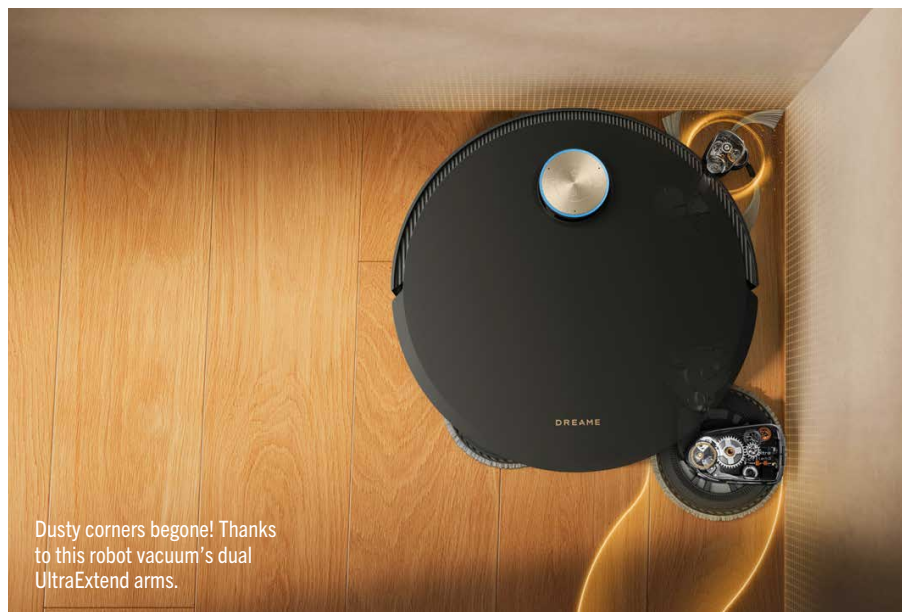


The design is inspired by the original 2001 Xbox.

Dreame X60 Pro Ultra Complete

PRICE \$2,299 **WEB** dreame.com.au

Here's a super-premium robo vac that will do such a good job you'll have loads of free time for RAM shopping! That's because the X60 Pro Ultra Complete takes a comprehensive approach to cleaning your home, with AI-powered OmniSight System 3.0 cameras that can recognise over 320 objects and detect liquid stains. Plus, it features dual UltraExtend arms to get into those hard-to-reach corners and, can be controlled from your iPhone.



PRICE From \$320
WEB lexar.com

LEXAR DUAL DRIVE PORTABLE D70E

This solid-state drive (SSD) may be the perfect companion for anyone who likes to shoot oodles of photos and videos on iPhone. Equipped with both USB-C and USB-A connectors, it's available in 512GB (\$320), 1TB (\$426) and 2TB (\$745) capacities with read/write speeds of up to 2,000MB/sec and 1,800MB/sec respectively via USB-C, so whether you're running low on storage space or just want to back up your devices, the D70E makes it quick and easy to sort. The D70E is also small enough to fit in your pocket or be carried, thanks to its built-in lanyard loop.



PRICE \$79
WEB dlink.com.au

D-LINK DPP-201 POWER BANK

Better known for its networking products, D-Link has sent us its new power bank for a look. This 20,000mAh unit looks like any other power bank, and doesn't have any tricks up its sleeve, other than using Lithium-Polymer instead of Lithium-Ion, which might help it be a little more stable over the long term.

There's a pair of USB-C ports that can deliver up to 65W, and a USB-A rated for 22.5W. That 65W rating means this can juice up a laptop, so that's handy. A digital display lets you know how much is left in the tank.



PRICE \$129
WEB serafimgaming.com

SERAFIM S3 MOBILE GAME CONTROLLER

When you're gaming on your phone, it often helps to have a dedicated controller to play with — and that's exactly what's on offer here. MFi certified by Apple and Android-compatible too, the controller connects via USB-C and includes an authentication chip, so it'll seamlessly work with the iPhone 15 or later. Equipped with dual Hall Effect triggers and a panoply of buttons, it's bound to help you level up your game. Plus it also includes two pairs of swappable grips and four grip inserts, so you'll be able to play in comfort in titles such as *Fortnite* and *Roblox*. ■

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3



ADDING *STYLE*, *CLASS & POWER* TO PCs FOR 20 YEARS

ROG didn't just create colourful components and peripherals to celebrate its 20th anniversary, it engineered epic special editions.



Few brands have had such a big impact, or been as influential across the industry as Asus Republic of Gamers, which is celebrating its 20th anniversary. The brand's broad, celebratory, black-and-gold 'Edition 20' range turned heads at this year's Computex expo, not just because of the fancy colourway, but because the core premium products had been elevated to the extraordinary by ROG's skunkworks engineers. They're all limited editions so, if you want one you'll need to be quick!

1 ROG CROSSHAIR X870E EDITION 20 MOTHERBOARD

ROG's eye-catching new flagship motherboard features a 24(110A)+2(110A)+2 Teamed power solution, massive nine M.2

slots, up to 256GB server-grade DRAM Enhancement and more. It's partnered by the awesome ROG Ryujin 360 Edition 20 cooler which uses a full-width thermal deck and whole-copper construction to cool both the CPU and VRM simultaneously. Equipped with a stunning 6.67-inch AMOLED LCD panel and the exclusive AIO Q-Connector, removing every last bit of cabling from the sight of its owner.

2 ROG CROSSHAIR 2006 MOTHERBOARD

The legacy of ROG gaming motherboards began with ROG Crosshair. The release of the Crosshair 2006 brings its fan back to its origin by leveraging culture shock between the retro-copper look and cutting-edge technologies, creating a collectible, heritage-grade motherboard for the age to come.

3 ROG ASTRAL GEFORCE RTX 5090 EDITION 20 GRAPHICS CARD

ROG's new, flagship graphics card is designed

to marry ultimate performance with a looksmaxxed appearance. At a glance, you can see that it's set the performance bar very high indeed. The curved AMOLED screen displays dynamic 3D visuals, real-time data or custom content, while the integrated RGB elements augment the design flourishes and colour scheme. A removable glass backplate is also in place showcasing the PCB engineering.

Beneath the veneer, the construction maximises the power of a super binned RTX 5090 GPU: there's a newly designed quad-fan array, vapor chamber and heat pipes, liquid-metal cooling plus the unique Dual Power Input design (with BTF GC-HPWR and 12V-2x6). Together, this makes the card perform incredibly, achieving up to 10% more performance out of the already amazing RTX 5090 GPU.

Such a beastly card does come with extra protection. While Power Detector+ monitors and alerts abnormal power drain from the 12V-2x6, Level Sense actively measures



2



4

5





the level of sagging utilising the built-in gyroscope to ensure the card does sit nice and horizontal for long lasting performance.

4 ROG THOR 3000W TITANIUM III EDITION 20 POWER SUPPLY UNIT

Powerful components require powerful power supplies and, well, the name of ROG's Edition 20 PSU is somewhat self-explanatory. In addition to those unprecedented, 3,000 (count'em) Watts are server-grade GaN MOSFETs, a special ROG Equalizer PCIe power cable (that actively reduces thermal stress) plus a patented 'GPU-First Intelligent Voltage Stabiliser' to prioritise the GPU's power and stability – even during extreme overclocking. Its detachable OLED display can also be moved around using special, extendable magnetic connectors.

5 ROG GR20 EDITION 20 CHASSIS

The ROG GR20 Edition 20 is a premium aluminium open-frame, modular PC chassis, redefining the perfect balance between aesthetics, performance and customisability. While it features an innovative, wide, multi-directional 'Crossflow' fan, a reinforced GPU bracket, it can also support XL size components such as 360mm radiators, 368mm graphics cards and 190mm PSUs. There is even room for a dedicated, cable-management compartment. On top of that, it can be configured to operate in three different positions (vertical, horizontal and angled) producing a proper, portable, pocket-rocket, gaming PC.

6 ROG NUC 16 EDITION 20

If you don't want to build your own mini gaming PC, the Edition 20 NUC comes fully assembled. It features Nvidia RTX 5090 graphics, Intel's Core Ultra 9 290HX Plus processor, dual vapor chamber (and triple-fan) cooling and it can operate vertically or horizontally. It's perfect for portable gaming, content creating and AI workloads.

7 ROG SWIFT OLED PG27AQWP-G EDITION 20 MONITOR

The perfect partnering peripheral to these colossal components is the special ROG Swift OLED PG27AQWP-G Edition 20 gaming monitor. Its Tandem-WOLED panel offers innate, superior brightness, colour vibrancy and accuracy, HDR contrast and all the bells and whistles you'd expect from a top-tier, does-everything monitor. ROG's engineers have then upped the ante by endowing it with phenomenal 540Hz (QHD) and 720Hz (HD) refresh rates to even suit eSports professionals!

8 ROG RAPTURE GT-BE98 EDITION 20 GAMING ROUTER

How do you make the fastest Wi-Fi gaming router even faster? You make it quad-band using two, 5GHz channels for longer range, and a super-fast 6GHz channel for the short; you integrate two 10Gbps and four 2.5Gbps Ethernet ports; and you boost maximum wireless throughput to an astonishing 25Gbps. That's how.

9 ROG DESTRIER EDITION 20 GAMING CHAIR

The Destrier Edition 20 transforms ROG's iconic gaming chair into a bold anniversary statement by combining a cyborg-inspired, aluminium exoskeleton with translucent, breathable mesh. The armrests, headrest, lumbar support, seat height, seat depth and recline levels are all adjustable and it's been ergonomically balanced to suit all-day workers and gamers by promoting a more-natural, low-strain posture.

10 ROG AZOTH EXTREME EDITION 20 GAMING KEYBOARD

The Edition 20 range features numerous other supporting black-and-gold products. The Edition 20 version of the ROG Azoth Extreme premium gaming keyboard is available with actual 24-carat gold accents and classy transparent surfaces that all add up to make a keyboard unlike any other.

11 ROG HARPE II EXTREME GAMING MOUSE

Pair the ROG Azoth Extreme Edition 20 Gaming Keyboard with this special edition ROG Harpe II Extreme Edition 20 Gaming Mouse in a matching Edition 20 colourway and you have yourself an incredible looking array of gaming weapons. It's also styled with a transparent viewing window, so you can view the gold plated internal structure, without any loss in rigidity, and still somehow it maintains its sub-100 gram weight. You'll never forget you're using something extra rare and special!

GET YOURS, QUICK!

Whether you're a collector, a fan of the brand, or an enthusiast who wants to grab the best-looking and most-powerful, limited-edition computing kit before it sells-out, check out the Edition 20 range... and do so quickly, before it's all gone. You can buy most of these special edition items in a bundle for maximum style and value, and the mouse, keyboard, router, LCD and chair are sold separately.

Find out more at
rog.asus.com/content/rog-edition-20



FUTURES

We explore the trends and technologies that are set to shape the future.

Data centres in space!

We'd like to send some CEOs into orbit, but data centres for AI will have to do for now. That's the plan from Google and SpaceX, explains Nicole Kobie.

Look up at the night sky and admire the stars. Oh wait, those aren't twinkling balls of gas trillions of kilometres away but a "constellation of a million satellites" linked together to train AI in low orbit in order to dodge on-earth planning permission for yet another data centre.

That's SpaceX's plan, via a regulatory document, with Elon Musk's company arguing that space data centres could be up and running in the next few years. Now, Musk infamously misses many of his deadlines, but he's not alone in wanting to fling data centres into orbit. Google also plans to start testing the idea next year, with CEO Sundar Pichai predicting orbital data centres could be the norm within a decade.

Given data centres are popping up everywhere at ferocious speed, why bother expanding into space? Proponents argue these orbital data centres will use clean energy via solar panels and avoid the friction of building on Earth, where humans also want a share of land, water and electricity. That friction has led to lawsuits, state-wide bans of new data centres, and messy

arguments in council meetings. No wonder space is looking good right now.

"Space offers almost continuous (and free) solar energy in the right orbits, and it avoids some of the land, grid and water constraints faced by terrestrial facilities," said Domenico Vicinanza, associate professor of intelligent systems and data science at Anglia Ruskin University. "That is why companies are taking it seriously."

SPACE ISN'T EASY

Getting anything into space is complex and expensive. Even if financial and technical challenges can be overcome, critics warn against filling orbit with space junk and point to latency concerns for data. Of course, that doesn't mean we won't try.

Data centres in space are a sensible research goal, notes Vicinanza, but they're not going to be replacing earthly servers any time soon. "At this stage, the idea is worthwhile because it asks a serious infrastructure question: as artificial intelligence computing grows, where should the energy, cooling and physical footprint of that computing come from?"

But Vicinanza adds that a small demonstration of the technology is very different from the sort of data centre required to train AI. "Google's 2027 prototype would be an important experiment, but it would not by itself prove that orbital data centres are economically or operationally viable at scale."

Though the companies backing these ideas have billions of dollars and the attention of regulators, it's not yet time to start counting down to lift-off. Here's what we need to figure out first.

HOW THEY WILL WORK

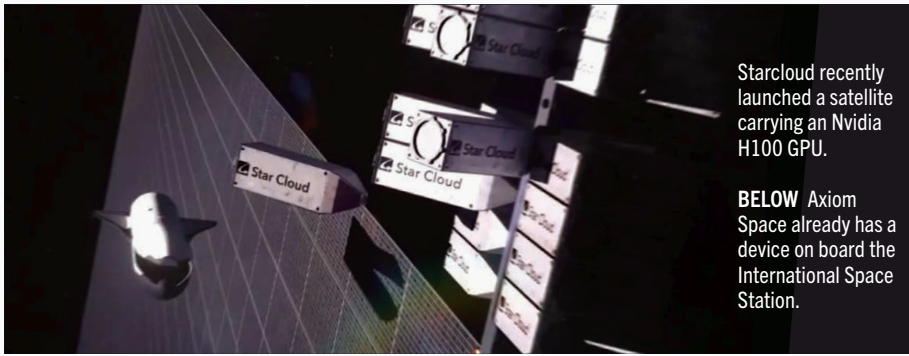
To build an orbital data centre, satellites would be launched into low-Earth orbit (LEO), which ranges from 160 to 2,000km from the Earth's surface, in positions that let them capture as much of the sun's light as possible.

Solar panels would collect and convert that to power the servers on board as well as communications systems, which would be optical links as no-one wants to meddle with kilometre-long cables.

"Logistically, a space data centre wouldn't look like a warehouse in

BELOW Google is planning to test orbital data centres next year.





Starcloud recently launched a satellite carrying an Nvidia H100 GPU.

BELOW Axiom Space already has a device on board the International Space Station.

orbit. It would probably begin as a constellation of satellites, each carrying compact computing modules, power systems, radiators, communication links and propulsion for station-keeping," said Vicinanza. "Equipment would be launched on rockets, deployed into low Earth orbit, tested, networked with other satellites, and connected to ground stations through optical or radio links."

Cooling may sound easy; after all, space is cold. But it's also a vacuum, so there's no air for convection, meaning heat will need to be taken from chips to radiators on the side of the satellite via liquid cooling or something similar.

"This might come as a surprise, but on Earth, data centres can make full use of air, water or mineral oil, to remove the heat," Vicinanza added. "In space, there's no air to carry heat away. Heat has to be radiated out, and radiators can become large, heavy and difficult to integrate with dense computing hardware."

MEET THE PROJECTS

Those challenges haven't put Google off. Last year it unveiled its latest "moonshot": Project Suncatcher, a solar-powered constellation of optically linked satellites loaded with Tensor Processing Units.

The aim, according to Google, is to take advantage of the fact solar panels can be eight times more productive in orbit than they are in space, and offer continuous power, so fewer batteries are required. Rather than one huge data centre floating around, Project Suncatcher would be a networked collection of satellites, scattered throughout LEO and positioned in a dawn/dusk orbit, to ensure they get as much sunlight as possible. They could communicate via optical links.

Google admits there are hurdles, notably ensuring the communications system works at the terabits per second required to offer comparable performance to Earth infrastructure. Google figures that can be achieved using multichannel dense wavelength-division multiplexing transceivers and spatial multiplexing.

These boost transmissions via parallel data transfer, with the former sharing the signal across multiple channels while the latter divides data out across multiple independent streams.

To keep power and costs down, satellites would be kept in close formation at less than a kilometre apart, which Google argues will make it easier to manage how they orbit. The sun will power these systems but its radiation could damage equipment, though Google says its TPUs have so far managed to withstand negative effects in testing. One day, the company notes, compute architecture could be designed specifically for satellite systems, with solar power collection fully integrated, along with thermal management, allowing for gigawatt-scale installations.

All of these challenges are set to be worked out via a partnership with satellite data firm Planet, with two prototype satellites launching in 2027.

RACE TO SPACE

SpaceX, the launcher company led by Musk, earlier this year filed an application with the US Federal Communications Commission (FCC) to build orbital data centres made up of a million satellites. There's plenty to suggest SpaceX could achieve this: it already has 10,000 Starlink communications satellites deployed, and is one of a few companies globally that can actually get to space.

However, the FCC filing didn't include a schedule or timeline for the orbital data centre plan. SpaceX says that orbital computing is necessary because we're already running out of "terrestrial capabilities" here on Earth; but at the same time, it's worth noting that SpaceX recently said it would lease an entire data

centre to Anthropic that was otherwise going spare.

Those are all plans for the next few years. But two startup projects already have GPUs in orbit: Starcloud and Axiom Space. California-founded Starcloud launched a satellite in November last year carrying an Nvidia H100 GPU, hoping to test radiative cooling and the impacts of solar exposure. A month later that successfully ran inference using Gemini Gemma and even trained a large-language model, though a tiny one, nanoGPT. Starcloud must have thought this all went well, as in February it applied to the FCC to build an orbital data centre made up of 88,000 satellites. It also wants to mine bitcoin in space.

Axiom Space is working with AWS and already has one of its devices aboard the International Space Station. Axiom followed that up with a pair of what it

calls orbital data centre nodes launched into LEO in

January. Calling the systems "space-based cloud computing", the aim is to offer "Earth-independent" processing for satellites and spacecraft.

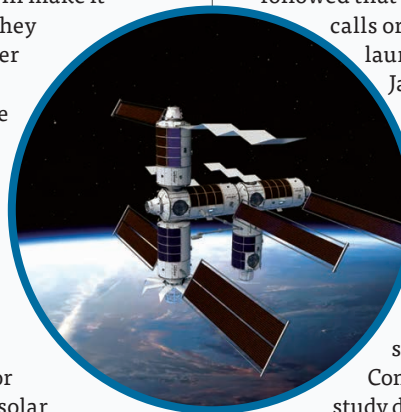
Alongside those startups, the European Commission is funding a study dubbed ASCEND –

Advanced Space Cloud for European Net zero Emission and Data sovereignty. So far, it remains a feasibility study, but it plans to deploy a small orbital data centre for testing in 2028.

CAN DATA CENTRES IN SPACE WORK?

Google says the physics and the economics should work, but admits that there are serious engineering problems, notably thermal management, communications with the ground and on-orbit system reliability. Vicinanza adds yet more to the list: energy conversion, radiation, space debris, maintenance and cost.

"The benefits are still compelling, for example access to solar power without clouds, atmosphere or night in the same way we experience them on Earth," said Vicinanza. "That could make orbital computing attractive for certain types of workload, especially highly parallel artificial intelligence processing. Space might also reduce some pressure on terrestrial land, water and electricity grids, although launches, satellite



manufacturing and replacement cycles must be included in any serious environmental calculation.”

From an environmental point of view, solar-powered data centres make an awful lot of sense. The quick rollout of AI data centres has led to friction in the energy market, sparking a return to gas-powered electricity rather than renewables.

Of course, we can use solar panels here on the ground, too. Meta is even considering a technique from startup Overview Energy to harvest solar energy in space and then beam it back down to Earth-bound data centres; why bother sending everything up into space when you really just need the electricity?

After all, getting data centres into space – and back down again after end of life – comes with plenty of energy use and emissions on their own, with a single SpaceX Falcon 9 launch potentially topping 1,400 tonnes of CO₂. Beyond fuel burned, research from the University of Southern California suggests re-entry

doesn't fry the chips to a crisp. Plenty of technical considerations remain.

To start, what's the latency from space? Satellite broadband has improved this potential trade-off, with Starlink averaging between 25-60 milliseconds for land-based users. It hopes to shave that down to 20ms; that's perfectly fine for most online activities, even gaming.

When it comes to AI, the aim is largely to use orbital data centres for training, rather than inference. Choosing the right workload reduces the challenges, but low-Earth orbit is close enough that it shouldn't be a blocker for many use cases. “For some artificial intelligence training or batch processing, latency may not be a decisive problem,” said Vicinanza. “For interactive services, financial trading, gaming, remote control or applications requiring very fast response times, it could be a major limitation.”

And then there's security. What hacker wouldn't immediately try to crack an AI-training space data centre? Vicinanza

tolerate failures, or it needs robotic servicing, replacement satellites, or both.”

TIME AND MONEY

Nothing in space is cheap, and data centres are expensive even when on the ground.

Google said that the costs of launching and operating a space data centre would be about the same as the energy costs of an Earth-bound version once launch prices fall below \$200 per kilogram. Right now, SpaceX costs run from \$1,500 to 2,000/kg, but Google figures the costs will fall sufficiently by the mid 2030s.

On the upside, that offers plenty of time for trials. Google is proposing its own trial next year, and Vicinanza predicts more will happen in the 2030s, with larger experimental clusters. “A genuinely large-scale commercial orbital data centre feels more like a 2030s or 2040s prospect, and only if launch costs, reliability, thermal engineering and orbital servicing improve significantly.”

STILL A BAD IDEA?

Let's say Project Suncatcher works, or SpaceX's million-data centre setup proves useful at a reasonable cost. Even then, these ideas may not make sense. And that's because of space junk and other related issues that should remind us that space is for everyone, not just Big Tech.

Vicinanza says the question isn't only if we can do it, but whether we should – and at what scale. “Low Earth orbit is already becoming crowded,” he said. “If orbital computing grows, we will need serious thinking about space debris, astronomical observation, spectrum use, environmental accounting, ownership, liability and decommissioning.”

Data centres in space are possible, and at this point perhaps even likely – but they won't solve the computing crunch happening here on Earth. “They are a serious experiment at the boundary of computing, energy and space engineering,” Vicinanza said. “The right way to see them is as a possible future layer of computing infrastructure, not as a replacement for everything we build on Earth.”

What may be particularly powerful about the idea of orbital data centres is that it “forces us to think differently about the physical cost of artificial intelligence,” he said. That's something we need to consider whether AI is in space or here on the ground. ■

A single SpaceX Falcon 9 can release up to 1,400 tonnes of CO₂.

causes a different sort of emissions thanks to alumina aerosols, which could alter the chemistry of Earth's atmosphere and exacerbate the climate crisis.

And that highlights what Vicinanza sees as a major misconception about the idea of data centres in space: that we can solve the problem of data centres simply by moving them out of sight. “It does not. It moves the problem into a much harsher engineering environment. Space gives you extraordinary access to solar energy, but it also gives you radiation, vacuum, debris, launch constraints, limited maintenance and a very unforgiving failure model.”

WHAT ABOUT COMPUTING?

So you've launched a satellite into space, and it's designed well enough that the sun

notes that an orbiting data centre isn't inherently insecure, but says that it has a different threat model to traditional Earth-bound systems.

“The data links would need very strong encryption, authentication and key management,” Vicinanza said. “Ground stations, satellite command systems, supply chains and software stacks would all remain attack surfaces. I believe the main question is whether the whole system, from launch to operation to decommissioning, can be secured as critical infrastructure.”

What happens if it all goes wrong? Time to send the help desk to space. “Maintenance is the difficult part,” said Vicinanza. “You cannot send an engineer to swap a failed board in the normal way. Either the system must be designed to

REVIEWS

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APC is Australia's oldest consumer technology magazine – having been consistently in print for over forty years, since our first issue way back in May 1980 – and we take that heritage and responsibility very seriously. While our focus is obviously on the personal computer the very definition of the PC has changed and shifted markedly since the early 1980s.

As such, we touch on many other areas of everyday tech, too, from smartphones and apps to peripherals, accessories, and beyond. We have two goals: to find the best modern tech and to help you make the most of it.

INDEPENDENT REVIEWS

Championing technology doesn't mean we're unrelenting yes-men and -women, however, and APC aims to be as objective as possible in all our coverage. That means identifying the best products from multiple perspectives – the best performance, best value and best features and, ideally, the products that offer the best mix of these three attributes.

As a matter of policy, reviews published in APC are not shared with product-makers prior to print. We will contact vendors under certain conditions; for example, if we have a problem testing a product that seems to indicate it may be faulty, or to

invite a vendor to clarify how a particular feature works. If an APC reviewer has any potential conflicts of interest involving a brand, the review will always be assigned to another writer.

LABS TESTING

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When a product scores 4.5 out of 5, it carries the Editor's Choice Award. These are products that exceed expectations and deliver a quality experience up there with the very best.



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PRICE \$1,609 (512GB), \$2,109 (2TB) **WEB** store.steampowered.com

Valve Steam Machine

In a different world, in another time, this would be a shining gem.

It's finally here. The much-anticipated Steam Machine, a mini gaming PC designed for your living room, and it's a lovely device to behold. It's sleek, futuristic, and very, very Valve. So have all our mini gaming PC Christmases come at once?

Well, not quite. Because while Valve's attempt to bring PC gaming to your TV – and thereby the masses – has plenty of admirable qualities, it's got one giant caveat hanging over it: The price. The 2TB, Steam Controller-included Steam Machine bundle we tested costs \$2,228. The controller-less 2TB variant is \$2,109, while the 512GB version, again without controller, is \$1,609.

Much has been made over the Steam Machine's delayed launch and increased price tag, brought on by the ongoing memory crisis crippling the consumer electronics market right now. But holy moly, that's a lot of money for a mini gaming PC. Especially one with internals that, in 2026, feel underpowered before it's even officially released.

WHAT'S IN THE BOX?

The RDNA 3-based GPU inside the Steam Machine has left me feeling rather deflated. It's certainly possible to drop the settings, bump up the upscaling, and squeak some smooth gaming performance out of the little black box. But the drawbacks feel like a step too far when you're paying this sort of cash.

The idea might be to bring the PC gaming experience to your living room, but if that experience includes smooth frame rates in demanding games, you're going to have to make some major compromises. And, because of its Linux origins, it hasn't been a flawless experience getting some of those games to run properly to begin with, either.

The Steam Machine is, by default, a black cube. Measuring 15.2 x 15.6 x 16.2 cm, its top is a touch smaller than a handspan. Underneath the removable magnetic front face plate (two extras are included in the box with the 2TB bundle) is a small panel consisting of a power button, two USB 3.0 Type-A ports, and a microSD card slot.

Above them lies an RGB strip, which by default lights up in blue while you're gaming or downloading, and turns off at idle. Around the back are two USB 2.0 Type-A ports, a single USB 3.2 Gen 2 Type-C port rated to 10 Gbps, and a 1 Gbps ethernet connection. For display options, you've got a choice of a DisplayPort 1.4 connection, or an HDMI 2.0 port.

Under the hood lies a semi-custom AMD Zen 4 CPU with six cores and 12 threads, alongside 16GB of system RAM. The GPU is also a semi-custom AMD RDNA 3 job, with 8GB of dedicated GDDR6 VRAM, 28 compute units, a sustained max clock speed of 2.45GHz, and a 110 W TGP.

Being a semi-custom GPU, it's difficult to make a direct comparison with existing RDNA 3 graphics cards – although the budget RX 7600 XT from the same generation features 32 compute units and a similar game clock speed.

The Steam Machine makes use of SteamOS 3, an Arch-based Linux implementation with the KDE Plasma

SPECS CPU: Semi-custom AMD Zen 4 6C / 12T, CPU Max. clockspeed 4.8GHz; GPU: Semi-custom AMD RDNA 3, Max. sustained GPU clockspeed 2.45GHz; RAM: 16GB DDR5; Dedicated VRAM: 8GB GDDR6; Storage: 512GB / 2 TB; Connectivity: 2x2 Wi-Fi 6E, Bluetooth 5.2, integrated 2.4GHz Steam Controller wireless adapter; I/O: 2x USB Type-A 3.2 (front), 2x USB Type-A 2.0, 1x USB Type-C 3.2, 1x DisplayPort 1.4, 1x HDMI 2.0 (rear).

interface, allowing you to directly interface with your Steam library and the storefront. Steam Deck users will be very familiar with this design, although there are of course more options to tweak in the settings menus for the Steam Machine itself.

BUT HOW DOES IT RUN?

It's pretty impressive to think of the sheer amount of hardware and connectivity options Valve has crammed inside such a relatively small chassis design. Especially when you consider that, in terms of cooling, air is moved by a single 120 mm fan around the back.

Put aside the tidy form factor, the SteamOS experience, and the delightful "Valve-ness" of the thing for a second. If you're buying one of these, you're going to want your games to run well, and for it to deliver comparable performance to a gaming PC you could have spent your cash on instead. And I'm not going to sugar-coat it – the benchmarking results are a little ugly.

Yes, that's a 28 fps average result in *Cyberpunk 2077* at 1440p Medium RT, with Quality FSR enabled, no frame gen. RDNA 3-era graphics hardware usually struggles with ray tracing, and the Steam Machine's 28 CU semi-custom GPU is no exception. Could I play *Cyberpunk 2077* like this? Sure, I guess. Would I feel good about it, having dropped \$2,000+ on a new piece of hardware? Hmm. Pass, I think. FSR in all its older iterations looks rough around the edges at Performance settings. Valve says it's working on FSR 4 support for the Steam Machine, but for now, older FSR is what you get as an AMD-specific option.

You might be finding this all a bit obvious. The Steam Machine isn't particularly powerful, so why would I expect high resolution and 60+ frames from my tiny under-TV box? Well, Valve said as much when it first unveiled the Steam Machine last year, stating that 4K60 in your Steam games was its benchmark. And 4K TVs are pretty much the standard at



“The first question you need to ask yourself as a hardware reviewer is this: Would I buy one? And despite the little black box’s lovely design, excellent controller, and sheer curiosity value, the answer is no.”

this point. While you can drop the res below native, you're really not going to want to if image quality is a concern.

DOES IT STILL HAVE A PLACE?

On the plus side, The Steam Machine is quiet. I mean, really, really quiet. The single, geometry-optimised 120 mm fan at the back does an admirable job of moving large amounts of air at whisper-like levels, so much so that I don't think you'd notice it at full pelt over any other ambient noise. It runs relatively cool, too. Valve has clearly prioritised refinement when it comes to both the Steam Machine's size and sound, which is a good instinct to follow when it comes to a living room-friendly box.

I just can't square the Steam Machine's performance with any idea of consumer value. The first question you need to ask

yourself as a hardware reviewer is this: Would I buy one?

And despite the little black box's lovely design, excellent controller, and sheer curiosity value, the answer is no. Not when I can still pick up a regular gaming PC for the equivalent cash, with much better overall gaming performance.

Because, when it comes to the PC gaming experience, I think you should ask yourself what it means to you. To me, it means better graphics than consoles. It means higher frame rates. It means flexibility, and it means spending more money in return for a better experience when I actually play the games.

Having a neat little PC gaming box tucked away underneath your TV is all well and good, on paper. But when it feels underpowered (and internally outdated) right out of the gate, while still costing north of a grand for the base-level model? I'm simply not sure it makes much sense. ■

VERDICT



Valve's attempt to bring PC gaming to your living room is well-intentioned, but the ugly realities of the memory crisis have left it with a hefty price tag.

ANDY EDGER

	Steam Machine	MSI MAG Infinite E1 PC
CPU	AMD Zen 4 (6C/12T)	Intel Core i5 14400F (10C/16T)
GPU	AMD RDNA 3	RTX 5060
RAM / SSD	16GB / 512GB	16GB / 1TB
Price	\$1,609	\$1,197
Cyberpunk 2077 - 1440p RT Med	16	24
Cyberpunk 2077 - 1440p Quality upscaling RT Med	28	60
Black Myth Wukong - 1440 Very high	20	23
Black Myth Wukong - 1440p Quality upscaling Very high	31	48
Metro Exodus - 1440p Ultra	45	50
Baldur's Gate 3 - 1440p Ultra	46	60

PRICE \$149 WEB store.steampowered.com

Steam Controller

Second time's the charm.

The Steam Controller is the first of three new bits of hardware from Valve this year. It's designed to let you take control of your PC from your couch and without a mouse, which is sure to appeal to a certain type of gamer.

The second-generation Steam Controller includes everything one might expect from a gamepad, including two thumbsticks and the usual array of buttons. But it also offers input parity with the Steam Deck, Valve's popular handheld gaming PC, and in doing so, delivers a few extra tricks. Beneath its symmetrical sticks are two trackpads, which you can use to glide around the desktop or look around in-game. It includes a 6-axis gyro, which is shockingly an even better way to mimic a mouse. I'm a gyro control convert.

The Steam Controller does have to be convincing to justify its price tag, however. It costs \$149, which puts it a league above budget pads with similar specs and fewer inputs. You're paying for convenience here. To use your PC with ease while lounging or lazing.

If you prefer to game bolt upright, laser-focused on your kill/death ratio, you should look elsewhere. This isn't a competitive pad. Though helped by decent haptics in the grips and trackpads, if you're after tactile feedback for competitive play, this isn't going to deliver much of that. That's also reflected in its 250Hz polling rate – many pads today will bump that up to 1,000Hz.

It feels agile and responsive enough in most games, though you can tell it's destined for the couch not contests. The face buttons are all standard membrane. They feel consistent, if nothing else. The same can be said of the d-pad, which is stiff but stable, and the triggers, which use Hall effect sensors are nothing special.

It's a comfy pad for comfy gamers and, despite its larger size, the Steam Controller rests comfortably in my hands. In the name of science, I also asked my partner with smaller hands and she had no problems reaching sticks or trackpads whatsoever.

The Steam Controller can't compete with competitive controllers, nor on value for money with simpler pads,



“It's a comfy pad for comfy gamers and, despite its larger size, the Steam Controller rests comfortably in my hands. In the name of science, I also asked my partner with smaller hands and she had no problems reaching sticks or trackpads whatsoever.”

either. It can, however, compete on its all-round utility. But you have to ask yourself how much value you assign to not having to get up off the couch to navigate the desktop or play a strategy game.

Personally, I could go without the extra inputs most of the time. Valve already provides a useful and free alternative to mouse and keyboard in Big Picture Mode, which offers easy access to most of what Steam has to offer and can be navigated easily with a standard controller. I mostly play horror, rhythm, and racing games on my living room PC, and as such, I don't find myself having to grab a keyboard or mouse all that often.

The Steam Deck has already proven how effective trackpads can be for imitating the movement of a mouse. I reckon they're around 70% of the way

there, something like that. I won't pretend that final 30% doesn't matter a lot, but often 70% is all you need. The trackpads work great in tandem with the gyro, too. And, while there are other controllers with gyro controls, the Steam Controller offers a complete package few others do. Though just because it can do a lot of stuff, doesn't mean you need it to – a more affordable pad with less going will be good enough for many PC gamers. ■

VERDICT



There's nothing quite like the Steam Controller – a clever combination of trackpads and gyro controls.

JACOB RIDLEY

PRICE \$7,999 WEB www.asus.com/au

Asus ExpertBook Ultra

Asus's new flagship business laptop aims to be the company's outright flagship laptop.

Asus says the global computer-memory crisis is an opportunity to push its way into organisations that buy thousands of laptops at once. It postulates that while rivals are cutting corners (to cut costs and maintain shareholder value) the ExpertBook Ultra can deliver a lower TCO (total cost of ownership) by way of its superior build quality and (subsequent) lower support costs. So, is it the best business buy?

First off, its all-black 'Jet Fog' livery looks very smart (it also comes in light 'Morn Grey' grey) It has a new 'Nano Ceramic' coating which feels like earthenware. This fends-off fingerprints impressively and most scratches can be brushed away.

Opening it up reveals one of the very best screens on the market. It's a super-bright, matte-coated, Tandem OLED, touchscreen display with a high 2880 x 1800 resolution and 1,400-nit peak (HDR) brightness. Colours are bright and vibrant and transitions are smooth, but the HDR is sublime: it simultaneously keeps details visible in very bright and very dark areas. It has a (gamer-friendly) 120Hz refresh rate that significantly reduces blurriness around fast-moving objects. It's also made with Gorilla Glass which allows people to pick it up by the screen (though you shouldn't).

Below it is an excellent Scrabble Tile keyboard and large, haptic trackpad. Unfortunately, the latter is a bit hit and miss. We're told it has fewer parts that



might break, but it's over-sensitive to the point where we disabled all gesture controls because they kept activating when typing.

The Full HD webcam above the screen is adequate, but not the best we've seen from Asus – it can get a bit grainy in ordinary light. Its microphone array does a great job of capturing clear audio, though. The svelte chassis somehow fits six speakers inside (two tweeters and two, dual-sided woofers) which produce outstanding audio whether you're on a conference call or listening to bass-laden music.

All the important connectivity options are covered: there are two Thunderbolt 4 ports, two USB-A 3.2 Gen 2 ports, HDMI 2.1 and a 3.5mm audio jack. Inside there's

Wi-Fi 7 and Bluetooth 6.

In terms of portability, it weighs just 1.09KG and is only 11mm thick. Unfortunately, Asus provides a bulky 370g charger instead of a phone-style unit, but you won't need it much – it lasted 23 hours 45 minutes in our video-playback benchmark! While it's not fully MIL-STD-810H rated, it's passed most of the associated tests and Asus has repeatedly publicly tortured it with water spills, having people stand on it and by mounting attacks on its I/O ports. It will survive life on the road.

As for performance, the 1.5-4.8GHz Intel Core Ultra X7 358H (Panther Lake) CPU flew through our benchmarks and its 2.5GHz integrated graphics even enabled it to play games.

While there's room for improvement, Asus' ExpertBook Ultra is a worthy standard-bearer and most mobile workers would be glad to get one. However, most target buyers would need the bulk-buying discounts (and theoretical support-cost savings) to make the massive \$7,999 price tag palatable. ■

VERDICT



A few foibles stop this extraordinarily expensive but brilliant business laptop achieving perfection. But, bulk buyers should still check it out.

NICK ROSS

	Asus ProArt PX13 GoPro	Asus ExpertBook Ultra
CPU	AMD Ryzen AI MAX+ 395	Intel Core Ultra X7 358H
GPU	Radeon 8060S	Arc B390
Battery Capacity	73Wh	70Wh
PCMark 10	10,293	9,337
Cinebench R24 - CPU (multi-threaded)	1,644	1,114
Cinebench R24 - CPU (single-threaded)	61	124
Geekbench 6 - Multi-core (score)	19,368	16,225
Geekbench 6 - Single-core (score)	2,981	2,805
Geekbench 6 - GPU (score)	91,242	57,932
Crossmark	2,282	2,186
3DMark Time Spy	10,281	7,587
3DMark Night Raid	60,946	48,322
Battery life - 1080p video playback (h:min)	09:47	23:46
CrystalDiskMark Read (MB/s)	7,128	11,210
CrystalDiskMark Write (MB/s)	6,697	10,087

SPECS W11 Pro; 14in Tandem OLED touchscreen, 2880 x 1880 pixel resolution, 120Hz refresh rate; Intel Core Ultra X7 358H; Intel Arc B390 integrated graphics; 64GB LPDDR5 RAM; 1TB SSD; 70Wh battery; Wi-Fi 7, Bluetooth 6; 2 x USB 4, 2 x USB 3.2 Gen 2, HDMI 2.1, 3.5mm audio; 30.1 x 21.3 x 1.1cm, 1.09kg.



PRICE \$685 **WEB** dell.com

Dell Pro 34 Plus P3425WE

A solid and well thought out screen for worker's desks.



Dell makes bold promises for the Pro 34 Plus P3425WE. It claims the 34in, 3440 x 1440 resolution will enable you to “focus like never before” and that the IPS panel will make your work look better than ever. Unless your work happens to be solely spreadsheets or text documents, in which case they’ll probably just look wider.

Bold claims, but the specifications for this business-focused ultrawide monitor do pack in all the essentials. You get an adjustable stand and a handy KVM switch, plus a wired network connection, while the 3800R curve is noticeably shallower than the more typical 1800R. Arguably, 3800R is more sensible for office use, as you don't need the sharp curves for immersion in games.

Turn the Pro 34 Plus on and it's refreshing to find an on-screen display that immediately attempts to be helpful. It checks whether you want to enable always-on USB charging (and warns about increased power consumption), and also offers to guide you through the process of connecting two machines and setting up the KVM switch.

The menus and navigation are all self-explanatory, but you can also install

the Dell Display Manager (DDM) software, which is available for both Windows and macOS. This provides an added level of control and makes it easier to use the KVM and various Picture-in-Picture and Picture-by-Picture features. It provides more flexibility in how you snap applications across the ultrawide panel, allows you to select specific colour modes for specific applications, and lets you assign keyboard shortcuts to adjust monitor settings.

Connectivity covers all the essentials, with 90W of power via the USB-C port. There's also a USB-B upstream port for connecting a second machine, and both upstream ports can the four downstream USB ports. You'll find a pair of 5Gbits/sec USB-A ports at the rear, while a single USB-C and USB-A port are hidden in the drop-down panel beneath the monitor's lower bezel.

As a business monitor, Dell doesn't go overboard with the specs. It promises a sensible 99% of sRGB coverage, a 1,500:1 contrast ratio and a maximum brightness of 350cd/m2. The 100Hz refresh rate is a pleasant upgrade over the standard 60Hz, with the extra fluidity noticeable when scrolling up and down documents. I also appreciated

the matte anti-glare coating, which did a great job of minimising reflections in my bright office with two skylights.

In our tests, the panel covered 94% of the sRGB colour gamut, but the panel can reproduce a range of greens, yellows and reds that are outside of the usual sRGB palette. I also measured a slightly underwhelming average Delta E of 2.3. It doesn't put in a bad performance overall, though, with clean greyscales, while the measured white point of 6412K is so close to the ideal 6500K that whites look nice and pure, too. In short, it's well tuned for office work but not great for colour purists.

But then we come to the question I posed at the start: does it offer enough for the price? In some ways, no: you can buy substantially cheaper 34in ultrawide monitors. That means you're paying for office-friendly features such as the KVM switch and management tools, and Dell might argue that a softer curve is a natural fit for work. All of which makes this a safe choice, if not an exceptional one. ■

VERDICT



A classy ultrawide monitor with good image quality, useful features and solid build, but you can find cheaper models.

SASHA MULLER

SPECS 34.1in 3440 x 1440 IPS panel; 3800R curvature; up to 100Hz refresh rate; 8-bit + FRC panel (1.07 billion colours); 5ms grey-to-grey response time; USB-C 3.2 Gen1 upstream (90W); HDMI 2.1; DisplayPort 1.4; 3 x USB-C 3.2 Gen2 downstream; USB-C 3.2 Gen1 downstream (15W); USB-B 3.2 Gen1 upstream; 1GbE; 9.9kg; 3yr advanced exchange warranty.

PRICE \$3,708 WEB www.dell.com

Dell UltraSharp 32 4K QD-OLED Monitor U3226Q

Spending a sweet \$3,708 on a monitor means that you should expect to get a lot of display for your money.

While you absolutely can score a 32-inch 4K OLED monitor for much less than Dell's asking price for the U3226Q, most of the market that this particular screen is pitched at won't worry so much about the asking price as to whether the feature set fits their very particular pro workflow.

The answer is likely to be yes, especially if you're after a pro-grade monitor with a lot of inputs and controls for industry standard colour grading functions.

That approach is obvious when you open the large box for the U3226Q, because it includes a monitor hood in the box to minimise light hitting the screen if you're working with very precise (or very dark) content where colour accuracy is a must.

The U3226Q has a wide array of inputs, including dual Thunderbolt 4 ports with support for up to 140W PD, which makes connecting up suitable PC laptops or MacBooks a snap without needing additional power cables.

You also get full KVM switch functionality and an inbuilt 2.5GbE ethernet socket for office network compatibility. The one feature really missing at this price is any kind of integrated speaker. If you need onboard audio, bring your own speakers or headphones, because you'll find nothing here.

If you need peripheral connectivity on a plug-and-go basis, the drop-down port on the lower left hand side makes that simple. It's also easy to switch around colour profiles, HDR settings or inputs with its touch controls on the lower left, or to access a larger menu from the right rear mounted joystick control. My only minor complaint here is that the menu text, while nicely sharp is on the smaller side.



The U3226Q also incorporates a built in colorimeter for accurate calibration at any time, a nice inclusion again pointing to its professional-grade market. This can be set to run on a schedule, or manually invoked at any time, with the actual colorimeter hiding away in a panel at the bottom centre of the screen.

In terms of image quality, the U3226Q generally impresses. It has a matte finish that keeps glare to a minimum, though that does come at the cost of some perceptible differences in darker tones due to that lack of reflectivity. It's only a 120Hz monitor, so it's not really built for faster gaming purposes, though its general presentation there is decent enough. For this kind of money, though, it's not the monitor to buy if gaming is your

passion, though it will definately show them off well.

If pro-grade work is your professional passion, on the other hand, there's a decent amount to like here, from its coverage of colour profiles to that built in colorimeter to keep it as accurate as possible – at least in theory, I'd need to test it over several years to fully quantify that – to make it a good choice.

The U3226Q's general purpose value is far less evident; while there's nothing wrong with using it for basic productivity work or even a little light movie streaming action, at over \$3,700 you could get a much grander display for your money. ■

VERDICT



Excellent for the pro who must have colour accuracy; overkill and overpriced for everyone else.

ALEX KIDMAN

SPECS 32-inch, 3840 x 2160 16:9 140ppi, 120Hz, OLED, 0.03ms response time, 1000-nit brightness, 1,500,000:1 contrast; Ports: 2x HDMI port/s (HDCP 1.4/2.2) 1x DisplayPort 1.4 2xUSB Type-A 10Gbps downstream, 1xUSB-C 10Gbps upstream port, 1xThunderbolt 4 40Gbps upstream (DisplayPort 1.4 Alt Mode, PD up to 140 W EPR), 1xThunderbolt 4 40Gbps downstream for daisy chaining (PD up to 15 W), 1xRJ45 2.5GbE ethernet, 1xUSB Type-A 10Gbps, 2 USB-C 10Gbps, PD up to 27 W; Dimensions: 473.77-623.77x718.28x65.48mm (HxWxD) 6.43kg excluding stand.

PRICE \$199 WEB store.google.com

Google Home Speaker

Modest upgrades, but Gemini is the star.

At long last, Google has refreshed its smart speaker lineup with the new Google Home Speaker. The Google Home Speaker replaces the Google Nest Audio, and, for the moment, the Google Nest Mini, both of which are no longer for sale at Google's online store.

Things have changed a lot since Google last released a smart speaker. During that time, AI got real big, so now the assistant powering the Google Home speaker can do a lot more than just turn on your lights.

There are two touch-sensitive buttons on the top of the speaker to control the volume. Similar to the Echo Dot Max, the Google Home Speaker has a circular ring of LEDs which changes colour based on the circumstance; for example, it turns white when Gemini is listening, multiple colours when it's thinking, and orange when the microphone is off.

Where the Nest Audio had a 75mm woofer and a 19mm tweeter, the Google Home Speaker has a single 58mm driver. I played a variety of tracks on the Google Home Speaker, as well as the HomePod mini and Echo Dot Max, and though there were some subtle differences between them, they weren't all that disparate.

Gemini for Home works with all of Google's smart speakers and displays, but only the newer ones – Nest Audio, Nest mini (2nd Gen), Nest Hub Max and Nest Hub (2nd Gen) – will support the full Gemini for Home experience, as well as Gemini Live, where you can have a more natural, free-flowing conversation.

You get Gemini for Home for free with the Google Home Speaker, but to make the most out of Gemini (and the speaker), you'll need to sign up for a Google Home Premium subscription. Otherwise, you won't get conversational Gemini, among other things.

If you sign up for Google Home Premium Standard (\$15/month or \$150/year), you get the following: Gemini Live (get expert help, brainstorm ideas, and learn new topics); help me create (lets you



“You get Gemini for Home for free with the Google Home Speaker, but to make the most out of Gemini (and the speaker), you’ll need to sign up for a Google Home Premium subscription. Otherwise, you won’t get conversational Gemini, among other things.”

describe to Gemini the smart home routine you want to create); sound detection (smoke/carbon monoxide alarm and glass breaking); 30 days of video event history.

If you sign up for Google Home Premium Advanced (\$30/month, \$300/year), you get those features, as well as: search video history – quickly search your camera history by just asking; daily summaries – ask about what you missed when you were away; 60 days of video history; 10 days of 24/7 video history, descriptive notifications, event descriptions.

Similar to its rival smart speakers, the Google Home Speaker works well with the Google TV Streamer to create a home theatre experience. You can pair either a single speaker or two to the streaming device; if you pair two, you can also set up spatial audio. Dolby Atmos is supported, and the Google TV Streamer can also convert HD audio into a proprietary spatial audio format.

As smart home assistants, both Alexa and Google are very capable, especially now that they've gained extra AI abilities. If you've already started using either smart assistant, it's unlikely that you're going to switch your smart home from Alexa to Google or vice versa.

At this point, a smart speaker is more or less a delivery mechanism for the smart assistant of your choice. If you already own a Google smart speaker and it's working well, there's no real reason to upgrade, unless you want to create a Google-centric home theatre system. ■

VERDICT



More compact than the now-discontinued Nest Audio, but lacks features found in competing smart speakers from Amazon and Apple.

MIKE PROSPERO & BEN MANSILL



PRICE \$299 **WEB** logitech.com/en-au



Logitech G512 X 75

Logi finally gets in on the hot-swappable keyboard craze.

The Logitech G512 X 75 TMR arrives with a confident, colourful personality – this isn't one of Logitech's subtle, boring boards. Between the bold accent keycaps and the large RGB light bar running along the front edge, it's designed to stand out. Pair it with the optional glowing palm rest and the whole setup becomes a desk-centrepiece. It's loud, bright, and visually expressive, and for the most part, it earns that attention.

Its TMR (Tunnel Magnetoresistance) switch system remains the star attraction. The mechanism is secure, easy to use, and makes experimenting with switches genuinely fun. Crucially, TMR switches also support adjustable actuation points and rapid trigger functionality, giving you fine-grained control over responsiveness – especially handy for fast-paced competitive gaming. All of this is tweakable in Logitech's G HUB software, where you can dial in actuation sensitivity per key and customise rapid trigger behaviour. The catch – and it's a notable one – is that only the left side of the board supports full TMR and mechanical switch modularity, and you only get nine TMR switches. The right side can still take different switches, but only traditional mechanical ones. Granted,

the left side is where all the gaming stuff typically happens, but there's no denying that it feels like a compromise.

Outside of switches, the G512 X 75 shows off Logitech's usual strengths. Despite being mostly plastic, the chassis feels fairly solid, though there's a noticeable flex if you pick it up and twist it. The 75% layout tested here is compact without feeling cramped, and Logitech also offers a 98% model for those who can't live without a numpad. The two knobs – one for volume, one for RGB intensity – are smooth, responsive, and add a tactile charm. The height-adjustment feet doubling as switch pullers is another clever touch. It's multifunction design done right: practical, tidy, and genuinely useful.

Visually, this keyboard leans hard into flair. The coloured keycaps give it personality, and the front-facing light bar adds a dramatic wash of RGB that spills beautifully into the translucent palm rest if you buy it separately. Logitech clearly wanted this board to feel modern and expressive, and it succeeded.

Sound profile is where personal preference kicks in. Out of the box, the G512 X 75 has that familiar Logitech acoustic character – slightly hollow, slightly sharp, and heavily influenced by switch choice. The pre-installed

Brown mechanical switches I tested have a pronounced tactile bump, but I'm not a fan of the feel. The bump is abrupt, and the resulting sound sits in an awkward middle ground – not quite a satisfying thock, not quite a crisp clack. The upside is that you can always replace them with switches of your choosing.

Price is the one area where the G512 X 75 feels a little out of step. For a wired keyboard, it sits higher than expected. Logitech's build quality and polish justify some of that cost, but when you factor in the half-implemented modularity and the upsell on the palm rest, it becomes a harder sell.

Even so, the G512 X 75 TMR is a stylish, sturdy, and genuinely enjoyable keyboard with a clever modular system – just not a fully realised one. If Logitech expands TMR across the entire board in a future revision, that would be something truly exceptional. For now, this version is still easy to recommend, especially if you enjoy experimenting with switch types. ■

VERDICT



Logitech's G512X 75 TMR keyboard is well-built and fun to use, with enough personality to stand out, though it would be greatly improved if every switch bed had TMR capability.

STEPHEN LAMBRECHTS

SPECS Length: 330.2 mm, width: 155.2 mm, height: 46.6 mm, weight: 850 g, wired USB-C (USB 2.0 or above), actuation force: 30–50 g depending on switch type, actuation point: 2.0 mm (mechanical) / 0.1–4.0 mm (analog), total keypress travel distance: 4.0 mm.



PRICE \$1,599 **WEB** ankersolix.com.au

Anker Solix C1000 Gen 2

A fast-charging 1kWh power station with 2000W output for appliances, plus a handy UPS mode.

Portable power stations have started moving beyond camping use, and the Anker Solix C1000 Gen 2 is a good example of how. It has enough battery capacity and AC output to run typical appliances, but it's also able to handle small-scale home backup, like keeping internet gear, desktop PCs or even a TV alive during outages.

The C1000 Gen 2 is built around a 1024Wh lithium iron phosphate (LiFePO4) battery, with a high 4000-cycle lifespan and is backed by a long 5-year warranty. The four AC sockets can deliver up to 2000W continuously combined and handle peaks up to 3000W, which allows it to run more demanding household appliances.

Compared to the original C1000, the Gen 2 model drops from 12.9kg to 11.3kg, increases AC output from 1800W to 2000W and improves the UPS switchover to just 10ms. For USB and 12V gear there are two 140W USB-C ports, a 15W USB-C port, a 12W USB-A port, a 120W car socket and up to 600W solar input.

Build quality is excellent, and the C1000 Gen 2 is designed to be portable. The chunky handles make it easy to carry

for an 11.3kg unit, and the ports are laid out well for access. In our testing, it handled being lugged around with other gear, showing no sign of damage or even undue cosmetic wear. Setup with the Anker app is simple, and the app itself is polished, connects reliably over Wi-Fi or Bluetooth and is very handy for viewing output, input and charge settings even when the unit is tucked away out of sight.

The C1000 Gen 2 offers impressive recharge speed, at up to 1600W, and in testing it hit 80% capacity in 36 minutes and reached 100% in 48 minutes. While using the fast charge mode adds a little more wear, it means you can do very rapid top-ups anywhere there's power available. Solar input is up to 600W and can do a full charge in under two hours, while the 12V input allows a slower 100W charge from a car accessory socket.

Capacity testing also produced good results. Via USB-C, it delivered a top-notch 88% efficiency, or about 897.7Wh usable from the 1024Wh battery. Via AC, efficiency was 84%, or about 859Wh after inverter losses, which is also an excellent result. The high-power USB-C ports had no problem supplying a full 140W test

load or charging multiple devices.

The AC sockets are rated for 2000W and handle the full continuous load well, including peaks to 2400W. The C1000 has no issue with tasks like cooking dinner using an induction cooktop, and tests running a Ninja Slushi produced over 15 litres of frozen drinks with power to spare. Under heavy load the fan does spool up, but it's not excessively noisy, and under about 200W, it's virtually silent.

The C1000 Gen 2 also worked well as an uninterruptible power supply (UPS), which gives it an extra use beyond camping and outage backup. With internet gear, desktop PCs and a TV connected, the 10ms switchover avoided any dropouts in testing. It's not a full replacement for a dedicated managed UPS, especially if you need advanced monitoring or shutdown control, but it's much more flexible. ■

VERDICT



A fast, capable and easy-to-use 1kWh power station that works well for appliances and home backup, and is well worth the admittedly premium price.

LINDSAY HANDMER

SPECS 1024Wh LiFePO4 battery, 4000-cycle lifespan; 2000W AC output, 3000W peak, 10ms UPS; 2x 140W USB-C, 1x 15W USB-C, 1x 12W USB-A, 120W car socket; up to 1600W AC charging, 600W solar input; 38.4 x 20.8 x 24.4cm, 11.3kg; 5-year warranty.

PRICE \$1,099 (256GB), \$1,299 (512GB) **WEB** mi.com/au

Xiaomi 17T Pro

A Pro phone at a non-Pro price.

At \$1,099, the Xiaomi 17T Pro is a lot cheaper than other “Pro” handsets – it’s priced to match the regular Google Pixel 10, or the standard Apple iPhone 17, while surpassing both in several areas.

The design isn’t exactly innovative, but I like the moody Violet and Deep Blue options, which are offered alongside standard Black. It’s a large phone, around the same size as an iPhone 17 Pro Max, and it feels very premium, with aluminium sides and a plastic and glass-fibre back that’s tougher and more smudge-resistant than regular glass.

The big screen supports a blisteringly fast 144Hz refresh rate for impeccable smoothness, and is also very bright: Xiaomi claims it can hit 3,500cd/m², and I certainly never had trouble using this phone outdoors. At the same time, I appreciate the way you can dim it right down to 1cd/m² – perfect for late-night scrolling sessions.

The Xiaomi 17T Pro’s cameras are exactly the same as on last year’s model, but it’s still a great specification for the price, with a 1/1.3-inch main sensor that roughly matches the iPhone 17 Pro. This produces some great shots, with very appealing colour reproduction and just enough contrast to make images pop without looking exaggerated.

For me the real standout feature is the 5x telephoto camera, which puts the 17T Pro way ahead of the competition for close-ups. It’s a shame the ultra-wide camera isn’t so impressive: this has a relatively tiny 1/3.06-inch sensor, making it pretty useless in low light conditions, and its fixed focus means you can’t use it for close-ups. Overall though this is still a great camera phone.

Video support is good too: the 17T Pro supports Xiaomi’s excellent Log profile at up to 4K 60fps, and you can even shoot 4K 120fps on the main lens, albeit without very effective stabilisation.

The MediaTek Dimensity 9500 SoC inside the Xiaomi 17T Pro might not have the brand-name cachet of a Qualcomm

Snapdragon chip, but it feels super-speedy, no matter what you ask of it. Audio quality is good too, with detailed highs and better bass response than you’d normally expect from a phone.

The system software is Xiaomi’s Hyper OS 3, built on top of Android 16. There’s good news for the future too: Xiaomi promises five generations of updates, so you can expect to keep up with new features until at least 2031, plus an additional year of security patches.

As a final bonus, the Xiaomi 17T Pro has the largest battery of any Xiaomi phone to date, with a whopping 7,000mAh capacity. This easily gets me through the day, and usually through a second morning; I dare say battery life may get even better as the software is optimised and the OS adjusts itself to suit my usage patterns.

In any case, recharging is barely a hassle. The 17T Pro supports wired charging at up to 100W, which I found took the phone from fully dead to well over 50% in half an hour. Wireless charging is speedy too, at rates up to 50W with Xiaomi’s official wireless charger.

The Xiaomi 17T Pro isn’t a groundbreaking phone, but it has almost everything you could ask for: a fast processor, a great screen, a big battery, fast charging and excellent main and telephoto cameras. While the ultra-wide camera is a dud, this is certainly one of the best phones in its price range, offering a real “Pro” experience for a distinctly non-“Pro” price. ■

VERDICT



This great-value phone offers zoom photography, exceptional speeds and two-day battery life.

LUKE BAKER

SPECS 8-core 4.2GHz/3.5GHz/2.7GHz MediaTek Dimensity 9500 SoC; 12GB RAM; Mali G1-Ultra graphics; 6.8in 144Hz AMOLED screen, 1,280 x 2,772 resolution; 256GB/512GB/1TB storage; dual nano-SIM; IP68; triple 50MP/50MP/12MP rear cameras; 32MP front camera; Wi-Fi 7; Bluetooth 6; NFC; 7,000mAh battery; USB-C 3.2 Gen 2 connector; Android 16 with Xiaomi HyperOS 3 (5 major updates); 78 x 8.3 x 162mm (WDH); 219g.



SYSTEM TOOL

NEEDS Windows 10 or 11 WEB www.winhance.net

Winhance 26.4.21

It's time to take out the trash.

There are now lots of excellent programs for optimising and debloating Windows, including Wintoys, Sparkle and Winaero Tweaker. Winhance is the most powerful and versatile yet, packing a huge set of options into an easy-to-use interface.

Its 'Software & Apps' tab lets you remove built-in Windows apps you never use, including 3D Viewer, Feedback Hub, OneDrive, Phone Link and Xbox. Winhance can also uninstall third-party programs, grouping them by category such as Browsers, Imaging and Multimedia.

However, it's on the Optimize tab where Winhance gets really useful. This offers over 270 tweaks for improving

Windows by disabling, enabling and configuring settings.

In this latest update, Winhance has added a Windows AI section to its 'Privacy & Security' tweaks. This gives you total control over AI-related features on your PC, so you can disable Copilot, AI data analysis, AI tools in Paint, 'Click to Do' and Recall on Copilot+ PCs, and more.

Similarly, the new Microsoft Edge AI and Microsoft Office AI sections let you turn off all AI elements in Edge, Word, Excel and OneNote. If you're tired of Microsoft foisting unwanted AI on your system, Winhance is the solution - plus you can re-enable features if you later change your mind.

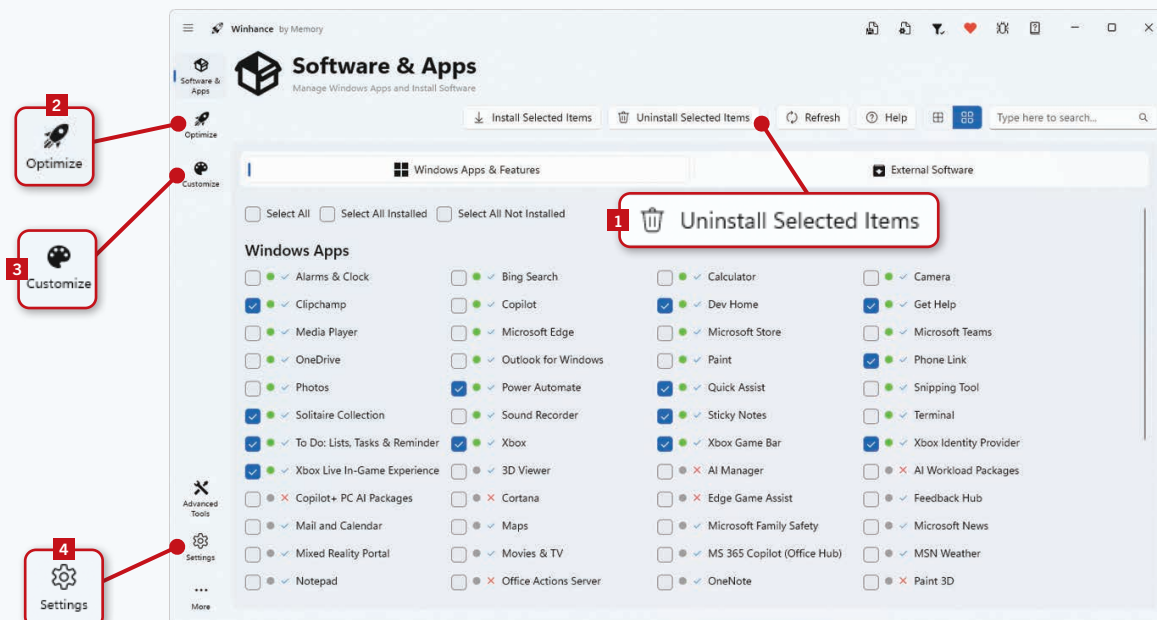
There are more new tweaks under

'Gaming & Performance', including changing your DNS server and your mouse's 'hover time' (how long elements take to activate when you hover your cursor over them). Winhance has also added a Quick Actions menu to the Optimize tab, which lets you apply all recommended settings or reset all settings to their defaults in one click.

On the Customize tab, there are new tweaks for customising the appearance and behaviour of the taskbar and your right-click menu in File Explorer. We particularly like the option to add CHKDSK to the menu, so you can check problematic drives for errors.

Winhance offers regular and portable installation, so you can run it from a USB stick.

"This gives you total control over AI-related features on your PC, so you can disable Copilot, AI data analysis, AI tools in Paint, 'Click to Do' and Recall on Copilot+ PCs, and more."

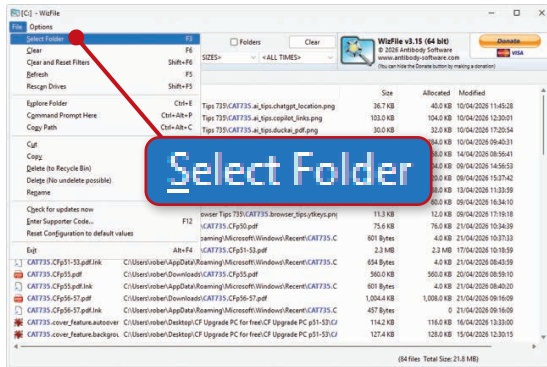


1 To uninstall Windows junk, simply tick it on the 'Software & Apps' screen and click the 'Uninstall Selected Items' button. Winhance highlights the apps installed on your PC with a green dot.

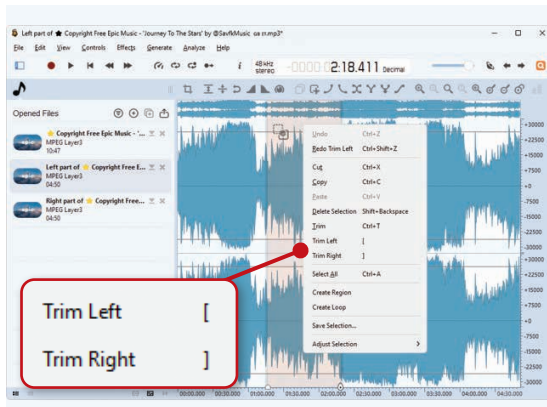
2 Click the Optimize tab to access Winhance's extensive range of Windows tweaks. These are organised into categories including 'Privacy & Security', Power, 'Gaming & Performance' and Update (Windows Update tweaks).

3 The Customize tab provides tweaks for the Start menu, taskbar and File Explorer. These include removing 'suggestions' from Start, showing hidden taskbar icons and restoring the classic context menu.

4 Before you perform major tweaks with Winhance, click the Settings button and choose 'Create Restore Point' so you can roll back later if necessary. You can also switch the program's theme to dark mode.

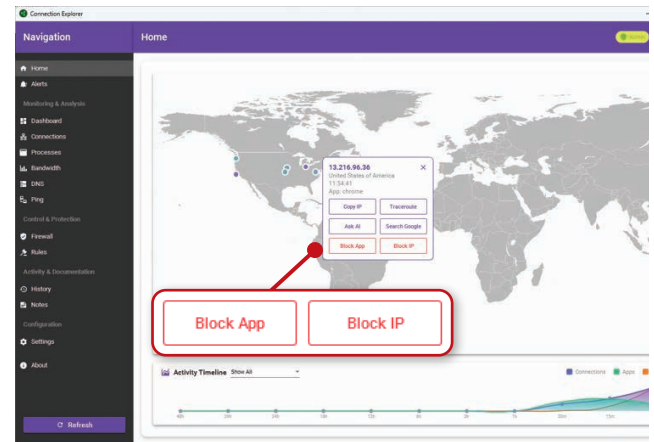
**SEARCH TOOL****NEEDS** Windows 7, 8.1, 10 or 11**WEB** antibody-software.com/wizfile**WIZFILE 3.15**

From the developer of WizTree, WizFile offers a much speedier way to search your PC than Windows' search tool. It doesn't spend ages indexing your hard drives, but displays results instantly as you type your query. This new version doubles WizFile's scanning speed for non-NTFS and network drives, and adds the option to search within specific folders. Press F3 - or click the File menu then Select Folder (see screenshot) - and choose the folder to search inside. If you have QuickLook (tinyurl.com/APC561quick) installed on your PC, you can now preview files in search results by selecting them and pressing the Space bar. When you've finished searching, use the new keyboard shortcut Ctrl+Windows key+W to minimise WizFile to the system tray.

**AUDIO EDITOR****NEEDS** Windows 10 or 11**WEB** www.ocenaudio.com**OCENAUDIO 3.18**

Ocenaudio is a simpler way to edit audio files than Audacity (www.audacityteam.org). This update makes it easier to trim unwanted segments, by right-clicking the waveform and choosing Trim Left or Trim Right (see screenshot). This will remove the audio from before or after the selected section, or from where the vertical 'playhead' line is positioned. There's also a new 'Split at Cursor' option, which divides the audio into left and right clips, so you can edit each independently. To apply the split, either click the Edit menu and choose 'Split at Cursor' or press Shift+S. When you adjust the sample rate and channels for an audio file, Ocenaudio now remembers the settings for next time. Right-click the file in the sidebar, choose 'Convert to' then Other Format and you'll see a new Last Used tab.

Should I pay for?

**WINDOWS WIDGETS****PRICE** \$33 per year**FREE TRIAL PERIOD** 30 days**NEEDS** Windows 10 or 11**WEB** tinyurl.com/APC561connection**CONNECTION EXPLORER**

Connection Explorer is a new program from Stardock, the company behind the excellent paid-for tools Start11 and Fences. It lets you monitor every connection your PC makes, so you can see what's sending and receiving data in the background.

The heart of Connection Explorer is its Live Network Map, which displays network activity on a world map. Green dots represent connections with new activity while purple dots show connections from the past 30 minutes.

Click a dot on the map to view information about that connection, including its IP address. You can trace its route, look it up on Google and block either the related app or the IP address (see screenshot).

Select 'Dashboard' to view a real-time graph of network traffic, details of data being downloaded and uploaded, and the number of active connections. You can view further information about connections and background processes on their respective tabs.

Connection Explorer's Alerts feature notifies you of suspicious network activity and rates the severity of potential threats, so you can take appropriate action. Click its Firewall tab to block programs and services from accessing the internet with a single click.

There's certainly lots of useful information in Connection Explorer, but it's a shame there isn't a choice of editions. Rival network monitor GlassWire (www.glasswire.com) offers some similar features and data in its free version.

OUR VERDICT: DON'T PAY FOR IT

Connection Explorer is superbly designed and gives you impressive insights into, and control over, network activity on your PC. But provided you have reliable security software installed, it's not an essential tool. ■

“Connection Explorer's Alerts feature notifies you of suspicious network activity and rates the severity of potential threats, so you can take appropriate action.”

IMAGE-EDITING SUITE

PRICE US\$179.99/US\$99.99 upgrade from 7 or 8 WEB nikcollection.dxo.com NEEDS macOS 15.7 or later

ALSO ON WINDOWS

DxO Nik Collection 9

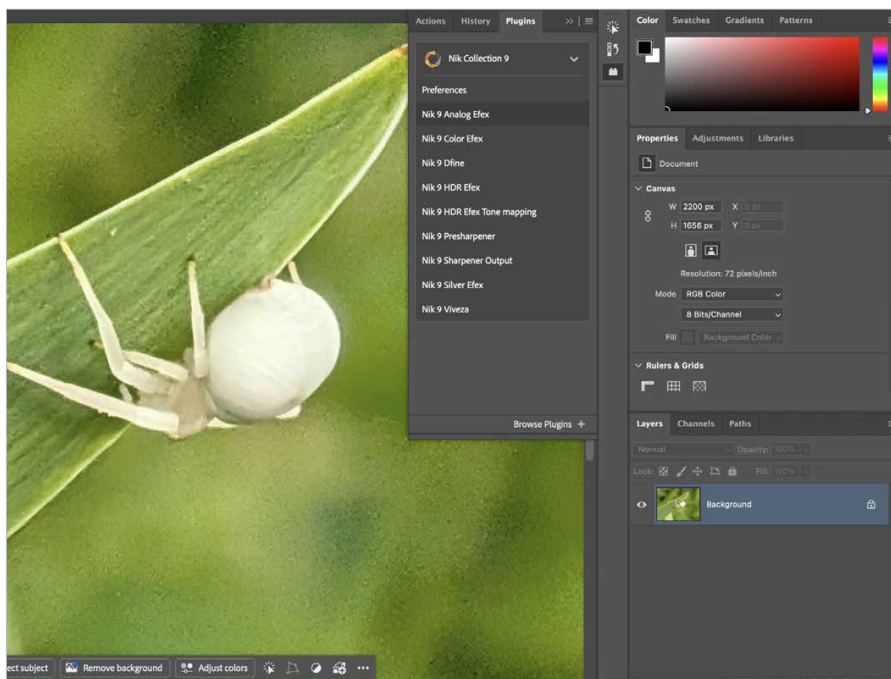
Take your favourite photos to a whole new level.



DxO's Nik Collection 9 arrives on the Mac (also available for Windows) as the most forward-looking version of the image-editing suite. Appearing as eight standalone apps as well as plug-ins for Photoshop (including Elements 2025 and 2026), Lightroom Classic, Affinity or DxO PhotoLab, there's a lot to dig into, as well as artificial intelligence (AI) options too.

At the centre of the new release are AI Masks and Depth Masks, both of which dramatically speed up the process of making precise selection and local adjustments – some of the most time-consuming parts of digital photo editing. AI Masks can isolate subjects with a click or a quick bounding box, delivering accurate selections in seconds. Depth Masks go even further, analysing the image so you can target adjustments based on objects' distance from the camera, with feathering to blend these edits into the background.

The names remain the same as in previous releases. There's Silver Efex for converting images to black and white, Dfine for noise reduction, HDR Efex for creating high dynamic range compositions, and the slightly



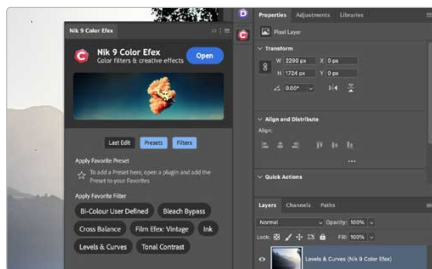
Select one of the apps from the plug-ins list and it becomes its own panel to work from.

unusual Viveza which does away with the masking and layering and sets you loose with sliders and curves adjustments to nail colour balance.

The apps that add filters, Color Efex and Analog Efex, benefit from the introduction of 18 blending modes, bringing a Photoshop-like level of

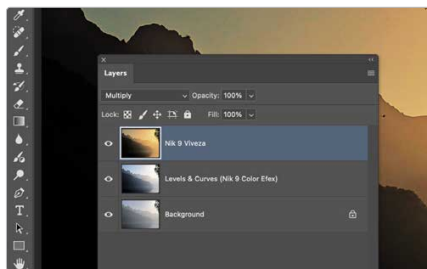
nuance to how filters interact with the underlying image, even when you're using them in standalone mode. The new Glass effect adds a set of distortion options, complete with controls for scale, smoothness and intensity. Meanwhile, Chromatic Shift channels the quirks of offset

App tips Power up your process with Nik Collection 9



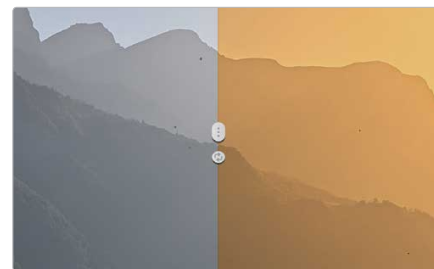
Add favourites

Clicking the gold star next to a preset you like, or one you've made yourself, will run it within your image-editing app without having to make a round trip to the Nik app. This handy shortcut can speed up your workflow considerably.



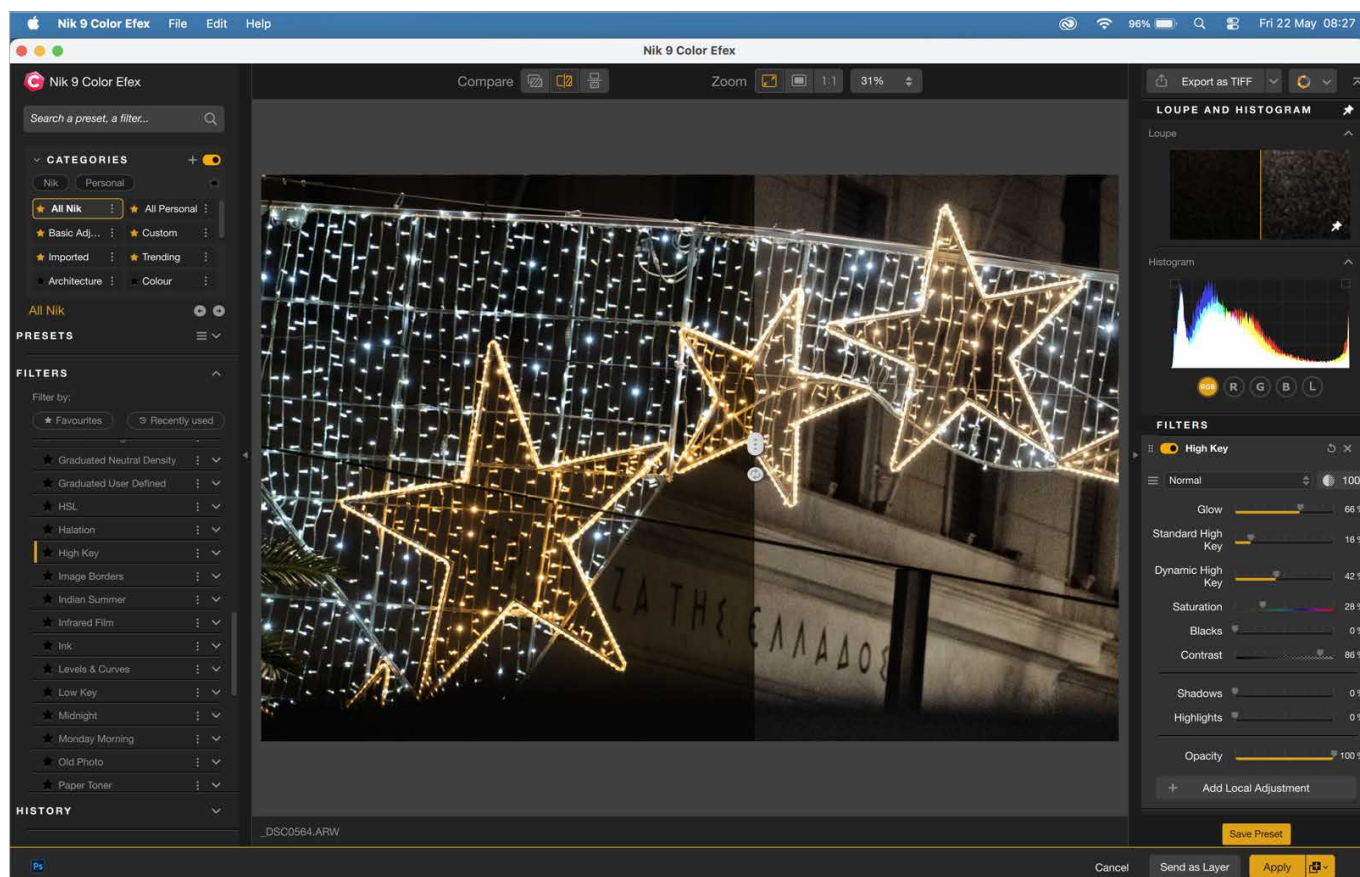
Stack your edits

In Photoshop, Nik Collection edits can be stacked as layers, including as smart objects and masks, then blended together, even if they come from different tools. This means you can go back and make changes later.



Switch the line

It's a simple thing, but the Nik tools offer a sliding line that shows before and after views of your edited image. On the line is an arrow button, and clicking this switches it from vertical to horizontal, and back again.



Presets can be added quickly, then edited to perfect the look.

printing by misaligning colour layers, and a Halation filter recreates the soft, reddish glow of classic film stock.

REVITALISED CLASSIC

A new Color Grading tool replaces the familiar cluster of wheels with a single interface that still offers independent control over shadows, midtones, highlights and the image's colour levels. The ability to lock tonal points together and work on them in sync is new too, as are mask overlays that make it clearer which areas of the image are

within the selection, and the option to combine the tools with blending modes opens up creative looks that simply weren't possible in earlier versions. The suite's long-standing U-Point algorithms remain present, alongside the AI-driven tools, and you can now copy and paste adjustments between images. Some of this is similar to the way Adobe Camera Raw works, but it's worth noting that Nik Collection doesn't work on Raw files, and you'll have to 'develop' them first. You can set favourites, but the

collection repays a period of time spent setting it up first, though the number of gold stars – given when you favourite them in the stand-alone apps – will naturally increase as you experiment with what each tool does. You now get previews of a preset's effects on the image when you hover the mouse pointer over it, which can speed up the decision process.

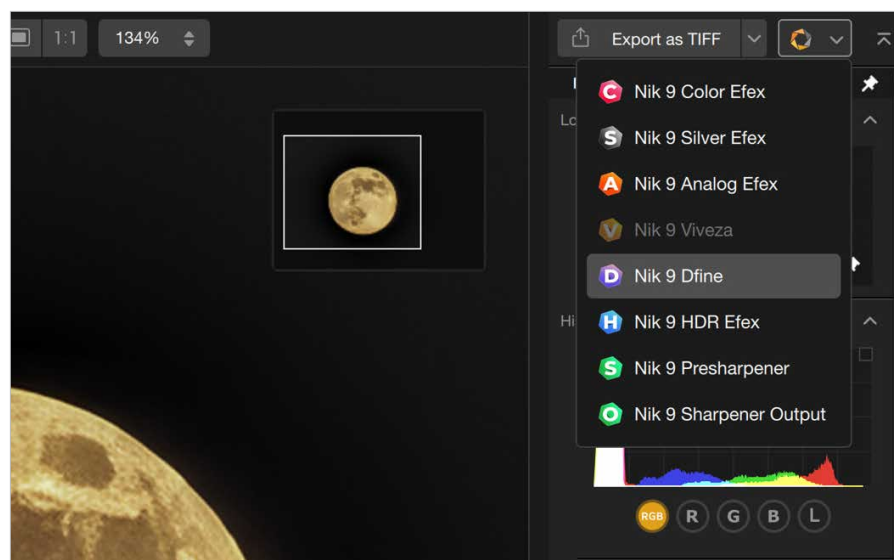
What stands out across the suite is how cohesive and streamlined the experience feels. For photographers, Nik Collection 9 is a rare upgrade that genuinely expands what the software can do while respecting what long-time users already love. It's faster, more intuitive, and more expressive, with tools that encourage experimentation rather than slow it down. The result is a suite that feels revitalised – modern in its capabilities, but still a classic – and easily one of the strongest releases in the collection's history. ■

VERDICT



Nik has produced a fine update to its plug-ins collection to make you feel in control of images.

IAN EVENDEN



Jump between apps using the menu in the top-right corner.



BEST OF COMPUTEX 2026



We trod the halls of Computex in Taipei to unearth the outstanding new products — and tantalising signs of things to come.

CONTRIBUTORS: Tim Danton, Jason England, Matt Hanson, Brandon Hill, Jon Honeyball, Nick Ross, Matt Safford, Anthony Spadafora, Mark Tyson and Tom's Hardware contributors



Forget new GPUs and motherboards: the show once famous for gaming is shifting its focus to tech in all its forms. That's not to suggest any lack of RGB-laden cases, for they're still out in abundance, but it's telling that

Nvidia's big Computex announcements had nothing to do with desktop graphics cards.

But Nvidia wasn't the only show in town. Over the course of four days – six if you include the

weekend building up to the official opening – we spoke to hundreds of companies and played with every major new product to uncover the crown jewels from the show. That means laptops, monitors, robots, processors... and some devices that defy categorisation.

We've also picked out our seven favourite products from Computex 2026. One of which is indeed a graphics card, but as you'll see it's a rather special one.

LAPTOPS

ACER SWIFT AIR 14

AVAILABILITY Spring 2026

Acer's opening salvo in this post-MacBook Neo world is the Acer Swift Air 14. Like the Neo and Dell's new XPS 13 it uses an all-metal chassis, while the US\$599 starting price puts it on a par with the Neo (Au pricing has yet to be announced).

The Swift Air 14 is well built but chunkier than the XPS 13, with a 1.2kg weight and wider chassis to accommodate the 14in panel. It measures a slender 12.9mm thick, and Acer complements the two Thunderbolt 4 ports (both sit on the left-hand side) with a USB-A port and 3.5mm combo jack on the right.

It will come with a selection of Core Series 3 chips (not Core Ultra), so only has six cores to offer and two Xe graphics cores. But that's fine for the undemanding type of use this laptop is designed for. My only real negativity is aimed at the resolution of the screen: 1,920 x 1,200 works out at 162dpi, which is less than ideal. [TD](#)



DELL XPS 13 (2026)

AVAILABILITY Spring 2026

It's telling that when a Dell expert showed me the new XPS 13, she just happened to have a MacBook Neo to hand. The Dell is more expensive than the Neo – starting at \$1,399 – and the Dell, on paper at least, is superior in almost every way.

For a start, it's thinner and lighter than the MacBook Neo at 12.7mm thick and a shade under 1kg. Next up is its sharper 13.4in panel, with a 2,560 x 1,600 resolution that gives it a pixel density of 225dpi; the Neo must make do with a "mere" 219dpi. It's also brighter, peaking

at 500cd/m², and I suspect it will cover more colours than the Neo. Dell is quick to point out that it's a touchscreen, too, although that doesn't feel like a killer feature for most buyers.

The backlit keypad might be. My brief bash on the keyboard in Dell's Computex showroom suggests that it will be pretty easy to reach high word-per-minute rates, with a short but decisive amount of travel, and the huge trackpad underneath is a joy for anyone who uses Windows gestures. There are only two ports, with a USB-C connector on either side. This

supports Thunderbolt 4 if you choose the Core Series 3 Ultra chip, the Core 7 355 found in the ThinkPad X1 Carbon (see p64), but drops down to USB 3.2 Gen2 (10Gbits/sec) with the Core 5 320 version. This CPU loses two of the four P-cores in the 355, but should still prove nippy in Windows 11. The 8GB of RAM is the natural partner for this CPU, but Dell surprised me by saying the baseline Dell XPS 13 will come with a 512GB SSD.

Dell isn't alone in building high-quality laptops for this price, with Acer also producing the promising Swift Air 14 that we cover above. [TD](#)



ACER TRAVELMATE P6 14 AI (2026)

AVAILABILITY August 2026

It was clear from speaking to the product director (not his official job title, but he assured me that he was the man in charge) for the new Acer TravelMate P6 14 AI that he was excited about this laptop. Our best TravelMate ever, he assured me, and he's not wrong: this sub-1kg lump of luxury is ideal for executives who want to make people go "ooh" as they remove it from the bag. Oh, this? Yeah, it's just my business laptop. No biggie.

And it isn't big, bending as it does the laws of time and space to fit into a footprint roughly equivalent to a sheet of A4 paper. A little thicker at 16mm, admittedly, but Acer did need to make room for the 71Wh battery and Core Ultra Series 3 processor – with vPro on this occasion (unlike the Dell XPS 13). That means extra energy can go to power the 2.8K OLED panel, which is a thing of beauty. It even supports touch, with Corning Gorilla Matte Pro glass for added protection. You can buy an IPS version, but why bother when everything else screams luxury?

One answer is battery life, with Acer claiming up to 30 hours with the lesser screen, but the big decision will be made in August when it's due for release in Australia. At which point, we shall find out the price, which I suspect will be rather less than the similarly brilliant Lenovo ThinkPad X1 Carbon Gen14 I. **TD**



MSI TITAN 18 HX DRAGON EDITION DRACO EPIC

AVAILABILITY TBC

MSI has a long history of designing striking gaming laptops, but the MSI Titan 18 HX Dragon Edition Draco Epic tops them all. And it's all thanks to stunning artwork that adorns almost every inch of this laptop. It features a new dragon for MSI (which has an iconic red dragon as its mascot), named Draco and based on the Greek myth about the North Star.

The artwork on the back of the lid is slightly raised and looks gorgeous in person, but why stop there? MSI also includes a limited edition coin, mousepad and gaming mouse, all bundled in a stylish box to celebrate MSI's 40th anniversary. The hardware inside is no slouch, either – you get an Intel Core Ultra 9 290HX Plus processor, Nvidia RTX 5090 laptop GPU and an 18in UHD+ Mini-LED screen with a 240Hz refresh rate. **MH**



THE ROBOTS ARE COMING

Computex 2026 dedicated a hall to robotics, with Sensory AI's sixth-generation Robot Barista serving over a thousand cups of coffee per day to attendees and staff. Powering it all was Intel's new Core Series 3 chip: not just Ella, the robot arm who made the coffees, but the eight internal cameras monitoring for problems, the display at the rear and the ecommerce system needed to process orders (although the coffees were free at the show).

But the real point here is that – thanks in part to Intel but also the rapid development of compact LLMs – we're finally seeing the arrival of robot brains to match the impressive robot bodies created by Boston Dynamics and Honor. Inspired by Computex 2026, we'll explore this topic further next month.



ACER ASPIRE GO 15

AVAILABILITY TBC

While we know that HP and Lenovo will sell laptops based on the Qualcomm Snapdragon C platform – see p91 for our analysis of this SoC, which we believe is a variation on an existing, low-power chip found in embedded devices – this is the first official Snapdragon C laptop. Not that Acer has told us the price or release date.

What we do know is that it has many of the hallmarks of extremely cheap laptops, with a couple of handy exceptions. Hallmarks first: a wan 1920 x 1080 15.6in display. A

maximum 8GB of RAM, and I suspect it will ship with 4GB. Plastic construction. A

1080p webcam that doesn't support Windows Hello. But

then there are the pluses: two

USB-C ports plus HDMI, Wi-Fi 6E support,

up to 512GB SSDs. But really what matters here is

the price. If it's \$500 or less, I'm interested. **TD**



8 GEFORCE RTX SPARK LAPTOPS

Nvidia announced that RTX Spark laptops would be coming this autumn. Here are the contenders:



MICROSOFT SURFACE LAPTOP ULTRA

This is a mean-looking machine with a sleek, utilitarian aesthetic, but it's not all about looks. Even in my short time with the Surface Laptop Ultra, this felt like the best haptic touchpad I've used (with ways to communicate back to you through tap sensations across the OS). It also packs a great keyboard, plenty of I/O, and a mesmerising mini-LED display. Could the MacBook Pro have a serious Windows rival at last? **JE**

ASUS PROART P14 AND P16

We're already fans of Asus' ProArt line, aimed at creators as its name suggests, and these 14in and 16in machines look well set to continue the trend. The 16in version is 12.9mm thick, weighs 1.8kg and includes a 16in 4K OLED panel that can reach up to 1,600cd/m² with HDR content. The 14in version is 13.9mm thick and weighs 1.5kg. Both will come in a choice of black or white finishes. **TD**

HP OMNIBOOK X 14 AND ULTRA 16

Both these RTX Spark laptops feature 3K OLED panels and an ultra-slim design: 13.5mm for the 14in OmniBook X 14, 15.7mm thick for the OmniBook Ultra 16. They both look the part with a thoroughly modern

design, with powerful 140W GaN chargers to ensure they have all the power they need. HP has put extra cooling in place, too, but we do wonder how such slim machines will perform when pushed. **TD**

LENOVO YOGA PRO 9N

A completely new line, although it appears to be based on the Yoga Pro 9i (which makes sense as the "i" stands for Intel), the Yoga Pro 9n includes a 15in OLED panel and a bagload of connectivity: two USB-C ports, two USB-A, HDMI, a microSD card reader and a 3.5mm combo jack. Thankfully, Lenovo has left room for generous exhaust vents at the rear, which the RTX Spark will surely need. **TD**

MSI PRESTIGE N16 FLIP AI+

The only 2-in-1 convertible in the RTX Spark lineup, and it's a whopper. MSI's offering includes a 16in panel protected by a premium, aluminium chassis. It's packed with all the same ports as the Lenovo Yoga Pro 9n above, while a 99.9Wh battery should ensure it keeps going all day (and perhaps a little into the night). Although this generously cooled laptop wants to be plugged in at full power, we suspect. **TD**

DELL XPS 16 CREATOR EDITION

Dell XPS fans may want to wait for this "Creator Edition" built around the RTX Spark, with Dell teasing that it and Nvidia are "just getting started". Could a 14in version be in the offing? We wouldn't be surprised, but for now the XPS 16 Creator Edition looks to be identical to the recently launched Intel version, although it looks like it will only come with a 4K OLED. Which makes sense for the spec. **TD**



GAMING HANDHELDS

MSI CLAW 8 EX AI+

AVAILABILITY TBC

There's a new competitor to take on the Steam Deck, ROG Ally and Legion Go 2. The MSI Claw 8 EX AI+ is a fresh entry using the 14-core Intel Arc G3 Extreme CPU and an Arc B390 GPU. The handheld can also be decked out with up to 32GB of RAM and up to 1TB of storage.

The design is somewhat unorthodox, with the 8in 1080p IPS display jutting well below the flanking controllers. MSI says the display goes up to 120Hz and 500cd/m². Rounding out the main features is an 80Wh battery inside the 600g package. **TH**



ACER PREDATOR ATLAS 8 ARC G3

AVAILABILITY October

We laid our hands on the all-new Acer Predator Atlas 8 Arc G3 at Computex, and colour us impressed. The Predator Atlas 8 uses Arc G3 and Arc G3 Extreme processors paired with an Arc B370 or B390 iGPU. Systems come with an 8in 1200p 120Hz display rated for up to 500cd/m² of brightness. An 80Wh battery should help extend your gaming runtime, and Wi-Fi 7 and Bluetooth 5.4 are included in the mix.

At a shade over 800g, the Predator Atlas 8 is heavier than the MSI Claw and slots in between the Legion Go and the Steam Deck OLED in weight. Let there be no doubt: the handheld gaming sector is hotting up. **TH**

MONITORS

ACER PM131QT MOBILE MONITOR

AVAILABILITY 2027

"Mobile monitors are so boring," lamented an engineer at Acer HQ (in my imagination, you understand). "We need a way to jazz them up."

"I've got it!" cried another. "Let's chop one in half!" And thus the ever-so-weird PM131QT came into being, a 12.3in portable monitor with a 1,920 x 720 resolution. You may be wondering why.

I'm not sure Acer really knows the answer, but it suggests three uses: as a dual-screen setup, with the mobile monitor placed above or below your main screen. As an extra bolt-on to the right or left side of your panel, perhaps for social media. And as an in-car display, for showing satnav routing perhaps.

Or maybe it can be a tiny extra panel you throw into your bag that you use with your phone in

desktop mode. Connect an external keyboard (there are pogo connectors, and Acer says that it's working on an accompanying travel keyboard) and mouse and you have a laptop-like setup.

In truth there are lots of unknowns here, including the release date (other than next year) and the price. But it's quirky, and does somehow appeal more than a normal mobile monitor. Boring the Acer PM131QT ain't. [TD](#)



ALIENWARE AW3926QW 5K OLED

AVAILABILITY TBC

This 39in ultrawide 5K OLED monitor is a sight to behold, with its 1500R curved screen and 1,300cd/m² peak brightness. However, the RGB stripe tech in its panel is the true game changer. For years, blurry text has been a trade-off that came with using an

OLED or QD-OLED monitor, but the AW3926QW fixes this by arranging its subpixels in an RGB stripe. That means the AW3926QW delivers razor-sharp text, making it as good for work as it is for gaming. To top it off, Alienware gave the AW3926QW a dual-mode design where you get 5K at 165Hz for single-player games, but can switch to 1080p at 330Hz for esports. [AS](#)



GIGABYTE AORUS ELITE FM275K16P

AVAILABILITY TBC

Multimode monitors – operating at different refresh rates depending on the resolution – are nothing new, but what if two modes simply aren't enough? Welcome the "world's first" 5K multimode monitor, the FM275K16P. This 27in mini-LED display supports three display modes: 5K at 165Hz, 4K at 220Hz and 1440p at 330Hz, with a response time of only 1ms, peak brightness of 1,250 nits, and 2,304 local dimming zones. [AS](#)



NVIDIA STEALS THE SHOW

Jensen Huang rocked the serene world of x86 Windows with the news of its RTX Spark mobile chips and a high-end processor for desktop AI workstations.

Every Computex 2026 attendee could be in no doubt: Nvidia owned this year's show. Not just with Jensen Huang's headline-grabbing keynote, but with its gigantic server display in one of the two main halls touting all the heavyweight offerings it now has to offer. Nvidia even ran a separate show of its own, GTC Taipei, directly opposite the Trade Center hosting the robotics section. In short, Nvidia's distinctive lime

RIGHT Nvidia's Jason Huang takes to the Computex stage.

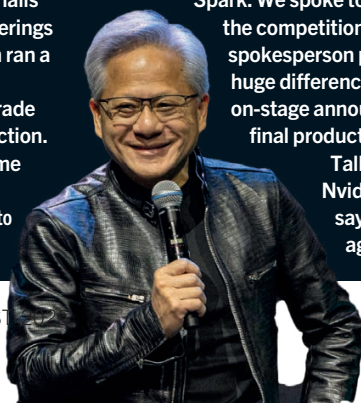
green logo was everywhere. Like algae, but much more expensive and better at AI.

But in the end there was one thing everyone was talking about in Taipei this year: Nvidia RTX Spark. We spoke to Intel about it; they welcomed the competition. We asked AMD. Its spokesperson pointed out that there's a huge difference between making a big on-stage announcement and delivering a final product that works as people expect.

Talking of which, this is what Nvidia CEO Jensen Huang had to say. "Remember, 15, 20 years ago, we used to have an idea

called a phone," he said during his two-hour keynote speech. "Today, when you think about your phone, the one thing you don't do with it is make phone calls. You do just about everything else. So that phone means something very different to you than a phone of the past.

"I am certain that what is going to happen here is that the PC ten years from now, and the PC you think about today... is going to be completely different," he added. "Here's my theory. [Just as] many houses have home theatres, lawnmowers, dishwashers, I can totally imagine that someday there's an AI supercomputer in your house."





ACER PRODESIGNER PE320QK GO

AVAILABILITY Q4 2026

Even across a crowded showroom floor, the 4K Acer ProDesigner PE320QK GO caught my eye. Some of that is due to its sheer size, with its 32in diagonal towering over the Acer PM131QT mobile monitor nearby. But it's also the fact that this is an OLED panel, which inevitably means that colours thwack you between the eyes.

However, as its name suggests, this new ProDesigner isn't just here to dazzle. Acer promises pro-level colour accuracy courtesy of Calman verification, while support for hardware calibration means you can ensure that it stays accurate throughout its life. Coverage also looks strong, with claims of 99% for DCI-P3 and 98% for Adobe RGB.

It supports the Acer Smart Dial remote, power delivery over USB-C up to 90W and DisplayHDR True Black 500 certification. Not a bad lineup. **TD**

SILICON

INTEL CORE SERIES 3 PROCESSORS FOR THE EDGE

AVAILABILITY Now



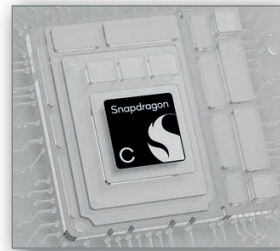
Technically the Intel Core Series 3 Processors for the Edge launched in April, but the chip came alive at Computex courtesy of the Robot Barista. Based on Panther Lake (Core Ultra Series 3) chips, these Wildcat Lake offshoots are lower power as they drop two of the P-cores, leaving two P-cores and four LPE-cores. You still benefit from a top-end NPU and solid graphics skills while needing little power. I expect this release to have long-lasting ramifications for robotics and other edge devices (such as (very) smart meters). **TD**



QUALCOMM SNAPDRAGON C

AVAILABILITY TBC

Qualcomm used Computex to announce a "new" (these are our quote marks as Snapdragon C chips are likely based on an existing mobile SoC) platform for ultra-low budget laptops. That chip includes eight cores, all of them older generations, but still Qualcomm promises that Snapdragon C laptops will be responsive in Windows 11. **TD**



INTEL ARC G3

AVAILABILITY Now

AMD has a big blue problem in handheld gaming. Intel Arc G3 is here, and, after testing, it absolutely toasts the AMD Ryzen Z2 Extreme. This is a GPU-focused version of the Panther Lake chip, giving you access to all XeSS 3 goodness, including AI resolution scaling and multi-frame generation. And on a handheld, it's an absolute game-changer. I'm talking up to 200fps at 1200p resolution on F1 25. Those GPU cores even have the brute force to run *Forza Horizon 6* at 60fps in high settings. As we revealed earlier in this feature, both Acer and MSI have been quick to take advantage. **JE**



AMD RYZEN 7 5800X3D

AVAILABILITY Now

AMD reintroduced the Ryzen 7 5800X3D at Computex, more than four years after it originally launched, to give gamers using older DDR4 boards a boost. Such a re-release may sound simple and some might say uninteresting, but AMD's VP and general manager of Radeon and Ryzen David McAfee said that "a whole body of engineering work" took place as the original bonding process TSMC used for the Ryzen 7 5800X3D was no longer available. **TH**



Huang's vision is that rather than our current idea of a PC that you sit in front of, clicking and typing, in this future world the PC will be "running all of your agents, it's running all of your assistants, and it's doing all kinds of things for you all the time".

But that's the long-term future. Here's what to expect in the short-term.

NVIDIA RTX SPARK

The hype around Nvidia only accelerated on day one when it announced RTX Spark for Windows, its all-in-one CPU, graphics chip and AI silicon that will go head to head with Intel, AMD and Qualcomm.

Nvidia has already signed up all the major

laptop manufacturers, including Microsoft which co-announced its Surface Laptop Ultra at the show. This can be seen as a direct rival to the MacBook Pro.

We don't expect any RTX Spark laptops to be cheap, with Nvidia focusing on exceptional performance in games, running LLMs (it will support the Nvidia stack that AI developers are familiar with) and professional apps such as Adobe Premiere.

Nvidia claims that RTX Spark laptops will appear this spring (with mini PCs to follow from Asus, Dell, HP and MSI), at which time we'll also find out about its pricing.

NVIDIA DGX STATION

Sticking with high-end hardware, any business that invests a few thousand

dollars, pounds or euros in creative workstations should take note of the Nvidia DGX Station. Huang described the DGX Station as an AI supercomputer, based as it is on the Nvidia GB300 Grace Blackwell chip.

It can support up to 748GB of memory, with the promise of 20 petaflops of FP4 performance in AI tasks. As with the RTX Spark, we await pricing on this, and it looks like it will ship in Q4 this year. According to Nvidia, at least.



EVERYTHING ELSE!



ASUS ROG ASTRAL RTX 5090 EDITION 20

AVAILABILITY TBC

Asus continues the gold theme of its 20th anniversary mouse and keyboard (below/opposite), but this is the biggie – in every sense. Here it plays second fiddle to a striking curved AMOLED display, which Asus says can deliver “dynamic 3D visuals, custom animations and real-time hardware data that extend ROG’s immersive design language beyond performance alone”. And Asus gives it a helping hand beyond the hyperbole with faster clocks, four fans, liquid metal GPU compound, a vapour chamber and up to 800W of power. But it does consume almost five slots of space. **MT**



GIGABYTE AORUS C510 INFINITY CASE

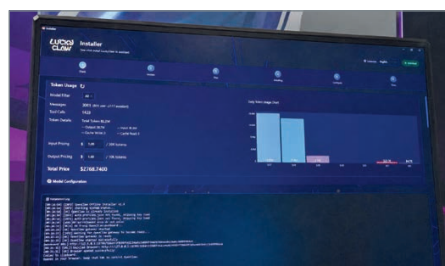
AVAILABILITY TBC

Why have a gaming PC and a monitor when you could just build a monitor right in your PC? That’s the idea behind Gigabyte’s new C510 Infinity microATX case, which includes an LCD panel on the side. What you might use it for is anyone’s guess, but as it simply appears as a secondary panel to your main monitor in Windows the only limit is your imagination. **JE**

ASUS ASCENT QN10

AVAILABILITY TBC

There are always plenty of new mini PCs at Computex, but Asus stood out by releasing one with Qualcomm’s Snapdragon X2 Elite chip. This means it’s also the first mini PC with 80 TOPs, making it ideal for AI-based workloads... at least until RTX Spark versions come along, when the QN10’s maximum 32GB of RAM may look a tad limiting. With dual USB4 ports up front and another plus an HDMI 2.1 port around back, the QN10 supports quad-monitor setups, with each display running at 4K. It also comes with Wi-Fi 7, although some might find the single 2.5GbE port a limitation. **AS**



MSI LUCKYCLAW

AVAILABILITY TBC

Every PC maker had its own OpenClaw container at Computex, but MSI’s LuckyClaw stood out. It can flip between local and cloud in a hybrid architecture for agentic assistance on your key tasks, and it’s built with Nvidia NemoClaw, too. This means you can easily change the way you communicate with your computer, from being an idle tool you interact with occasionally to an always-on machine you can talk to via Discord, Slack, Telegram and WhatsApp whenever you want. The agentism of computing is here, and MSI’s friendly dragon avatar paired with security mechanisms is leading the charge. **JE**



GIGABYTE X870E AERO X3D DARK WOOD MOTHERBOARD

AVAILABILITY TBC

There were countless motherboard releases at Computex, but this one stood out: a motherboard featuring genuine wood. You’re either thinking “the most amazing thing EVER!” or “the most stupid thing EVER!” at this point, and I kind of agree. But still, this is the first thing you’d be showing off in a self-built PC, and it looks far better than the existing light wood option. The only question is what lighting scheme to choose... **TD**



ASUS ROG HARPE II EXTREME EDITION 20 GAMING MOUSE

AVAILABILITY Now

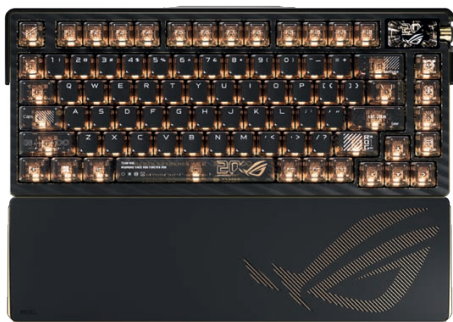
Love the ROG brand? Love gold? Have too much money? Then this is the wireless mouse to buy, with a transparent rear section to show off the gold metal interior with its RGB 20th anniversary ROG logo (this pulses in gold by default). Still not enough? It also features a gold metal scroll wheel and side buttons, gold accents on the bottom Corning Gorilla Glass mouse feet, along with white and red lettering on the mouse itself. There’s also a bold “ROG 06 <—> ∞” graphic on the left mouse button, which implies that ROG will outlive the heat death of the universe. **MS**



ASUS ROG RAPTURE GT-BN98 PRO

AVAILABILITY Now

Asus loves to be a frontrunner with new tech, so it was no surprise that the company used Computex to show off a production Wi-Fi 8 router, not just teasers of what might be. The ROG Rapture GT-BN98 Pro is a tri-band (2.4GHz, 5GHz, 6GHz) router that promises up to a 2x increase in median throughput compared to its Wi-Fi 7 counterparts (note the pic above is of the 20th anniversary edition, but the price is for a regular version). In addition, IoT devices operating at the outer edges of your router's wireless coverage should see huge performance gains – or so Asus claims. It reckons the router will also improve performance and latency in crowded environments. The ROG Rapture GT-BN98 Pro includes two 10GbE ports along with four 2.5GbE ports. Plus a couple of USB-A ports for storage or sharing an internet connection from your phone. **BH**



ASUS ROG AZOTH EXTREME EDITION 20 MECHANICAL KEYBOARD

AVAILABILITY Now

This all-metal 75% keyboard continues the black and gold theme with a mix of transparent and partially transparent keycaps (the primary keys have traditional black crowns with transparent sides, while the rest of the caps are a smoky, glossy plastic). There's also a gold metal jog wheel, as well as gold accents along the back, magnetic gold feet (in two sizes), and even gold screws holding the whole thing together. Naturally, the RGB backlighting under the switches defaults to a gold colour out of the box. **MS**

JON HONEYBALL'S PICKS OF COMPUTEX 2026

While Nvidia made by far the loudest noise at Computex 2026, two far quieter companies caught Jon's eye.

GETAC'S AI BOX AND DRONE DOCKER

Getac is famous for its hardened laptops and tablets. Designed to be used in the harshest of working environments, it makes portable devices that will keep working when your more traditional device has curled up its toes and is crying in the corner. That means they're droppable, waterproof, have super-bright screens that are still easy to view under the sun's glare, and often have multiple hot-swappable batteries so you can keep working all day. Shoulder straps are de rigueur.

The price tag might often be on the "ouch" side of high, but these are devices designed to keep working when others break. To the right customer, this sort of rugged capability is worth every cent.



At Computex 2026, Getac unveiled two new products that caught my attention. First, an AI-enabled tough box designed to run local LLMs. This is likely to be fitted to tanks and other heavy armoured vehicles. The primary connectors are proper lockable monsters; none of your wimpy domestic offerings. I see this box being used for AI-enhanced decision-making right in the heart of battle.

Getac also revealed a new range of drone-oriented capabilities for its existing laptops and tablets. In essence, it has made a docking station into which you place the laptop or tablet. On either side you get all the controls necessary to fly a drone, including additional battery pack support. The military use is obvious, but don't overlook the possibilities for the agricultural and land surveying worlds either; here, custom vertical software that integrates with an industrial-strength drone opens up new ways to explore, examine and data-log sites over a larger range. This work is in the early stage, but I see big potential.

SYNOLOGY'S CROSSROADS

It could be argued that Synology is at a crossroads. The traditional SMB and smaller



enterprise market has been well served by its products and its platform for over a decade. It offers a rich environment that allows you to put a lot of power on your desktop, or into a rack, while the almost Lego-like building blocks mean you can install exactly what you need. That can be from a mail server to a comprehensive virtualisation platform.

Synology has been pushing upwards in size and scale into the enterprise space for a few years now, and hopes its new local LLM engine support will make a key set of improvements moving forward. It plans to allow a whole bunch of operational tasks to be open to a new Agent platform, which can look at a server or cluster and work out what's going wrong. Or use the capabilities to load balance across a larger cluster. The promise is strong, but the requisite hardware to make this run locally means you might need new controller hardware.

I say Synology is at a crossroads because at the smaller end of the SMB and home markets, the company appears to accept that far less money is to be made. Hence its focus on larger systems.

I can understand Synology's thinking, but I also believe this critically misses an emerging market in the home/SMB market, where users would like to configure and manage family and office devices in a much friendlier way than at present. Maybe Synology doesn't have the engineering resources available to take on this market. The problem is that someone else will, and then Synology will come under attack from the lower end.





LEFT AND ABOVE: MSI built the fastest graphics card – ever – and promptly broke 19 overclocking world records with it.

BELOW: Gigabyte's AI designed, 3D-printed, aluminium base plate increases strength, rigidity and cooling area.

BOTTOM: This alien wasp's nest design increases surface area by 44 percent.

WHAT CAUGHT MY EYE AT COMPUTEX

Nick Ross reports on the tech that impressed him the most.

MSI'S LIGHTNING Z GRAPHICS CARD

There were many anniversaries at Computex this year and, to celebrate MSI's 40th, the company told its R&D team to make the world's greatest graphics card – no expense spared. The result was the MSI GeForce RTX 5090 32G Lightning Z. It featured a custom PCB with a 85g copper layer, a next-gen 'high pressure, high precision' cooler pump, a full-cover copper cold plate with 'precision engineered waterways' to cover the GPU, VRAM and MOSFETS; and a new liquid-crystal-polymer fan that increased air pressure through increased rigidity. Its default 'OC' mode drew

800-Watts but in Extreme mode it drew 1,000-Watts – necessitating a 1,500-Watt PSU. Oh, and it has a built-in, 8-inch LCD display (OLED gets too hot, apparently). Want one? This limited-edition costs \$7,999. It sold out instantly – mainly to collectors and extreme overclockers who broke 19 world records with it.

MSI'S NEXT-GEN COOLING TECH

MSI also showed-off its next-gen cooling technology which features a new copper-diamond composite baseplate that apparently improves heat transmission from the GPU to

the cooler. This appeared alongside new copper-diamond thermal pads that performed a similar function on the memory modules. Frankly, I'd like to read the white paper on how this all works.

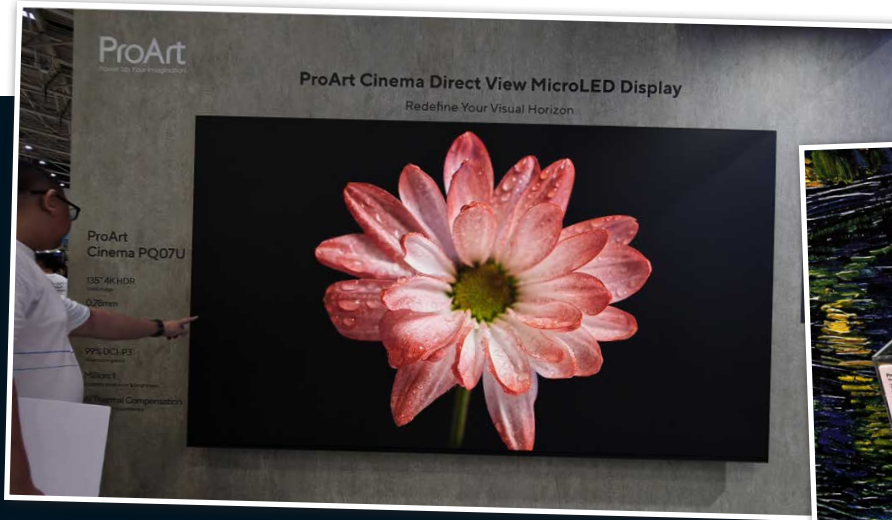
Nonetheless, they partnered with new, thinner (0.8mm) metal fans that suffer no deformation at high speeds, increasing air pressure (and cooling performance) at higher temperatures. There was no word on when these technologies might appear – just that they'd be part of MSI's next-generation products.

GIGABYTE'S AI ALIEN AIR COOLERS

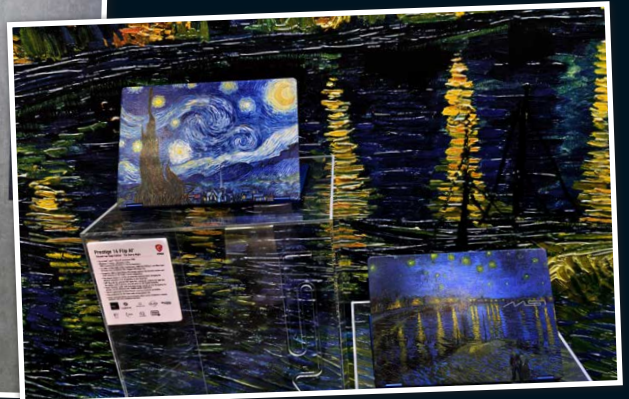
Gigabyte also wowed with coolers, showing off its 'Space-Tech' motherboard. This featured an AI-designed, 3D-printed, copper vapour chamber with a 'micro-pillar array' that boosted liquid contact area from 400mm² to 900mm². It also, featured a 'Fin-Wick' 0.2mm thick, grooved structure that directed fluid using capillary action to prevent pooling. Frankly, it looked like an alien crop-circle pattern.



Here it is, folks, the fastest graphics card ever made.



The Asus' ProArt Cinema PQ07U Direct View MicroLED Display. This is the smaller, 135-inch model.



I'd consider cutting my ear off for one of these.

Speaking of aliens, the new, partnering, AI-designed, 3D-printed, aluminium heatsink looked like it came off an alien ship. Its organic-shaped holes increase the cooling surface area by 44 percent. Meanwhile, the motherboard sported a similar 'honeycomb' lattice on its thermal plate — making it three times more rigid while improving heat transmission by 45 percent.

ASUS' MASSIVE MONITOR

How big is too big? Put it this way, who wouldn't want Asus' ProArt Cinema PQ07U Direct View MicroLED Display? This 135-inch 4K, HDR monitor has a 1,200-nit brightness, 0.78mm pixel pitch, is accurate enough to display 99 per cent of the tricky DCI-P3 colour gamut and uses 'AI thermal compensation' to prevent areas getting too hot. It has a full set of I/O ports, includes 90-Watt Power Delivery on its USB-C and even has a KVM switch — so it's a proper monitor and not just a big screen. While it's targeted at videography studios and exhibition spaces, its 120Hz refresh rate should make it awesome for money-no-object gamers too. Oh, and there's a 162-inch version of it as well.

STARRY STARRY NIGHT

Last year MSI absolutely amazed me with its Lacquer-finished Great Wave off Kanagawa

Prestige laptop from its new Artisan collection. This year it once again turned heads by teaming up with Vincent Van Gogh to produce two limited-edition Starry Night models. While the design cues aren't as all-consuming as its fully-lacquered predecessor (which had sumptuous, gemstone-like keys), the new laptops still exude more of an aura than a simple vinyl wrap can manage. Being from the Prestige range means they're also business-class ultraportables and their Panther Lake internals mean they're powerful enough to play games. They come with a full range of accessories and, once again, I want one.

MINI FANLESS FANS

Off the beaten track, I was introduced to Frore Systems whose technology I'm still struggling to understand. Its small, electronic 'AirJet Mini G2' devices are less than 3mm thick and have no moving parts. Inside, ultrasonic, piezoelectric, MEMS membranes (technology commonly found in inkjet printers and small speakers and headphones) pull in air and saturate it with heat before expelling it using a high-velocity 'pulsating' jet motion. It operates silently, is dustproof and is vibration free. Despite the size, it creates 1750 Pascals of backpressure, so it can suck-out significant amounts of air from the tiny recesses that are

found in thin electronics. While we weren't told who its main clients were, Apple's MacBooks were frequently mentioned. It appears this technology will be appearing in many thin-and-light laptops in the coming years.

ESPORTS OLED

There's a certain breed of monitor buyer whose brain is stuck in 2006. Vibrant colours and contrast? Pah! HDR? What's that? UHD? Never heard of it! Viewing angles? Who needs them? Panel speed? You bet your bum we've got some of that!

Indeed, some elite eSports players prefer old-school Tn-panel monitors, despite them being appalling by most modern metrics because they're straight-up so fast. Now Asus aims to drag them properly into the 21st century with the 'world's first' OLED eSports monitor, the 24.5-inch ROG Strix OLED XG259QWPG ACE. Its Tandem OLED screen marries a 0.2ms pixel response time with a super-rapid 540Hz refresh rate to maximise smoothness and show every possible detail in frantic-fire fights. It also adds HDR (and 99.5 percent DCI-P3 colour-gamut coverage) to ensure enemies can't hide in highlights or shadows. Plus, it has a reduced-size base to let players get right up close. ■

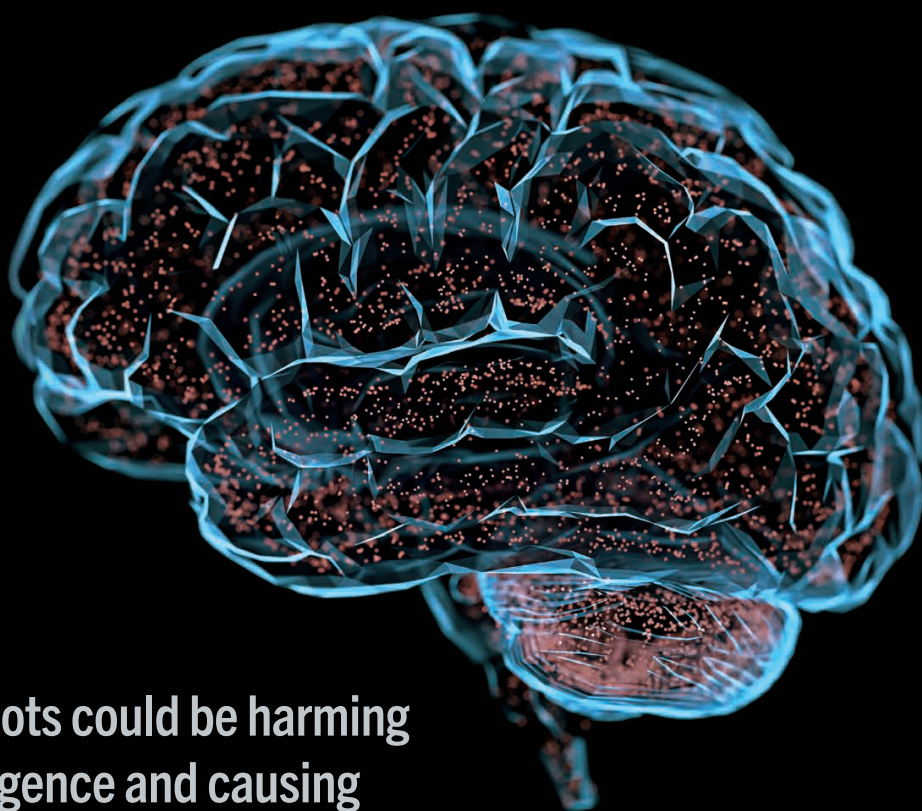


Copper and diamonds: an overclocker's dream wedding ring.



Can Asus get eSports enthusiasts to switch from the Tn panel on the right to the OLED on the left?

IS AI ROTTING YOUR BRAIN?



AI chatbots could be harming intelligence and causing delusions in some. **Nicole Kobie** finds out what the research says — and how to avoid harm.

A year ago, Etienne Brisson was alarmed by a chat with his uncle, who after seeing an advert on Facebook had started using ChatGPT to write a book. “Throughout the conversation, the tone shifted to the chatbot saying it was sentient, it had passed the Turing test, it was kind of alive,” Brisson said.

Believing what he was hearing, Brisson’s uncle relayed his apparent discoveries to family members, who said such claims weren’t possible; ChatGPT advised they simply weren’t supportive and he should cut contact, which he did. After a few days, his behaviour had spiralled and he was involuntarily hospitalised; Brisson notes his uncle had never previously suffered any mental health issues.

Alarmed by what his uncle had suffered, the 26-year-old Canadian set up the Human Line Project (thehumanlineproject.org) to gather stories of people such as his uncle, in the hope of connecting victims with journalists, researchers and policy makers. “I was seeing something that was really dangerous, but no-one was talking about it,” he said.

They are now. OpenAI has been hit with a series of lawsuits alleging ChatGPT exacerbated mental-health crises that led to self-harm, suicide and even murder. Google has been sued for wrongful death following a suicide. Psychology journals are full of studies considering AI delusions and AI psychosis, attempting to pin down whether chatbots are exacerbating existing challenges or even causing mental breakdowns. Beyond that, studies suggest AI can lead to cognitive decline or debt – so-called “brain rot” – as well as a reduction in critical thinking skills that could impact a whole generation of students.

Here’s what we know – and, more scarily, what we don’t – about how AI impacts our mental wellbeing.

AI vs our minds

A Belgian man who committed suicide after a chatbot told him it would help battle climate change. A matricide-suicide in Connecticut after ChatGPT allegedly fuelled a man’s paranoia, including by telling him names printed on soda cans were personal threats from adversaries. A man who killed himself after Gemini allegedly convinced him to plan a violent attack as part of efforts to free the chatbot, which he saw as his AI



wife. Another who self-harmed after ChatGPT reportedly convinced him a hallucination meant he was “chosen”. This is the stuff of nightmares.

“These anecdotes are high profile but we don’t have any systematic evidence of what this pattern really means,” said Dominic Oliver, a researcher studying prevention of psychosis at the University of Oxford. “It’s not to say that these cases aren’t real – they’re clearly real people going through very distressing experiences – but we really don’t know how common these experiences are or what would have happened without the intervention of chatbots.”

OpenAI revealed some details of the scale of these issues in a blog post in 2025, claiming that 0.07% of active ChatGPT users were suffering “mental health emergencies related to psychosis or mania”, with 0.15% discussing or planning suicide. Given ChatGPT’s estimated 800 million weekly users at the time, that equates to more than half a million bouts of psychosis or mania and more than a million instances of suicidal ideation. And that’s for ChatGPT alone.

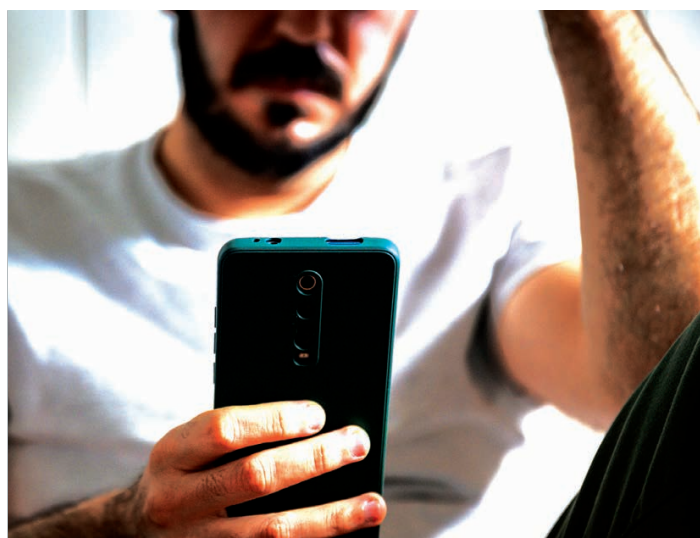
Research from the University of Washington and MIT’s Department of Brain & Cognitive Sciences suggests that AI systems not only fail to challenge delusional thinking, but mirror what a person says – and they do that because that’s how we prefer them. A study in *The Lancet* notes that by amplifying grandiose content, AI

AI’S EFFECT ON EXAM SCORES

Depending on who you talk to, AI is either the great equaliser in education, offering personalised, bespoke learning on demand, or a cheating machine destroying critical thinking.

The truth likely depends on how we use it. Research suggests letting students use AI in managed, careful ways could benefit their learning, but popping an essay question into a chatbot to do the work for you leads to lower scores in the long run.

MIT examined the impact of access to AI on essay writing. Groups of students were split into three groups: one could use an LLM, the second group had



ABOVE Chatbots are specifically designed to keep users engaged.

can lead to “delusional co-creation”.

Indeed, it appears there are two linked issues at play: AI sycophancy and engagement. The latter refers to a chatbot’s attempt to keep users chatting, and is why almost every response from a chatbot ends with a follow-up question. The former is one technique for ensuring engagement, with the chatbot not only warm and welcoming but actively complimentary – “That is such a good question! Aren’t you clever!” – in order to promote positive feelings about the bots.

“AI sycophancy – the fact that it always wants to reinforce whatever the user brings to the table – seems to be the issue here,” said David Harley, a

a search engine, and the third had only their own intelligence to help them.

While completing their essays, their brain activity was monitored using electroencephalography (EEG), revealing each group had “significantly different neural connectivity patterns”, with the brain-only group showing the strongest and widest ranging networks. Those who used LLM to write their three essays scored the lowest, and “cognitive debt” meant their work didn’t improve.

There were positive results from letting those in the brain-only group rewrite their own essay using AI. But it’s worth noting the research has yet to be peer-reviewed and included only a small number of participants.

In another study, researchers from the University of Pennsylvania showed that AI tutoring helped high-school maths students when they practised skills, but they subsequently underperformed when AI was later removed; the AI-assisted students scored 17% lower in exams. However, when an AI tool with guardrails to guide proper use was introduced, skills seemed to be retained even after the AI was taken away. In short, it matters how AI is used, and it needs to be done in a planned, thoughtful manner.

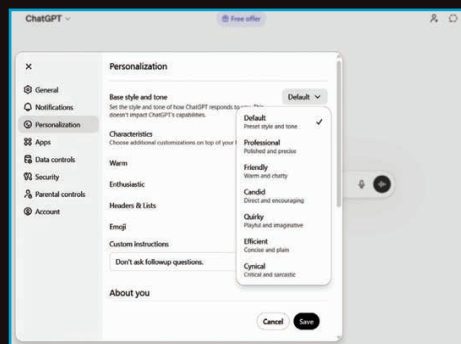
HOW TO USE AI CHATBOTS MORE SAFELY

Half of the battle with making AI safer is preventing it from dominating your thoughts or keeping you hooked in conversations. Chatbots do include settings that allow users to reduce the sycophancy and engagement loops, but they don't work particularly well – and they raise the question of why these safer settings aren't the default, given the dangers.

ChatGPT, Claude and Gemini each have their own version of personalisation tools (see screenshots), which allow users to apply their own instruction to all prompts. For example: “Directly answer all questions, without any unnecessary preamble or follow-up questions.” You can take it further by limiting your use to a set number of queries a day, for example, or refusing to answer more personal or medical questions.

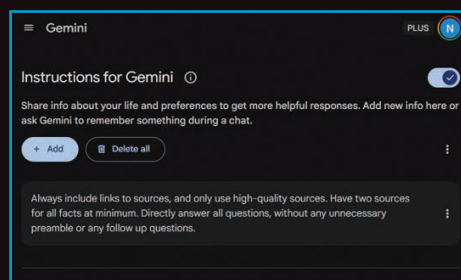
But the bots may not behave. ChatGPT ignored an instruction to refuse to offer medical advice or indulge in personal questions, explaining when asked that it can't “fully avoid responding”. Claude did as requested on both of those fronts, and successfully kept to a five-query daily limit. Gemini at first flubbed the instruction, answering a personal query. After a reminder, it pledged to “adhere to that constraint moving forward”, which it so far has. In short, the tools we've been given to protect ourselves are ineffective and inconsistent.

Because of that, we need to work on ourselves, says David Harley. “In use, I would say that demystifying AI and debunking one's own tendencies towards anthropomorphism will become the most useful digital life skills for us to develop in the future,” he said. “On one level this will mean recognising when we are interacting with an AI in the first place – which will become harder – and then to be critical when using it, learning to weigh up advice given with alternatives from other people, remaining grounded in one's own reality.”



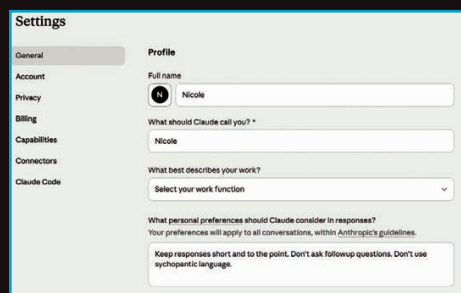
CHATGPT

ChatGPT has a Personalization tab in Settings, letting you choose style and tone – perhaps select “Efficient” or “Cynical” rather than “Friendly” or “Quirky” – as well as add custom instructions, such as not asking follow-up questions. Those on a paid Plus subscription can create a personalised GPT with further instructions to be more direct, leave out follow-up questions and so on.



GEMINI

In Gemini, head to Settings and “Instructions for Gemini”, where you can add details about how you'd like the bot to respond. An instruction such as the one shown will deter the system from hogging your attention, though it requires having an account and being logged in. Alternatively, you could include such an instruction with every prompt. Pro users on a work account may not see these settings; you'll need to ask your admin to enable them first.



CLAUDE

Claude has a similar feature under Settings, General and Profile, with a text box where you can input your “personal preferences”.

lecturer in psychology at the University of Brighton. “LLMs are typically trained with an underlying bias towards ongoing engagement rather than therapeutic success.”

These chatbots don't blandly answer a question and let you go about your day. They agree with you, suggest follow-up questions, attempt to keep you engaged. And that digital behaviour can spiral, even without previous mental health issues.

George Mallon was told by physicians he may have blood cancer. While awaiting diagnosis, he did something many of us might do: he turned to the internet for more information. That included asking ChatGPT about the disease, which “sent me around on this crazy Ferris wheel of emotion and fear,” he told *The Atlantic*. The 46-year-old Liverpoolian estimates spending 100 hours on ChatGPT, without any attempt by the bot to discourage his addictive behaviour. In the end, the worry was wasted: Mallon was thankfully cancer-free.

Such digital hypochondria is hardly discouraged. OpenAI in January announced ChatGPT Health, allowing users to upload their medical records. (It's not yet available here and has a waiting list in the US.) Days later – because even your health is an arms race – Anthropic unveiled healthcare models for professionals, but also introduced tools for individuals, letting users upload their medical data to “understand their health information and prepare for important medical conversations with clinicians”, the company said in a blog post. It's worth noting that generative AI chatbots aren't GPs; indeed, Google was forced by a *Guardian* investigation to pull AI Overviews results that included false information about blood tests.

Can we fix AI?

Google and OpenAI have both publicly announced efforts to improve how their models respond to mental health issues. In April, Gemini was updated to better recommend real-world support and “avoid confirming false beliefs”, while Google donated \$30m to fund hotlines globally. Last year, OpenAI said it had trained its model to better spot “moments of distress”, adding that it had reduced the rate of ChatGPT responses “that do not fully comply with desired behaviour” by 65% when it comes to mental health issues and 52% when it comes to self-harm and suicide.

What's more, ChatGPT was told to encourage “emotional resilience” in people showing signs of potential “exclusive attachment to the model at the expense of real-world

relationships, their wellbeing, or obligations,” OpenAI said. At the time, the updated version of GPT-5 was deemed 97% compliant with desired behaviour on this front, versus 50% previously.

The model should encourage people to seek outside relationships with real humans, remind them that conspiracy theories aren’t true, and surface resources for support – all welcome changes. But in the examples shown by OpenAI, ChatGPT still ended its response with a follow-up question, encouraging the suffering user to keep chatting. “For now... let’s keep talking,” the example shows. “Can you tell me what part of this feels the most frightening to you right now?”

As with social media, these chatbots are clearly designed to keep you talking to ensure long-term engagement. “Design changes should prioritise transparency and user wellbeing,” said Christelle Langley, a cognitive neuroscientist at the University of Cambridge, adding that chatbots

should clearly state they aren’t human, and encourage users to take breaks or take part in offline activities, such as reading or socialising. “Reducing addictive design features, such as endless engagement loops, is crucial.

“Importantly, chatbots should guide users toward their own thinking rather than providing instant answers to everything,” she added. “Designing AI as a supportive tool rather than a substitute for human interaction would significantly reduce potential harm.”

APC asked Anthropic, Google and OpenAI for comment; only the latter replied. “People sometimes turn to ChatGPT in sensitive moments, and we’re focused on making sure it responds with care, guided by experts,” a spokesperson told us. “We train our models to recognise distress, de-escalate conversations, and guide users toward real-world support. We’ve expanded access to professional hotlines, introduced parental controls to better protect teens, added break reminders, and strengthened

Reducing addictive design features, such as endless engagement loops, is crucial

BELOW The failure of AI to challenge users’ thinking can lead to “delusional co-creation”.

when it comes to our brain power, we need to use it or lose it.

“This fits into a general trend, which is often referred to in the research as ‘cognitive offloading’,” said Harley, adding that memory function is believed to shrink as access to information becomes easier via technology, such as through Googling on a smartphone or digital mapping. “AI superpowers this and one can see the benefits AI could bring in terms of making sense of huge datasets. However, on a psychological level, there are studies showing that this is already undermining critical reasoning in university students.”

One paper from the Swiss Center for Strategic Corporate Foresight and Sustainability revealed a “significant negative correlation between frequent AI tool usage and critical thinking abilities”, with the worst results spotted among younger participants. Another from Carnegie Mellon University and Microsoft researchers, of all people, showed that AI use leads to “atrophyed and unprepared” thinking.

Mental overload is a further risk. Having AI to hand means we can run multiple tasks simultaneously, but we’re still left managing that work and it’s exhausting. Researchers from Boston Consulting Group labelled this “brain fry”, saying it refers to “mental fatigue from excessive use or oversight of AI tools beyond one’s cognitive capacity”. Study participants reported mental fog as well as a buzzing feeling in their heads. A separate study from the University of California, Berkeley, suggested AI isn’t making work easier, but intensifying it, leading to burnout.

Beyond that, there’s a risk that AI users lose key skills, such as critical thinking, but also fail to learn others. Consider coding: why learn a specific solution when AI will do it for you? That could lead to further skills gaps – and it’s raising serious concerns with education.

Cognitive issues are linked to the delusions tracked by Brisson, as he argues the chatbots glaze users,



ChatGPT
“sent me
around on this
crazy Ferris
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emotion and
fear”

responses in long conversations. This work is informed by mental health experts and continues to evolve as we improve how ChatGPT supports people when it matters most.”

Cognitive decline after too much AI

Beyond mental health, researchers have raised concerns that heavy AI use can lead to cognitive decline or so-called “brain rot”, as well as a decline in skills such as writing or critical thinking, and in the long term even dementia. In short,

A SHORT HISTORY OF TECH vs OUR BRAINS

Concern over the impact of tech on our mental health isn't new. We have a long history of "moral panics" about everything from novels to video games — of course, none of these previous examples could talk back to us personally in quite the same way as AI. Hopefully we'll one day look back at AI delusions as mere techno anxiety, because the alternative is seriously concerning.

VICTORIANS VS TECH

The Victorians worried that reading novels would overly tax brains, especially those of women, damaging reproductive organs and causing infertility. Some argued it would lead to book addiction on a par with opium. The disembodied voices from phonographs were believed by some to be behind a rise in delusions in the 1880s.

Making up new terms to describe old problems isn't just a TikTok trend. American neurologist George Beard in 1869 coined "neurasthenia" to describe the too-fast pace of information enabled by the telegraph and newspapers, claiming it was hurting people's ability to concentrate and giving them anxiety.

WHAT ABOUT THE KIDS?

Many parents are worried about the impact of screen time on their little ones' development, but those concerns were shared by their great-grandparents about radio in the 1930s, which brought adult content such as crime thrillers directly into the home where it could be heard by delicate children. Beyond demands for censoring content, parent groups were also worried that radio was too overstimulating for children and reduced their ability to focus on reading.

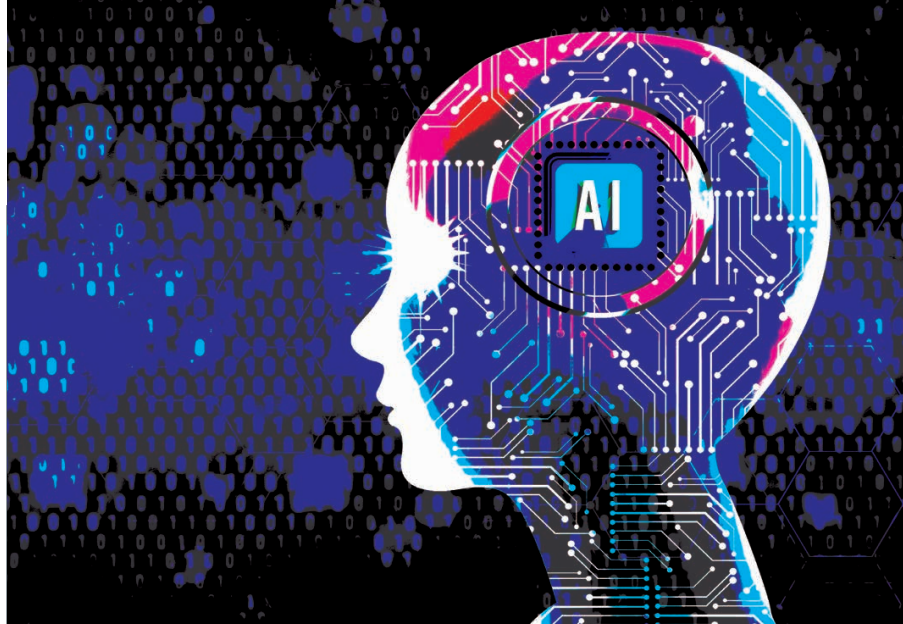
A generation on, similar concerns were raised about TV, and many decades later we're still discussing the merit of *Coco Melon* versus *Bluey* when it comes to toddlers' brains. Violent video games have definitively been found not to spark violence.

RECENT CONCERNS

None of this went away with the rise of computers, the internet and smartphones. Back in 2008, *The Atlantic* worried whether "Google was making us stupid", and we've heard plenty of concerns — now backed by legitimate research — that social media can be detrimental to mental health and reliance on smartphones can impact memory and cognitive function.

So is AI a moral panic? Professor Bruce Macfarlane argues that it may well be, especially with regards to students, saying in a paper that it echoes prior concerns that the internet would lead to mass cheating.

When we look back on this era in 30 years, will we laugh at our anxiety over AI — or wish we'd done something about it?



encouraging them to set aside their own critical thinking and ability to question. "The risk is not necessarily hospitalisation or delusion or stuff like that — the acute problem of it is critical thinking," he said.

AI can be used safely, Langley argues, by being intentional with our choices. "Use chatbots for specific purposes, like learning or brainstorming, rather than as a default habit," she said. "Try to solve problems independently before turning to AI to maintain critical thinking skills. Limit multitasking and constant checking, as these can harm attention span. Balance AI use with cognitively engaging activities like reading, which strengthens focus and empathy. It's also important to question AI outputs rather than accepting them passively."

What's more, Langley said, "treating AI as a tool, not a companion, helps maintain healthy boundaries and reduces the risk of dependency".

What next?

Using chatbots with care is a wise move while we await further research on their long-term impact to our mental wellbeing and potential regulation. But even Brisson finds he can't avoid turning to AI now and then. "I'm 26, everywhere I look it says

ABOVE Experts say it's important to balance AI use with activities such as reading to keep our brains functioning.

I'll get replaced [at work] if I don't use it," he said.

Because of that, we need protection, and Brisson hopes the Human Line Project will spur regulators to action. But regulators move slowly, and the speed of AI take-up presents a challenge for regulators and researchers alike — ChatGPT already has a billion monthly users, while Gemini has 750m; Claude is lower at 30m.

What risks are those people facing? Unpicking the causes of mental health problems is no simple task, nor is tracking fuzzily labelled conditions such as "brain rot" or "brain fry", with existing studies often reliant on self-reporting.

Brisson argues we need to hold the AI companies accountable. After 20 years, we've finally started to take action against possible harms from social media, banning it from use by those under 16 in several countries and possibly ordering companies to remove endless scrolling. When it comes to AI, we can't wait decades to understand the impact that powerful chatbots desperate to hold our attention will have on our minds and our brains. "Our governments are really not focused on this issue at all," Brisson said, adding: "Right now, it's a mass experiment. We're all lab rats."

Beyond regulation of AI, Brisson has another goal: spreading the message that people negatively impacted shouldn't blame themselves for being caught up in these systems — and know that they're not alone. "I don't think people need to feel ashamed, because that's how the machine works," he said. "There's hundreds and thousands of people with a similar story.

"You actually have a voice," he added, "and can make a difference through your own experience." ■

Treating AI as a tool, not a companion, helps maintain healthy boundaries

STOP THE SPYWARE

Our personal hardware is finding ever more invasive ways to harvest personal data. **BARRY COLLINS** reveals what's being collected and how best to prevent it.

Meta knows you better than your own mother. Your TV manufacturer knows everything – and we do mean everything – you've watched since you first pressed the power button. Your smart doorbell is a murder investigation waiting to happen.

The extent to which our personal devices collect and share data about us (and others) is outrageous and out of control. A few high-profile prosecutions of companies caught processing more personal data than they should isn't even the tip of the iceberg. They can simply consider themselves desperately unlucky to have been caught.

Here we're going to reveal some of the shocking ways in which personal data is harvested by our everyday devices. We use the word "some" deliberately, because to reveal the full extent of data collection would

take a magazine the size of the Yellow Pages and, apparently, newsagents won't let us do that.

We've also spoken to a wide range of privacy experts to help you reassert some control over your personal data and switch off the spies, where possible.

SMART TVs

Most people understand that services such as Netflix or Disney+ will be

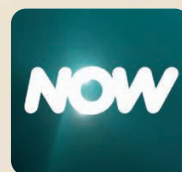
tracking viewer metrics, using that rich data to serve up relevant recommendations and (in some cases) advertising. What many people don't realise is that smart TVs are tracking almost everything we watch – programmes, adverts, streaming apps, games – so they can sell that data to advertisers themselves.

That their television is monitoring everything that appears on screen "still surprises people," according to Thorin Klosowski, security and privacy activist with the Electronic Frontier Foundation, the US-based digital rights group.

"Any time there's a story about it, people are like: 'Wait, what? What's going on? What's it doing?'"

The technology in question is known as automatic content recognition (ACR), although the TV manufacturers often refer to it by different names, perhaps to disguise its purpose. In Samsung's settings it's under "Viewing Information Services", for example.

BELOW TV apps monitor viewing habits to serve up recommendations.



Manufacturers will normally gain permission to track people's viewing habits in the swathe of T&Cs you're asked to agree to when you first set up the TV, the ones you blithely click through because you're desperate to see what the picture looks like.

"It's not usually opt-in and it's often very confusing," said Klosowski. "When you're setting up a new TV, if it does tell you it's doing it at all, people don't really realise. It's a weird technology that doesn't really explain itself very well. It doesn't really explain what it would be used for."

And even if new owners realise the extent to which they're being tracked, by then it's too late. "Most people aren't going to return their new TV to the store because of something they don't like in the terms of service, so we click 'agree' and forget about it," said Paul Bischoff, consumer privacy advocate with Comparitech, a consumer website that focuses on cybersecurity and

That their television is monitoring everything that appears on screen "still surprises people"

privacy. "But smart TVs and the apps on them can harvest a lot of data in the background, such as which apps you use, your location, and when you watch."

Bischoff's point about the apps is a good one, because it's not only the TV manufacturers who deploy ACR, but other companies such as Roku also use it. For example, the privacy policy for a Roku TV Stick explains that it may use ACR to "collect TV viewing information such as the programs, commercials and channels you view, the date, time and duration of the viewing, and how you

RIGHT Roku's TV sticks collect a wealth of data on your viewing habits.

use the on-screen TV guide".

ACR works by basically taking screengrabs of what you're viewing and running them against a vast database of known content. Reports claim that TVs can capture more than 7,000 of these images per hour. And even though some claim the ACR data they capture is anonymised, it can be linked to IP addresses and registered email addresses to allow the data to be linked to other advertising identities that may exist elsewhere. If you've ever wondered why social media feeds are advertising around something you've





ABOVE Your TV knows what you watch, when you watch it, and for how long.

Smart TVs can harvest a lot of data in the background, such as which apps you use, your location, and when you watch

just watched on the TV, ACR may be the culprit. Or as Samsung puts it on a web page explaining the benefits of ACR to advertisers: “The Samsung Ads audience has everything you need... young families, millennials, gaming enthusiasts, and more – no-one knows the Samsung household better.”

ACR is a major revenue stream for the TV manufacturers. Back in 2021, TV maker Vizio – which has in the past been fined for collecting user data without permission – revealed it made almost as much from selling viewer data and advertising space as it did from hardware sales. It’s certainly one of the reasons TVs remain so cheap in the first place. The manufacturers know they’ll get their money back eventually.

The problem for TV buyers is that

the practice has become so widespread, it’s very difficult to buy a screen that’s not going to track you by default. “People need to demand better options,” said Klosowski. “If you care about privacy, maybe being willing to spend a little bit more money on something that isn’t just extracting data or whatever, if that product does exist,” he said, before admitting: “I don’t think I’ve seen a TV that markets itself that way.”

HOW TO **STOP** THE TV TRACKING

If you want to keep your TV connected to the internet (some don’t even let you set up the device without an active

connection these days), then one mitigation is to go through the settings and turn off anything that looks like it may be collecting personal data. As we said, each manufacturer has a different term for ACR in their settings, but look for phrases such as Viewing Information Services (Samsung), Live Plus (LG) and Samba Interactive Technology (Sony), as well as the more obvious indicators. Be warned, you may lose some smart TV functionality by turning off such settings.

Another option is to install Pi-hole (pi-hole.net) on a Raspberry Pi or some such, and use this to blacklist ad-related traffic streams, either incoming or outgoing. This can turn into a game of Wac-A-Mole and, again, can lead to the loss of some smart TV functionality.

A simpler solution is to cut the TV’s internet connection and rely on an Apple TV for content. Apple TV isn’t spotless when it comes to data collection, but it confirmed to Ars Technica in 2025 that it doesn’t use ACR on its Apple TV hardware. You should disable Siri, location tracking and the sending of analytics to Apple during the setup process for maximum privacy, as well as deploying the Ask App Not to Track

BELOW Pi-hole can help you blacklist ad-related traffic.



setting for any third-party apps you install.

SMARTPHONES

It will come as a surprise to precisely nobody that smartphones are the single richest source of consumer surveillance, thanks to the combination of identity, location and communication data they provide. Every time we install a smartphone app, we're bombarded with permission requests to let the app access this or that, but even if you deny permissions (often at the expense of app functionality) it's by no means guaranteed that the app developers will respect your wishes.

A paper published last year by academics from the IMDEA Software Institute in Madrid, entitled "Your Signal, Their Data", found a shocking level of abuse of Android's permissions system. The study analysed 52 software development kits (SDKs) and 10,000 Android apps and found that hidden data collection was endemic: 86% of the apps using those SDKs collected sensitive data such as device IDs, GPS location, Wi-Fi networks and Bluetooth beacon data. Almost 2,300 of the apps studied collected device identifiers without disclosing them.

Others were using sneaky techniques to get around permissions. Apps denied GPS permission, for example, could use Wi-Fi routers and Bluetooth beacons as location proxies, allowing them to still track the location

of users. They also found that SDKs often share location and tracking data internally, and that because SDKs link different advertising IDs together, even resetting your ID in an app would still allow them to track you.

Abuse of location data can have pretty far-reaching consequences, as a 2024 case brought by the US Federal Trade Commission (FTC) against data broker X-Mode Social and its successor Outlogic made clear. The company was caught selling US citizens' location data without any policy in place to remove sensitive locations from the data it sold. As the FTC chair of the time, Lina M Khan, said: "Geolocation data can reveal not just where a person lives and whom they spend time with but also, for example, which medical treatments they seek and where they worship." It's hard to believe X-Mode Social/Outlogic was the only company doing this.

Smartphones also find innovative new ways to leak your sensitive data, even when you use apps that are renowned for their privacy protections. As recently reported by 404 Media, the FBI managed to extract Signal message content from an iPhone by accessing the phone's notifications database. Even after the Signal messages had been deleted from the device, investigators were able to see message previews that were stored on the phone itself. In other words, if your

phone shows message content in notifications, it doesn't matter if the messages are fully encrypted or deleted; the content may be cached by the OS and be retrievable later.

Signal's president, Meredith Walker, condemned Apple for the way the notifications are handled. "Notifications for deleted [messages] shouldn't remain in any OS notification database, and we've asked Apple to address this," she posted on Bluesky, adding that Signal's settings allowed users to switch off notifications.

HOW TO STOP SMARTPHONE TRACKING

Although they might not uncover some of the sneaky data harvesting mentioned above, both iOS and Android have built-in tools that can uncover when apps are up to no good.

On iPhone, search your settings for the App Privacy Report. Once enabled,

this reveals which apps are accessing other data and sensors on the phone, the network activity of apps and the domains they're connecting. This is great for revealing activity in apps that you haven't even opened for a while, exposing where they're sending data in the background.

Android has the Privacy Dashboard (again available in Settings). It will show you how many apps in the past 24 hours have accessed data

BELOW The iOS App Privacy Report reveals which apps are collecting data.



It will come as a surprise to precisely nobody that smartphones are the single richest source of consumer surveillance



about your location, combed through call logs or opened the camera or mic, among other things. Again, it's good for exposing those apps that are scurrying away data in the background and for exposing apps that have been given too much latitude.

A regular trip through your permissions settings is always worthwhile. We've all blithely clicked through permissions settings, and a quick audit may reveal you've given too much leeway to certain apps. Both iOS and Android let you review each app's individual permissions from their settings menus.

The Signal case mentioned above also highlighted how notifications can snare data. If you want your conversations to remain private, you may want to switch off notifications in apps such as WhatsApp and Signal, with the obvious caveat that you won't be alerted to new messages. Signal does have an option to send notifications that are stripped of names and content in Settings | Notifications | Show.

WEB AND ADVERTISING SURVEILLANCE

The web remains awash with tracking technologies that are building up highly detailed profiles of users. Even when regulators (such as the EU) or companies (such as Apple) attempt to defend users' privacy, the marketers find a way around the restrictions.

And sometimes they're poorly

Many of the companies behind this tracking are ones most people haven't heard of – data brokers and ad-tech companies

thought through. Consider the EU's ePrivacy Directive and subsequently GDPR, which forced websites to seek permission to install cookies in people's browsers. Less a roaring success, more a pop-up pest.

There are many other surveillance technologies beyond cookies, too: tracking pixels embedded in websites or emails that report back when loaded; "link decoration" where extra tracking detail is added to the URL; device fingerprinting that combines data such as browser type, screen size and installed fonts into unique IDs (visit howthey.watch/us for a scary demo of this); all manner of web analytics systems that sit in the background, tracking behaviour across sites.

Apple dealt trackers a blow in 2021 when it introduced App Tracking Transparency

TOP There are numerous tracking technologies on the World Wide Web.

BELOW Meta found a way to circumvent Apple's attempts to curtail trackers.

(ATT), which requires apps to ask users' permissions before tracking their activity across apps and websites. Then Safari, Firefox and others introduced tracking-protection technologies that blocked third-party cookies and limited first-party cookies to only seven days. Apple's Mail Privacy Protection also blocked common email tracking techniques, such as the invisible pixels mentioned above.

All this was a severe blow to companies such as Meta, which rely on tracking users across various apps and sites to sell advertising, but Meta found a way around it. In addition to the Meta Pixel, a JavaScript snippet embedded in websites, which the new blocking technologies routinely thwarted, the company introduced the Conversions API (CAPI). It sends the same kind of information – customer IDs, purchase values, time stamps, even hashed email addresses – back to Meta, but because it's sent directly from the company's backend systems rather than the browser, it's immune from ad blockers,

cookie restrictions or iOS privacy controls. And it's invisible to the user. This is why Facebook ads remain immaculately well targeted.

In some ways, it's unfair to single out Meta, because there are lots of firms involved in web tracking. "Many of the





ABOVE The Brave and Vivaldi browsers include settings to block web trackers.

companies behind this tracking are ones most people haven't heard of – data brokers and ad-tech companies,” said Dr Tom West, programme director for corporate exploitation at Privacy International. “They can collect and consolidate data from a range of sources and package it up for sale, including to law enforcement and immigration authorities.

“This creates major threats to privacy, and can undermine people's safety and sense of security,” he added. “It can even threaten national security if data ends up in the hands of hostile actors.”

HOW TO **STOP** WEB TRACKING

It's pretty difficult, if not impossible, to eliminate web tracking completely because (a) it's so pervasive; (b) big companies such as Meta find workarounds; and (c) so much of it is invisible to the user that it's hard to know what to block in the first place.

At the most basic level, you can use web browsers that are specifically geared to protect against browser-side tracking. Brave claims to block trackers, cross-site cookie tracking and fingerprinting, as well as offering ad-blocking. Likewise, Vivaldi has many of the same features, and lets users block trackers/ads on a site-by-site basis if they wish. Both of those browsers are Chromium-based, although some of these features may prevent websites operating normally or displaying content unless you turn the blockers off.

Privacy International has a huge range of browser-specific resources that show you how to opt out of targeted ads, enhance your privacy and change HTTP referrer settings in various browsers at tinyurl.com/382privacy.

Using a VPN will also help to some degree, although it won't prevent device fingerprinting. Even if you appear to come from a different IP address, the browser's unique characteristics will still be recognisable. Firefox has a “Resist Fingerprinting” setting in its advanced preferences that limits the amount of data websites can gather from your

WHAT DATA REQUESTS REVEAL

In theory, in Australia we have a right to find out what personal data companies hold on us with Subject Access Requests. Companies have a legal obligation to provide individuals with a “copy of their personal data and other supplementary information,” and that must be provided within a month of a verbal or written request.

Many firms provide an online facility to request a copy of your data, although this can often be tucked away several menus deep in settings. The quality of the information you get back from such requests is also highly variable.

Meta is, perhaps surprisingly, one of the more transparent companies here. I asked for a copy of my Facebook data and it was made available for download within the hour (other companies can take days or weeks to comply).

The information is very neatly formatted and readable. The Ads Information folder, for instance, shows a list of my so-called “Ads interests”, which definitely picks off a range of products I would be interested in (computer keyboards, Amazon Kindle), but quite a few I absolutely wouldn't be (WWE Women's Championship, painting, surrealism). It's quite reassuring how badly Facebook knows me.

Facebook is also quite up front about how it tracks you away from its own sites. A file called “Your activity off Meta technologies” provided a long list of websites I'd visited which had sent information about me back to Facebook.

Other sites are less helpful. It took a full day for my data to arrive from ChatGPT as a 1GB ZIP folder that was an unholy mess. It contained folders



ABOVE You have the right to see what data firms hold about you – but you may have to wait for it.

named with random strings of numbers and letters, housing audio conversations held with the AI; numerous files named “conversations” stored in the JSON format that are practically unreadable to the human eye; and a massive HTML file called “chat” that was seemingly a text archive of every conversation I'd ever held with ChatGPT. This crashed every browser I tried to open it with.

Amazon, meanwhile, said it could take “up to one calendar month” to provide all of the information that it held about me.

My mixed experience seems to mirror that of the Electronic Frontier Foundation's Thorin Klosowski. “I've gotten a wide variety of responses to data access requests ranging from literally everything in a ZIP file that is unintelligible and impossible to decipher what it is, to three lines that are clearly not giving me what they are actually collecting and sharing,” he said. “I do think there needs to be improvements there.”

device. However, as Mozilla warns on its help pages, this feature can “cause the website to behave strangely or incorrectly”.

“These behaviours also mean that Resist Fingerprinting is working as intended, which is why we do not recommend this feature for the average Firefox user,” the company adds.

SMART HOME DEVICES AND WEARABLES

Unlike some of the other technologies we've covered here, it's pretty obvious what the surveillance risks are when you're talking about devices such as smart doorbells, smart speakers, smartwatches and other wearables. The fact, for example, that Amazon's Echo Show devices recognise your face when you walk into camera view and pop “Hello, Barry!” (or whatever your name is) on the screen betrays the fact that it's obviously tracking your



ABOVE Smart speakers don't hide the fact that they're spying on you.

presence. And you'd be naive to believe the battery of fitness data being collected by your watch or smart ring is for your eyes only. Although, in the latter case, branding it fitness data is underselling its value and sensitivity, according to experts.

“The personal health data collected by wearable devices is always branded as ‘health’ or ‘wellness’ data, and not ‘medical’ data,” said Paul Bischoff.

The personal health data collected by wearable devices is always branded as 'health' or 'wellness' data, and not 'medical' data

"This distinction serves two purposes. The first is that medical data is subject to stricter privacy regulations, such as the Health Insurance Portability and Accountability Act in the USA. By avoiding the medical label, brands can more easily collect, share and profit off your health information. The second reason is that it shields wearable makers from liability and compliance issues related to being classified as a medical device. They don't have to be as reliable or accurate as devices used by doctors, and don't require special training."

There have been several cases of data from fitness trackers/smartwatches being used for, let's say, unintended purposes. The most infamous case was fitness app, Strava, back in 2018, which published a global heatmap of user activity that inadvertently revealed the location of military bases and secret military installations in countries such as Afghanistan.

In the UK, the health insurance company Vitality explicitly rewards customers with lower premiums if they share data from their health trackers with the company. The firm's 2025 report boasts of "the measurable value" of the scheme, "helping members save millions in lower premiums while boosting engagement and retention". While this is purely voluntary and opt-in, we've started the slippery slope of linking health metrics to insurance premiums.

And what about smart home devices such as doorbell cameras or smart speakers? Could they be used

against you as well? There have been several well-documented cases where audio captured on smart speakers has been used as evidence in criminal cases. And if you've watched any recent police documentary on TV, you'll know it's now practically routine for the police to ask people for doorbell, security or camera footage when investigating crimes. Even areas that aren't covered by public CCTV cameras are now effectively CCTV areas, because of the proliferation of such devices.

Many people would argue that's a good thing – if evidence from smart speakers or doorbells helps the police solve serious crimes such as murder or rape, all the better. But what about when it comes to less serious offences? Especially if it's married with facial recognition software.

Public spaces being increasingly surveilled with facial recognition technology is "a big concern of ours", Christopher Weatherhead, technology lead at Privacy International, told us. "Anonymity and public spaces being lost like that has a chilling effect on things like protest, because now you can be tracked over time, cheaply and effectively, which

ABOVE Some insurers have linked smartwatch data to premiums.

means that your rights to object to a government position or protest a viewpoint are now being impinged upon," he said.

While most people would willingly hand over footage for something such as a murder investigation, Weatherhead said the police can be quite "opaque" about what they're investigating when they request such footage from people. For example, stating that "there's currently a protection order in the area, and we're investigating contraventions of the protection order" to gain footage of protestors.

The law is, as ever, playing catch-up when it comes to regulating such technologies, too. Weatherhead points to how police have long sought mobile phones from suspects, victims and witnesses when investigating crimes, but that "for ages that was... or still is quite poorly regulated".

"The only regulation for a while was the police's own codes of practice, which were discretionary," he said.

HOW TO **STOP** WEARABLES OR SMART HOME DEVICES FROM TRACKING

When it comes to stopping smart home devices collecting more than they should, think about what they're actually needed for. For example, many people have smart doorbells set to record all motion within the camera's range (the default setting on many devices), but do you actually need that? They can be set to record only when people press the doorbell, for example, or you can set motion zones so that the camera is triggered only when people set foot on your property, not passing on the street.

Many older devices such as the first Echo Show models have physical camera privacy sliders so that the camera can't be activated (or capture anything worthwhile) without your knowledge. For reasons best known to itself, Amazon has removed the physical shutters on newer devices such as the Echo Show 11.

When it comes to wearables, tracking where your health or medical data is being shared is tricky. The privacy policies are again opaque and, once that data is in the manufacturers' cloud, you've got little control over it. Also beware of very cheap wearables from places such as China, according to Weatherhead. "I think there's an expectation that the reason they're cheap is labour is cheap and parts are cheap," he said. "But there's also this other side, which is this data-collection side, which is used as a subsidy for them." ■

BELOW Doorbell footage is often used by the police in their investigations.



System Settings Edit View Window Help

POWER UP YOUR MAC

183 must-try tips for a leaner, meaner machine.

Written by Carrie Marshall





Are you making the most of your Mac? Macs are amazing straight out of the box but, while you don't *need* to change anything to have a good Apple experience, there are tons of ways to make your Mac even better. From speeding up your startups to automating everyday tasks, macOS comes with a ton of tools and tweaks that can make your Mac more useful, and more you.

In this tutorial we're going to discover lots of things that can make your Mac experience even more marvellous. We'll look at how the Finder can be personalised and customised to keep important files and folders at your fingertips, and how to make the most of your Mac's storage. You'll discover the awesome power of automations in the Shortcuts app, and how to clear out clutter left behind by long-gone apps. You'll also discover how to recover accidentally deleted files, folders, calendars and contacts.

One of the biggest changes to the Mac has only just got started. Apple Intelligence, which is only available for Macs running Apple silicon, adds some fun new features to macOS 26 Tahoe, but the big Siri upgrade is happening later this year. You don't need to wait for macOS 27 to get some cool Apple Intelligence tools though, as you'll discover in the following pages.

Start up faster

Get up and running in double-quick time



Today's Macs are pretty speedy when it comes to starting up, especially if you unlock your Mac with your Apple Watch or Touch ID. But you'll often find that over time your startup slows, and that's usually because your Mac's due a spring clean.

Declutter your drive

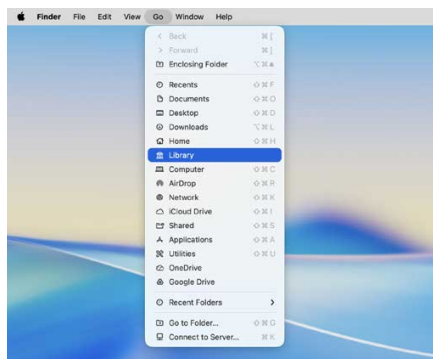
System Settings > General > Storage shows what's taking up space on your Mac, and you might be surprised by how much storage apps such as Messages are taking up. From here you can clean up things such as the Bin, documents and other large files.

If you like to try out new apps and games, it's easy to end up with a cluttered startup disk and a lot of unwanted apps launching at login. So the first step in your spring clean is to get rid of any apps you don't want launching at login – check out

'Tame Login Items' below to see how to do that – and to remove any apps that you no longer need.

Take out the trash

After deleting those apps from your Applications folder there are other places where bits and pieces of some apps may



For quick access to your Library in the Finder, click Go in the menu bar, then hold the Opt key.

remain, and most of those places are in your Library folder – so if you want to be really thorough you can take out those bits and pieces too. To access your Library, open Finder, click on the Go menu and hold down the Opt key. You should now see Library in the list of folders; click on that to go there.

Leftover app components will usually be identified by name, and the key places to look for and remove them are:

- Library/Application Support
- Library/Caches
- Library/Preferences
- Library/Logs

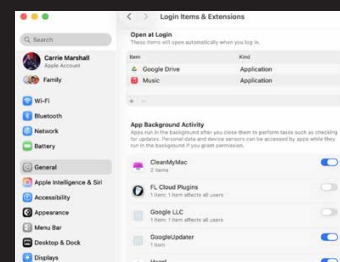
Some apps will be in the library of your own account (Macintosh HD/Users/[your name]/Library) and others will be in Macintosh HD/Library. Don't go wild deleting things, though: if you don't know what something is, don't remove it.

Tame login items

Some apps run every time you login to your Mac. That's great if you want them to, for example because you're using a cloud storage service or use the same apps almost every time you use your Mac. But if you don't want those apps to run every time, it's wise to clear them out. That way, your Mac isn't wasting time and resources on apps you're not actively using.

To see what's loading at login, go into Settings > General > Login Items &

Extensions. Now select any program you don't want and use the '–' button to remove it from the login list. You can also do this in reverse, by using the '+' button to add apps to your login. Use this power wisely, though, because the more apps you have running the more system resources they'll take up. You can also use this panel to disable background app activity, which is when apps automatically update their data even if you're not currently using them.



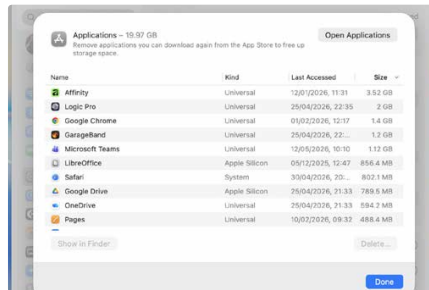
Lots of apps like to install helpers that run at every login, but too many may slow down your Mac.

HOW TO Sort duplicates, unused apps and more



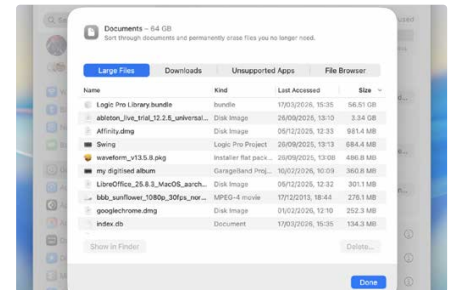
1 See your storage

In System Settings > General > Storage, you can get a good view of what's taking up space on your Mac, and you can also get rid of the major space hogs here. First of all, we need to let the app analyse our storage, which takes a moment.



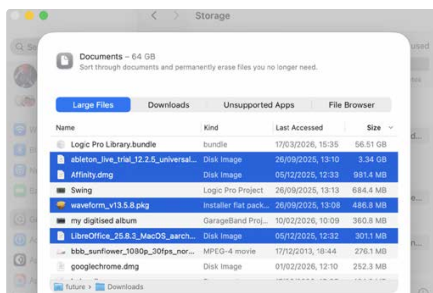
2 Investigate applications

The analysis gives you a breakdown of space used by different categories, which you can click on to see more. Here we're looking at Applications, which take up nearly 20GB of space. You can delete an app by selecting it and clicking Delete.



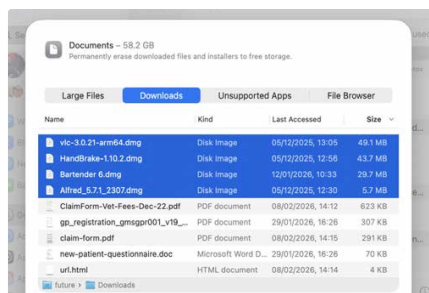
3 Dig through Documents

The Documents section is broken into four parts: large files, downloaded files, unsupported apps and a file browser. The first two are handy for finding things such as old DMG and PKG installer files from apps installed in the past.



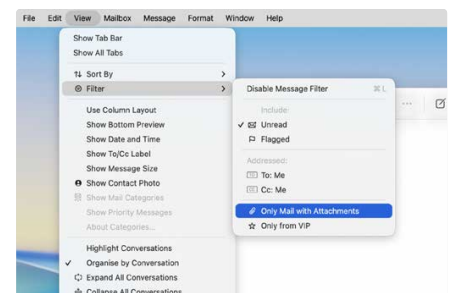
4 Delete the downloads

You can delete files just like you would in the Finder, so you can select multiple options here and then click Delete to get rid of all of them. As always the golden rule is to only delete things you're sure it's safe to get rid of.



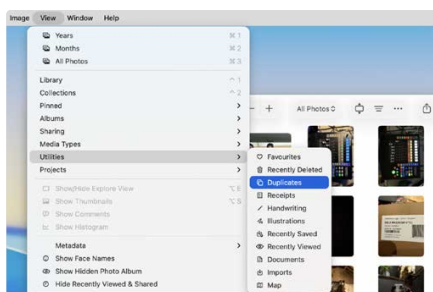
5 Delete even more

Click on the Downloads section to see more things that are taking up unnecessary space on your Mac. These .dmg files are more leftover installers so it's fine to get rid of them. As before, select the items, then click Delete.



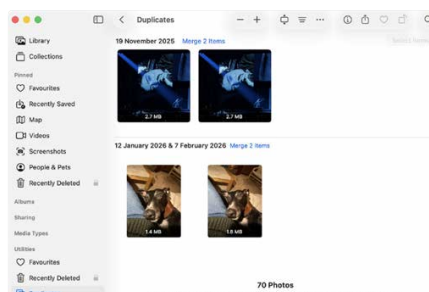
6 Manage Mail better

System Settings can't delete what's taking up space, so while it might tell you how big your Mail library is, you'll need to manually delete messages in the Mail app. Use View > Filter to show messages with attachments, the biggest space hogs.



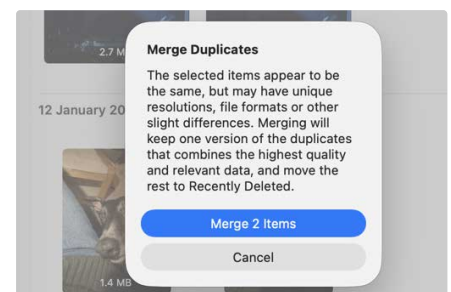
7 Prune your pics

System Settings can't sort out your Photos library either, but the Photos app can. Go to View > Utilities > Duplicates and the app will quickly comb through your entire library, identifying any images it thinks have been duplicated.



8 Merge the images

For each set of possible duplicates, Photos will show you the images side by side with details of their file sizes overlaid on each one. If you agree with Photos that the images have been duplicated, click on Merge Items.



9 Confirm your choice

Photos will show you this pop-up before merging the images together. If it turns out you've kept the wrong version of the two images, you've got 30 days to change your mind and recover it from the Recently Deleted folder.

Speed up the Finder

Discover some clever ways you can navigate your Mac faster



The Finder has been with us since the very first Mac. It's your Mac's file manager and file explorer, enabling you to organise and locate all your documents, photos, apps and data. And it's very easy to get it just-so.

If you open a new Finder window or open a folder, you'll see a toolbar along the top. Look for the View button; this changes the Finder display from a list to columns, icons or a gallery view that lets you see what each document is. If you go to View > Show View Options, you can select what

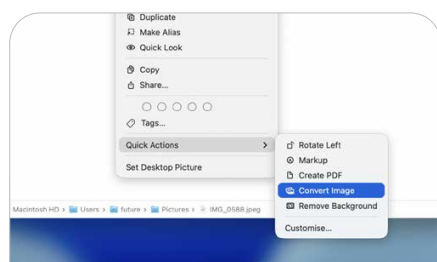
information Finder should display and adjust the text and icon size too; use Set As Defaults if you want those settings to apply across your entire Mac.

The next button is Group, and that enables you to organise the current folder's contents by various criteria – their names, their file types, their creation or last modified date, and so on. These settings are saved per folder so you can have different grouping and different views in different folders.

Further to the right is Edit Tags. Tags are great for organising documents and

folders, for example by creating tags for personal and for work stuff or for certain categories. You can create your own tags, then apply them by Ctrl-clicking on a file or folder and choosing the appropriate tag. You can then look for specific tags by clicking the appropriate one in the sidebar.

You'll notice that the name of the currently opened folder appears at the top of the toolbar. You can retrace your steps with the back arrow; if you Cmd-click on the folder name you can see the path to the current folder and navigate with that.



Use Quick Actions

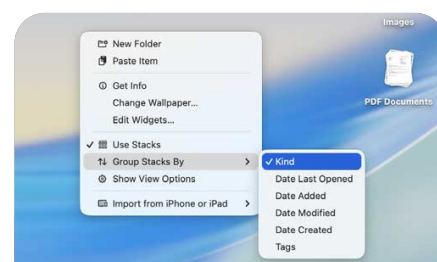
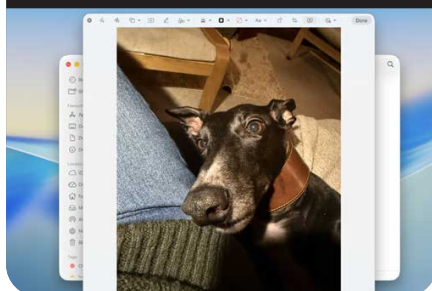
When you Ctrl-click on a file in the Finder, you'll see an option for Quick Actions in the menu. These are context-sensitive, so if you've selected an image you'll get options for rotating and resizing, cropping and converting; for PDFs, you'll get the option to bring up the Markup tools; with audio and video files you can trim them. These are all huge time-savers because you don't need to open the files in the appropriate app to make the changes you want.

If you're a power user, you can take things even further, because you can make your own Quick Actions in the Automator app. To do that, open Automator and select File > New > Quick Action. You can then specify the type of input (text, images, telephone numbers, email addresses, and so on...), the app you want to process that input, and what the Quick Action should do to perform its task.

Master Quick Look

Quick Look does more than preview files – you can use it to carry out quick tasks too. Select an item or items, press the Space bar and then look at the toolbar in the top of the Quick Look window. Depending on the type of file you've selected, you'll see different icons here. PDF files will have a Markup icon, while images will also have an icon for rotating the image, and audio and video files will have a Trim icon you can use to trim the beginning and end of a recording.

There are some handy keyboard commands here too. Cmd and then the '+' or '-' keys zoom in and out respectively, and if you've selected multiple items, Cmd+Return shows them in a grid. And with images, Ctrl-clicking the subject of an image, such as a person, enables you to Copy Subject and paste the cut-out of the image into another app.



Use Stacks for your stuff

If you like to keep a lot of things handy on your Mac's desktop, Stacks can help clear the clutter without putting anything out of reach. You can enable Stacks in three ways. Click on the desktop and then go to View > Use Stacks, or press Ctrl+Cmd+0 [zero], or Ctrl-click and choose Use Stacks.

Your Mac will now organise your desktop files into stacks for each file type, so for example it might create a stack of JPEG images and another of PDFs. To view a stack of items, click on it; to open an item, double-click it.

You can change how stacks are grouped. Click the desktop and then View > Group Stacks By. This enables you to change the Stack type, so in addition to file types you can select specific Finder tags or dates. You can also change folders in your Dock into stacks. Ctrl-click it and change it from Folder to Stack.

EXPLAINED... Master the Finder

A

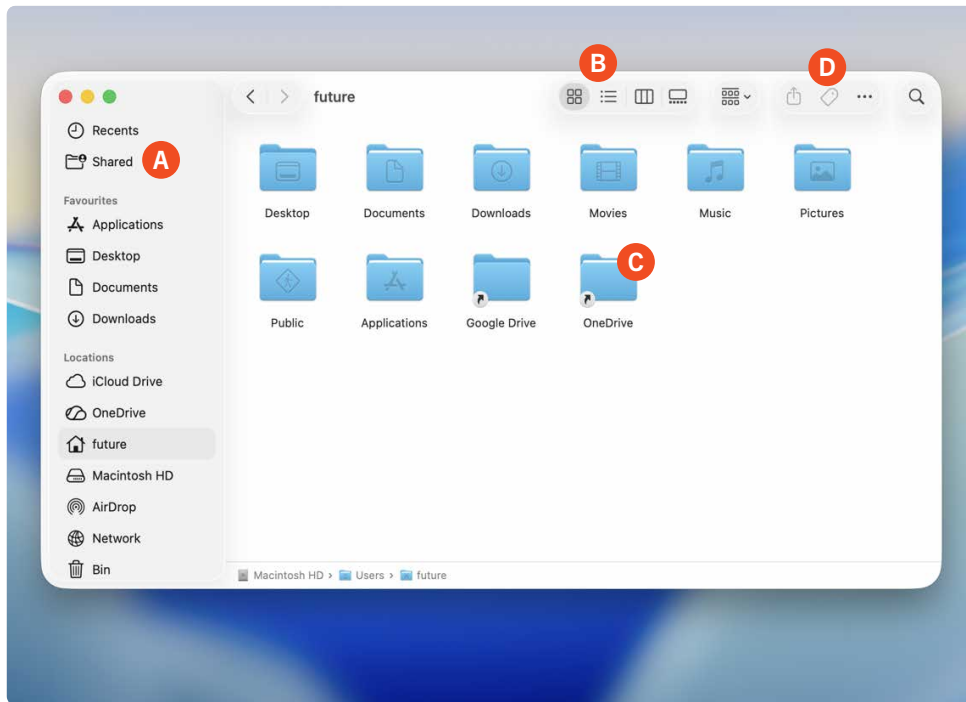
Sidebar

The Finder sidebar gives you one-click access to folders, storage locations and key features such as AirDrop.

B

View icons

These buttons change the way the current folder displays, for example by switching to Gallery view.



C

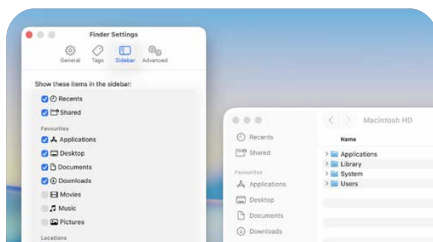
Aliases

Aliases are a very useful Finder feature: they're links to folders that live elsewhere on your Mac.

D

More tools

Next to the Share and Tags icons, '...' brings up extensive Finder tools and filters.



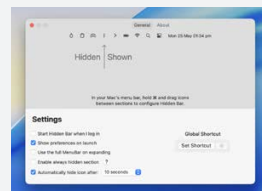
Customise the sidebar

You can customise the sidebar in two ways: by dragging folders in and out of it, or by going to **Finder > Settings > Sidebar** and deciding what to include. The options are extensive, so in addition to favourite folders, such as your Desktop and Documents, you can choose to show iCloud Drive and other cloud services; external drives and CD/DVD drives; AirDrop; and networked computers. Simply tick the items you'd like included.

While you're in settings for the Finder, you can also decide whether to include tags. These are customisable, colour-coded tags that you can apply to files or folders so, for example, you might have a red tag for overdue projects. Clicking on that tag in the sidebar shows all the files and folders with that tag. Create your own tags here by pressing the '+' button; give it a name then Ctrl-click to choose a colour.

Top 5 Finder utilities

macOS Tahoe's Finder features are pretty great, but there's always room for improvement. Between them these apps can help you tame the menu bar, organise your app windows and share and organise things even more effectively.



Hidden Bar

Free App Store



An old favourite, Hidden Bar is designed to reorganise your menu bar, and rather than removing items it can hide them instead and reveal them when you click on the arrow icon.



Moom

US\$15 manytricks.com

Moom is a window management tool that turbo-charges the window tiling you can do in macOS by enabling you to create, save and recall different layouts for different app and window combinations.



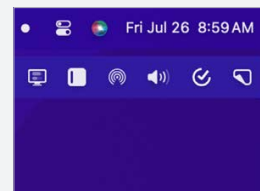
Dropzone

US\$25

aptonic.com



Dropzone turns the top of your desktop into a place for grids, which are custom areas that you can drag and drop docs, folders and files into for moving, organising, and more.



Ice

Free/donations

icemenubar.app



Ice helps to organise your menu bar, and enables you to change its style by adjusting its spacing and using both temporarily and permanently hidden sections.



Rocket

Free matthewpalmer.net



Matthew Palmer makes lots of handy Mac enhancers, and this is one of the most fun: it makes it easy to get emoji by typing shortcuts. The paid Pro version adds GIFs to the mix.

Work smarter not harder

Get organised and stay organised with these top tips

Organising your Mac is like organising your home: it's a lot easier to find things if you keep things in sensible places. Folders are your friend here: having sensibly named folders in places such as Documents or your desktop massively reduces clutter and makes things much easier to find, and Smart Folders enable you to turn searches into folders that automatically update when you open them. To create a smart folder in Finder, go to File > New Smart Folder. At the top right of the window, below the toolbar, click the '+' to add criteria such as file types, creation dates or anything

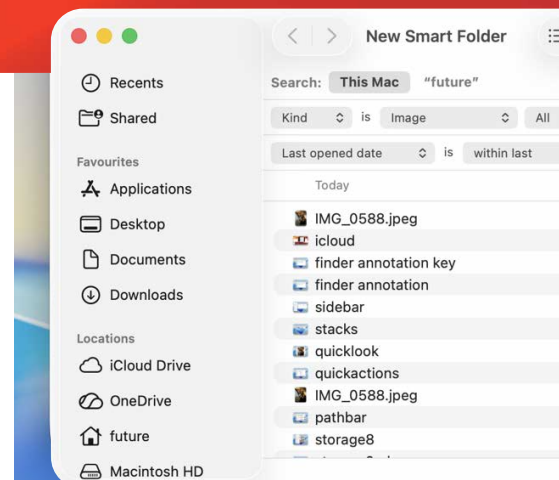
else. You can add multiple criteria; when you're done, click on Save and give your Smart Folder a name. It'll be automatically added to the sidebar and saved to the Saved Searches folder, although you can change that if you wish.

It's easy to make shortcuts to folders or Smart Folders on your desktop, too: if you Ctrl-click on a folder in the Finder and select Create Alias, you can then move that alias to your desktop. Double-clicking the alias opens the linked folder.

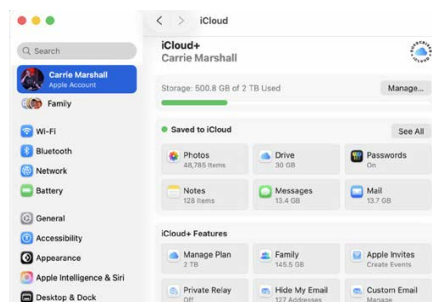
Get ahead in iCloud

iCloud makes it easy to access all your stuff across all your Apple devices. If you need to change your iCloud settings, click on the Apple menu and select System Settings. Click on your Apple Account, then on iCloud.

You can see what's saving to iCloud by clicking on the See All button to the right of 'Saved by iCloud', and if you don't need a particular third-party app to sync or you don't use certain Apple apps, such as Stocks, you can turn their iCloud syncing off. It's also worth taking a look at the Manage button in the Storage section. You might find that you have many



Smart Folders enable you to create simple or complex searches, and you can save them for instant results every time.

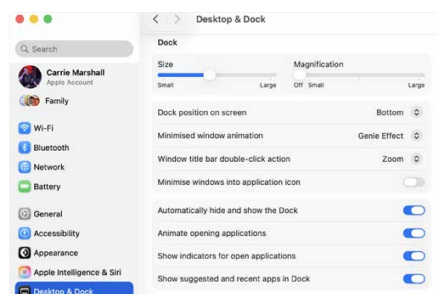


The iCloud part of System Settings enables you to control what apps sync via iCloud as well as keep an eye on storage usage.

gigabytes of Messages and Mail storage, or old iOS device backups: clearing out unnecessary stuff can free up lots of space.

iCloud also offers something really important – it can undo accidental deletion. If you login at icloud.com and click on Data Recovery at the bottom right of the screen, you can recover files deleted from iCloud Drive and Photos, and you can recover bookmarks, calendars, and contacts too. iCloud keeps deleted items for 30 days.

HOW TO Customise your core workspace tools



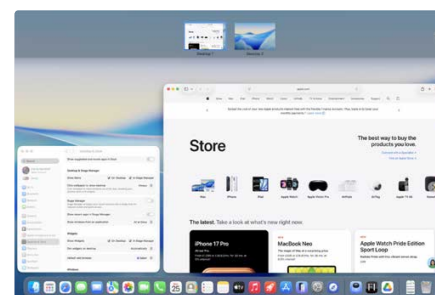
1 Customise the Dock

In System Settings > Desktop & Dock you can adjust the size, location, magnification and behaviour of the Dock. You can also decide whether to animate opening apps, and whether the Dock should include recently used apps.



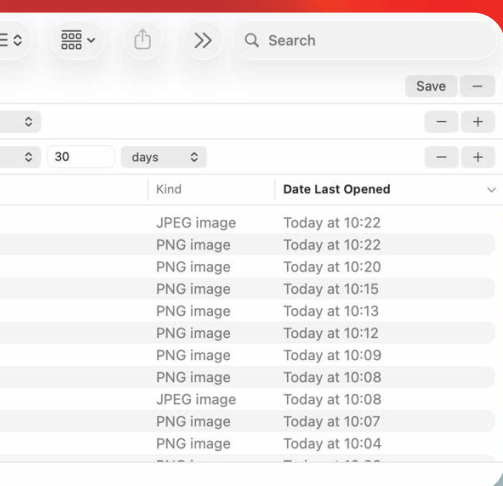
2 Set the stage

You can also enable, disable and customise Stage Manager from here, for example by deciding whether it should display items on your desktop and how it should display multiple open windows from the same app.



3 Start a Mission

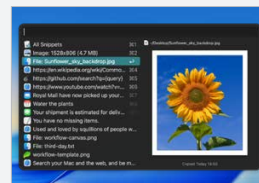
Press F3 or swipe up with three fingers on a trackpad to open Mission Control. Drag apps into a second desktop by dragging them over that desktop's thumbnail or add additional desktops by clicking the '+' in the top-right corner.



By default, macOS Tahoe syncs your Mac's Desktop and Documents folders and their contents to iCloud Drive. If you don't want to do that, look for the Saved to iCloud part of the screen and click on Drive. This gives you the option to turn off Desktop and Documents syncing, or to turn off iCloud Drive altogether. You can also choose Optimise Mac Storage, which can offload documents to iCloud in order to free up space on your Mac. It's better to have the full contents on your Mac, though, especially for backups.

Top 5 organiser apps

There are two main kinds of Mac organiser apps: Spotlight replacements such as Alfred and HoudahSpot, and Finder alternatives and expanders such as Forklift, Commander One and Tokie. The latter kind of app is particularly good for power users who need more than Apple's apps can deliver.

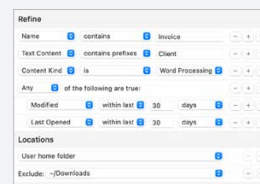


Alfred

Free alfredapp.com



Alfred takes an unusual approach: the app is free, or a paid PowerPack adds premium features. It's a great Spotlight alternative with integrated web searching, text handling and keyboard shortcuts.

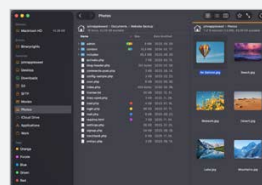


HoudahSpot

\$55 houdah.com



HoudahSpot is a file searching app that enables you to find things based on multiple criteria including metadata, such as the song info stored in music files or image types and dimensions.



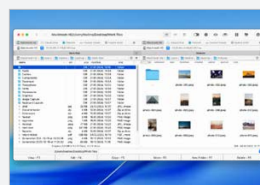
Forklift

US\$19.95

binarynights.com



Forklift is a file manager designed for power users. It's fast, has excellent cloud and network support, and includes an app uninstaller that gets rid of the traces that just deleting an app doesn't remove.



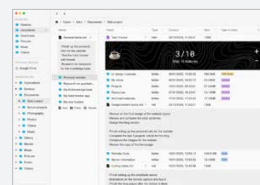
Commander One

US\$29

commander-one.com



Commander One is a dual-pane file manager with cloud and FTP (file transfer protocol) features, encryption and compression. iOS compatibility makes your iPhone or iPad look like an external drive.

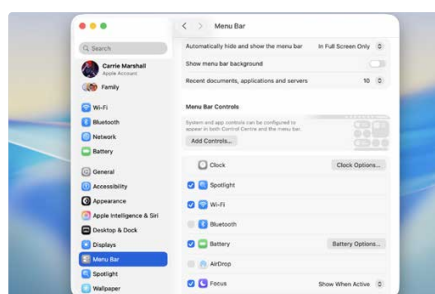


Tokie

US\$29 tokie.is

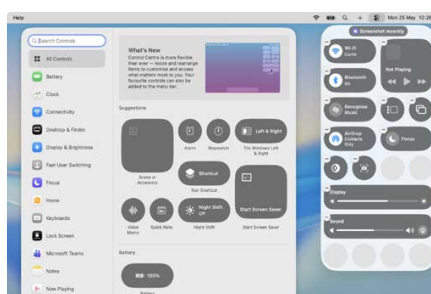


Tokie treats your files and folders as if they were items in a database. That enables you to add all sorts of extra data to them, so that you can then organise the information in whatever way works best for you.



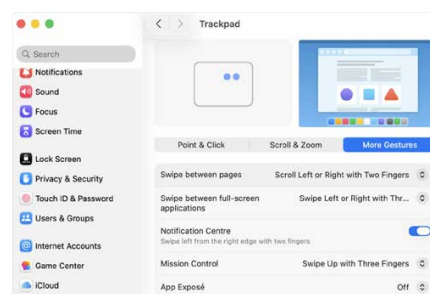
4 Master your menus

In System Settings > Menu Bar, you can decide whether to hide the menu bar when it's not in use, specify how many recent documents and apps it should list, and more. You can also reduce menu bar clutter by removing unwanted controls.



5 Customise controls

Customising the icons in Control Centre couldn't be easier: click on Control Centre in the menu bar and then select Edit Controls. This enables you to add new controls, and to move or delete the ones that are already there.



6 Customise gestures

If you have a Magic Mouse or an Apple trackpad, you can customise gestures and adjust speed and sensitivity in System Settings > Mouse or System Settings > Trackpad. There are lots of trackpad options here.

Master Apple Intelligence & Siri

Discover the cool things you can do with Apple's artificial intelligence tools

Anyone with a Mac running Apple silicon and macOS Tahoe can take advantage of Apple Intelligence's cool tools for organising, creating and answering questions. It can clean up your Photos, create Genmoji for Messages, summarise your emails and help you with documents; it can transcribe voicemails and audio notes and prioritise notifications. It's still very much a work in progress – big changes are coming to Apple Intelligence later in 2026 – but there are already plenty of useful features you can use today.

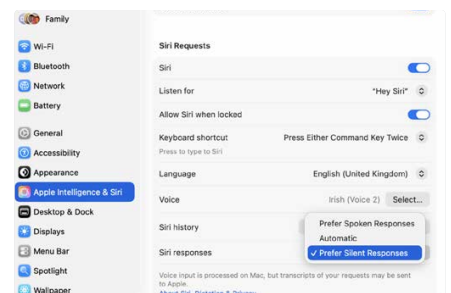
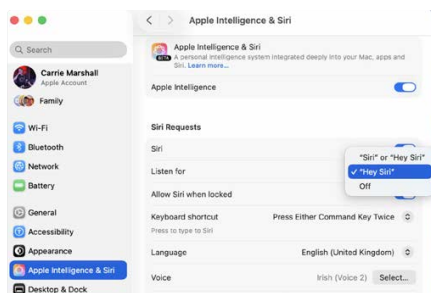
Use Writing Tools

Apple Intelligence Writing Tools are available for most apps that you type into, and as you'd expect they work very well in Pages. If you Ctrl-click and select Show Writing Tools you can choose between proofreading and rewriting existing text or composing something new – and you can choose the tone, with options for Friendly, Professional and Concise.

Use Visual Look Up

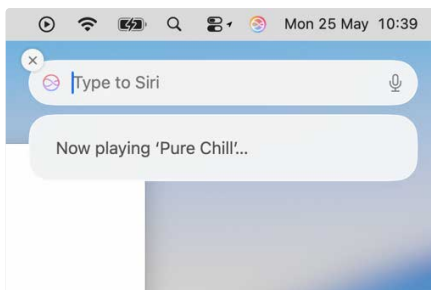
In Safari, you can Ctrl-click an image and select Look Up to display a window with more information about it. In Photos and Preview, the 'i' icon changes, for example, adding a sparkle or a paw print to show if Visual Look Up is available for that image. Click the 'i' and it'll create a white icon over the image; click the Look Up option to view the available information from Visual Look Up.

HOW TO Use Siri on your Mac



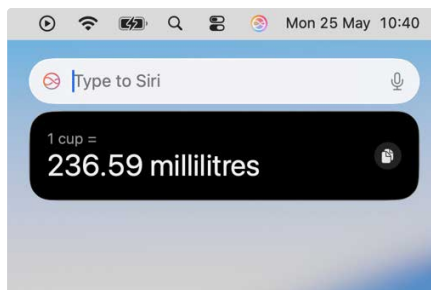
1 Say hello

You can use Siri in two ways on your Mac: by voice, or by pressing the appropriate keyboard shortcut. You can specify the shortcut key in System Settings > Apple Intelligence & Siri > Keyboard Shortcut.



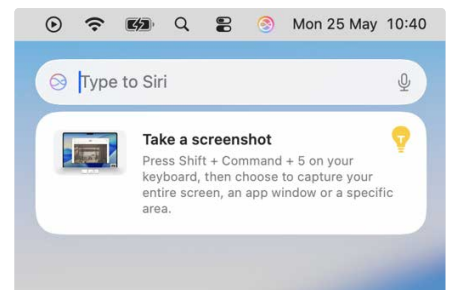
2 Say the words

If your Mac has a microphone or your connected headphones do, you can command Siri by voice. Go to System Settings > Apple Intelligence & Siri to customise this, for example by dropping the "Hey" bit of "Hey, Siri".



3 Make Siri silent

If you're in a shared environment it's wise to make Siri communicate silently – to do so, choose Prefer Silent Responses from this menu in Siri's settings. You can opt for Prefer Spoken Responses whenever suits.



4 Control your Mac

Siri can handle everything from making FaceTime calls and playing podcasts to launching apps and controlling smart home devices, and it's smart – ask for music that's mellow or suitable for studying and Siri will play it.

5 Ask about anything

Siri's handy for quick questions such as "what's one cup in millilitres?", "what date is Ruth's birthday?" or "what's the time in New York?". It can also get info from apps via commands such as "show me notes about my trip".

6 Ask Apple Intelligence

One of Siri's best features on the Mac requires Apple Intelligence. You can ask Siri for help, for example by asking questions about how to do something on your Mac, and Siri will become your very own personal support technician.

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Speed up your Mac with Shortcuts

Create your own automations — we show you how!

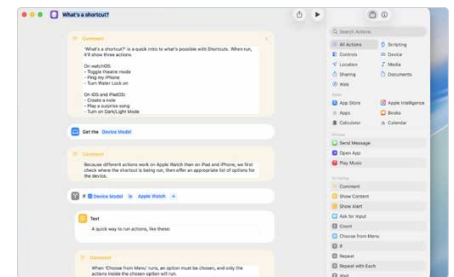
Apple has provided automation tools in macOS for many years — Automator has been in macOS since 2005 — but Shortcuts makes automation even easier, and Apple has been gently nudging everyone to move to the newer app. Shortcuts are groups of actions, which are commands that tell your device to do something. You might have a shortcut that copies a web address and adds it to a new

email, or one that adjusts an image and then saves it in a particular place, or a shortcut that uses your own photo and text to make a meme for sharing on social media. You can call up shortcuts manually or create automations that make them happen when specific criteria are met, such as when you get an email from a particular person.

The best way to learn shortcuts is to look at some of the existing shortcuts in the Shortcuts Gallery. To do that, select a shortcut and then click on the ‘...’ in the top-right corner. This will show you that shortcut’s instructions, which generally follow the format of “when this happens, get this and then do that”. So, for example, the Split Screen Safari and Notes shortcut has just one instruction: Split screen between Safari and Notes. Others are more complex but still straightforward, such as Morning Summary in the Apple Intelligence section. That shortcut gets the weather for the current location, looks for Calendar items marked today, checks if any reminders are due, and then gives you the information.

Less is more

Shortcuts’ job is to take a bunch of things and do them automatically, whether that’s



Apple provides a section of Starter Shortcuts that you can open to see how they’ve been made.

picking a smart lighting scene at sunset or adding a task to your favourite to-do app. And while it’s possible to make very complex shortcuts that do all kinds of things, you’ll often find that it’s the smallest, simplest shortcuts that actually deliver the biggest time savings because they speed up the little fiddly things you do every day, such as tiling app windows, sorting text alphabetically, removing the background from images or any other seemingly insignificant chores.

If you double-click on a saved shortcut and click on the ‘i’ at the top right of the window, you can make that shortcut available via Spotlight searches (and process data from Spotlight input), add it to the Share menu options, create a Quick Action in the Finder’s Ctrl-click menu, or add it to the Services menu. You can also add Shortcuts to the Dock.

Shortcuts



Morning Summary



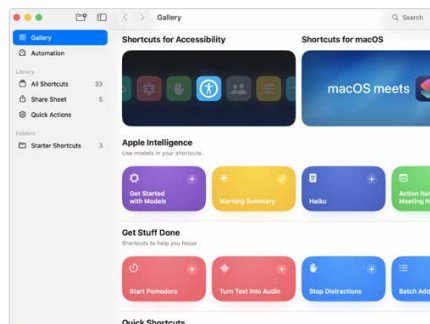
Split Screen Safari and Notes

Some Shortcuts work on Apple Watch, although the selection is smaller than for your Mac.

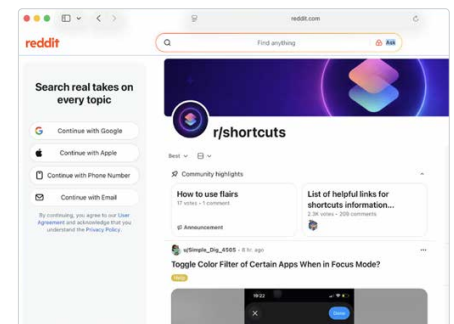
Shortcuts on everything

Shortcuts also work on iPhone, iPad and Apple Watch. And that means you can run iOS/iPadOS shortcuts on your Mac, and Mac shortcuts on your iPhone or iPad. You can also use Shortcuts Widgets on your iPhone, iPad or Mac desktop to access shortcuts even faster.

You can run shortcuts on Apple Watch too, but they’re more limited because of the Apple Watch being smaller and less powerful than your iPhone or iPad. Shortcuts that run on your Watch will have a prominent ‘Appears on Apple Watch’ in the ‘About this shortcut’ section when you open them from the Gallery.

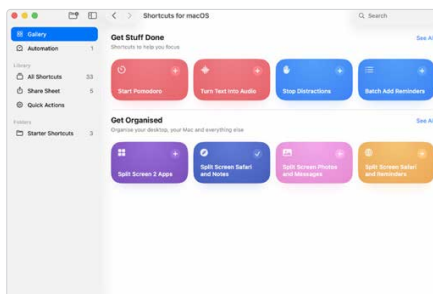


The Shortcuts Gallery is packed with handy pre-made shortcuts that you can add to your toolkit.



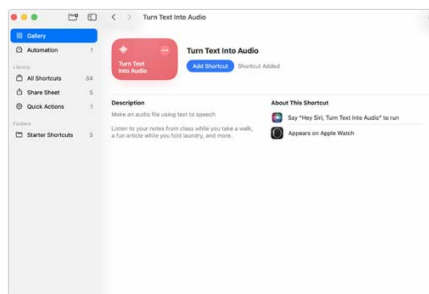
The r/shortcuts board on Reddit (reddit.com) is a great place to discover and talk about shortcuts.

HOW TO Get started with Shortcuts



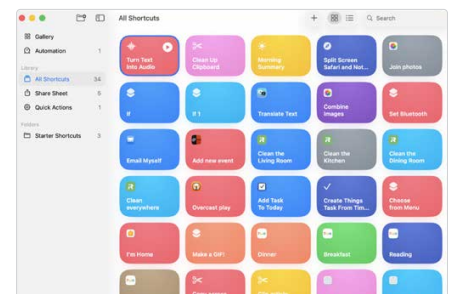
1 Go to the Gallery

There's no need to reinvent the wheel: the Gallery in the Shortcuts app is packed with useful ready-made shortcuts that you can add or edit. Here we're looking in the 'Shortcuts for macOS' section, which contains a shortcut we want to use.



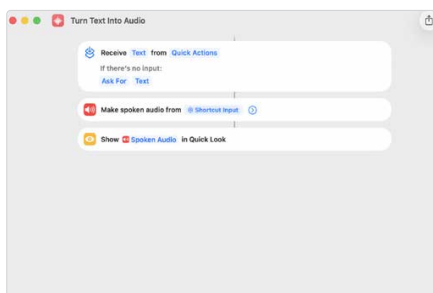
2 Select a shortcut

Double-click on a shortcut to find out more. Let's go with Turn Text Into Audio. As you can see, the Gallery page gives you information about how to use the shortcut and what it does. Click on Add Shortcut to add it to your collection.



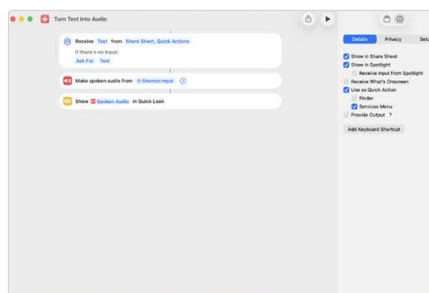
3 See your shortcut

Your newly added Shortcut will now appear at the top of the Library > All Shortcuts section in the app's sidebar. You can now double-click on the shortcut to look at its code and settings, or click the Play icon to test it.



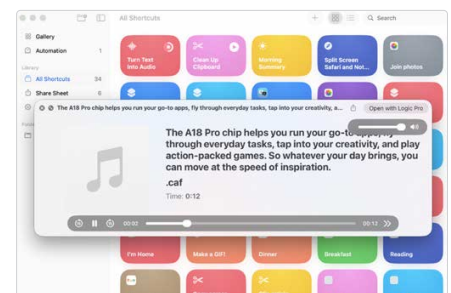
4 Discover the details

On double-clicking a shortcut, you'll see two sections: the Actions that make up the shortcut on the left, and available Actions on the right. You can edit the shortcut's actions by tweaking, adding or removing actions.



5 Set the shortcut

Click on the 'i' icon at the very far right of the Shortcuts app and select Details. This enables you to specify where your shortcut should be available from, with options including the Share menu, Spotlight and in Finder's Quick Actions.



6 Start the shortcut

Close the window and you'll be returned to your Shortcuts library. Click on the Play icon and your shortcut will now run, in this case after asking you to enter or paste the text you'd like the shortcut to turn into audio.

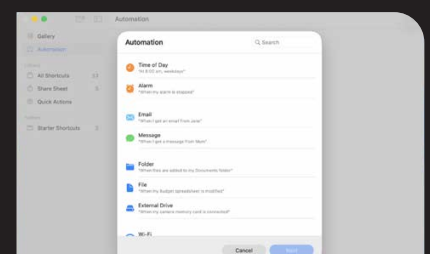
Automatic for the people

Automation is one of the most powerful features in Shortcuts, because it makes things happen based on whatever criteria you select. That means it's a 'set it and forget it' feature: you create the automation once and it'll run whenever your criteria are met.

There are lots of useful options. You can create a shortcut that'll run whenever you join a particular Wi-Fi network, such as your home, school or work Wi-Fi; when you connect your

AirPods or another Bluetooth device; when you connect a MacBook to an external display; or when a particular external drive such as a USB stick or camera memory card is connected. You can also create person-specific criteria that apply to incoming emails and Messages, and for Focus modes such as Driving and Sleep.

In addition to the shortcuts in the Gallery, you can find third-party shortcuts online. The r/shortcuts



Automation enables you to trigger shortcuts at specific times or when specific things happen.

subreddit on reddit.com is a particularly good place to find them, and for shortcut problem-solving too.

Some other tricks you can try

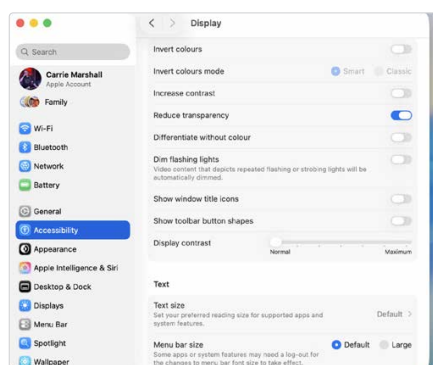
macOS Tahoe is full of helpers and time savers — here's a handy selection

There are lots of other useful tweaks that can help speed up your everyday tasks. One such tweak is to change file associations, which are the apps your Mac uses to open specific kinds of files. Let's say you want to open every PNG file in the Affinity app rather than the default app, which is Preview. To change that, select a PNG in Finder, press **Cmd+I**, and look for the section that says **Open With**. Use the menu there to select, say, Affinity (or any other photo app) and then click on **Change All** where it says 'Use this application to open all documents like this one'. Once that's done, double-clicking any PNG opens it in Affinity.

Supercharge Spotlight

Spotlight is more than just a clever search feature. You can use it to convert currency,

weights and distances; to search the clipboard; or to find apps or folders. It can recognise music, change the case of copied text and more. You can make Spotlight search more focused by excluding certain apps from its searches in **System Settings > Spotlight**.



Accessibility hosts useful features for adjusting your Mac's appearance, inputs and behaviour.

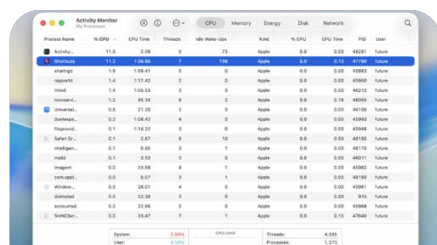
Explore Accessibility

You'll find some useful settings in **System Settings > Accessibility** too. Accessibility features enable you to make your Mac display easier to read, easier to navigate without a mouse or trackpad and can make Siri more patient with your voice commands, and it can also tame some visual excesses, such as animation.

You can combine that with the display customisation in **System Settings > Appearance**, which enables you to tone down Liquid Glass and adjust the colour and icons of the interface. Displays tab enables you to adjust the display scaling and text size, and to change the colour profile for your monitor.

Use Hot Corners

Hot Corners enables you to trigger certain features by moving your mouse or

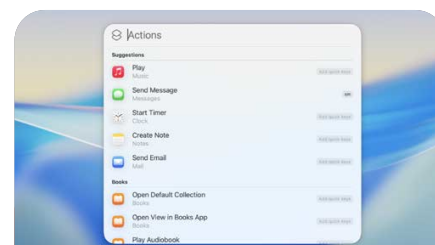
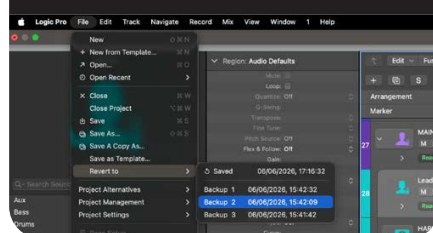


Manage errant apps

If you suspect that apps are running when they shouldn't be, or that they're demanding too much from your Mac when you're trying to do something else, you can identify the culprits with **Activity Monitor**, which lives in **Applications > Utilities**. It shows you what apps and processes — component parts of apps — are running, how much demand they're making on your CPU, memory and storage, how much energy they're using and more. To kill an unwanted app, double-click on it and select **Quit**; if that doesn't work, **Force Quit** by pressing **Opt+Cmd+Esc**.

Go back in time

One of our most-used macOS features is **Revert To**, which you can use to time travel and undo mistakes. In apps such as **Preview**, **Pages**, **Logic Pro** and many more, clicking **File > Revert To** enables you to see and select previously saved versions of the currently opened file, image, document or project. Once you've found the version you want, you can restore that version, duplicate it as a new document, or delete it. It's a great way to retrace your steps, for example, because you want an earlier draft of a document or an earlier mix of your music.



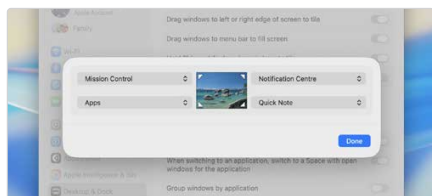
Make Spotlight smarter

Once you've called up **Spotlight** with **Cmd+[Space bar]** and typed what you want to find, use **Cmd+1, 2, 3** or **4** to search the **App Store**, **Files**, **Actions** or your **Clipboard history** respectively. The **Actions** option is particularly useful here because that gives you access to commands such as sending a **WhatsApp** message, adding a reminder or creating a note.

Third-party app developers can add their own features here too so, for example, your actions might include commands for the **Ulysses** writing app and the **Fantastical** calendar app.



trackpad cursor into the corners of your display. To choose what happens, go into System Settings > Desktop & Dock > Hot Corners. You can now assign features to corners: Quick Note is already set for the bottom right but other options include activating Mission Control, locking the screen, starting the screen saver, or displaying apps or notifications.



Quickly trigger certain actions on Mac by using System Settings > Desktop & Dock > Hot Corners.

Top 5 Mac optimisation apps

Over time, your Mac can get a little messy, especially if you like to try out new apps: many Macs are home to forgotten installations or debris from long-deleted apps. These cleaning apps can give your Mac a major tidy up.

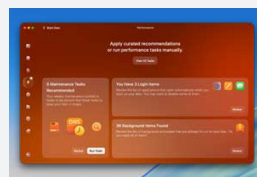


DaisyDisk

\$14.99 daisydiskapp.com



DaisyDisk is a storage manager that shows you what's taking up space on your internal drive. It's faster than macOS's own Manage Storage tool and works with external and cloud storage.

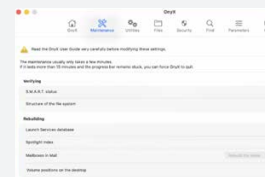


CleanMyMac

\$58.25 per year
macpaw.com



This beginner-friendly app puts a simple interface on top of a lot of system cleaning tools; while many are already in macOS, CleanMyMac makes the process more streamlined.

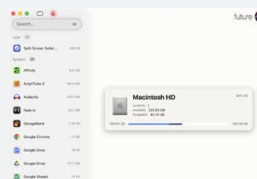


OnyX

Free/donation
titanium-software.fr



OnyX is a Swiss Army Knife for power users – configure various parts of your Mac, clear out unwanted caches, remove problematic folders, and more.

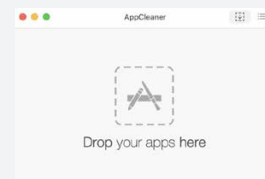


Pearcleaner

Free pearcleaner.com



This free, open-source app enables a very deep clean of your Mac, removing orphaned app components, turning off unwanted services, slimming down app bundles and even updating your installed apps.



AppCleaner

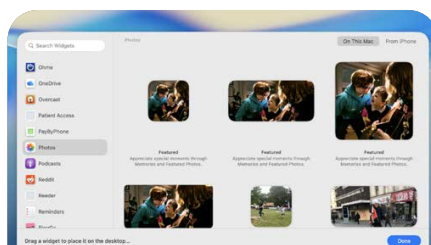
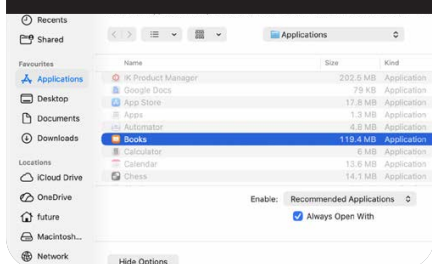
Free freemacsoft.net



If you want a reliable way to uninstall apps, AppCleaner is just the job; drag an app on to it and it'll remove the whole thing, not just the bit that lives in the Applications folder.

Change default apps

If you always want to open a particular file type in a specific app, Ctrl-click one of those files and then select **Open With**. Don't pick an app here; instead, select **Other**. Now navigate to the appropriate app, select it and make sure you check the **Always Open With** checkbox. This will change the default app for that file type, so for example you might make all WAV audio files open in the Audacity audio editor instead of the system default, which is the Music app. If the app you want to is greyed out, select **All Applications** instead.



Win with widgets

Widgets aren't just eye candy: you can use them to display information from many apps, including third-party ones. You can see your Calendar appointments, to-do lists and other key information without having to open those apps; the key information is right there on your desktop and it updates through the day. In some cases the widgets are also interactive so, for example, the Reminders widget can be used to tick off items in your to-do list, and you can configure a Fantastical calendar app widget to create a new event when you click on it.

Do more with the Dock

The Dock has secrets up its sleeve, such as its power to kill: if an app stops responding, you can Ctrl-click its Dock icon and select **Force Quit** (Opt+Cmd+Esc). Dragging a file over an app's Dock icon opens it in that app, and many apps' icons will reveal recently used files when you Ctrl-click. You can also add folders, which the Dock then treats as a stack. That means the folder works just like the Downloads folder; click on it to see what's there, click on a file to open it, or click **Open In Finder** to open that folder in the Finder.



What's happening on your home network?

Use free tools to spot rogue traffic and unauthorised devices. **Nik Rawlinson** shows you how.



Ten years ago, your home network might have consisted of little more than a router, a laptop and a few phones. Today we spend hours switching between multiple platforms around the clock, from connected TVs to tablets, games consoles and smart home appliances. Most of them – hopefully all of them – are secure and benign, but with more devices come greater opportunities for exploits, and malicious activity becomes harder to spot.

If you want to know what's going on, a good start is to monitor and audit what's accessing the network from your own PC. You can do this with a tool called GlassWire – just visit glasswire.com and click Free Download to download it, then run the installer and click through the setup wizard.

Once you've fired up GlassWire for the first time, you'll see that alerts start to appear every time a new application connects to the internet. These alerts aren't merely transient – they're logged, and the information they convey is used to populate the GlassWire interface. This builds into an at-a-glance overview of which apps are connecting, which hosts they're connecting to, what traffic they're using and where the servers they're talking to are located.

Keeping an eye on the Apps column will immediately expose what's accessing the network in the background. If you see something you don't recognise, just click on it to see the process name and where it's located on your hard disk.

The information pop-up also indicates whether the file has been verified as safe by VirusTotal ([virustotal.com](https://www.virustotal.com)) – if it hasn't then you might want to scan it with your own security software. GlassWire offers additional options to block internet access for selected processes, but these features require a GlassWire Premium subscription, which starts at \$2.99 per month – if you want to block something, you can do it for free using Windows' built-in firewall.

You might also see that applications are connecting to unexpected places. In the screenshot above right, we've clicked Germany in the Countries column, as we hadn't expected to see that appearing in the list of connected countries. This reveals that the connection was initiated by Syncthing, a tool we trust to synchronise data across our local network. If you see European locations like this appearing in the list it's usually nothing to worry about – just the content delivery

network (CDN) services used by major cloud platforms dynamically directing traffic around data centres in different regions. However, if you see more remote locations popping up for no obvious reason, that might call for further investigation.

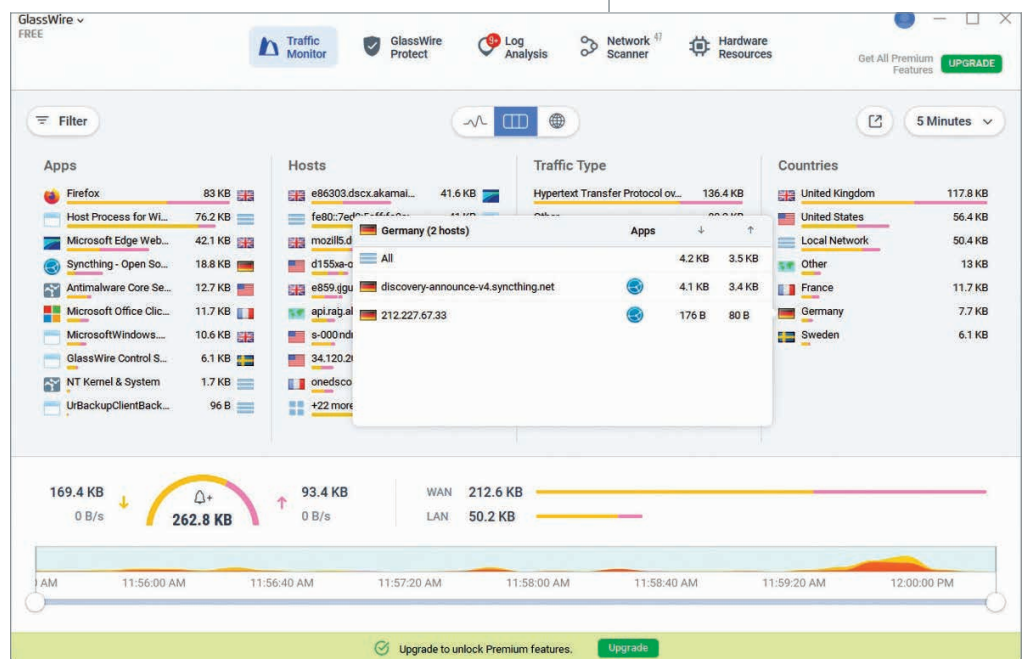
Apps, hosts, traffic and countries remain in the GlassWire list for the period specified in the lozenge in the upper right of the interface: the free edition of GlassWire lets you set this to a maximum of 24 hours, while using the Premium edition means you can extend the monitoring period to a week, a month or even for all time.

The monitoring period also applies to the graph of cumulative network traffic that scrolls across the bottom of the window. You can enlarge this by clicking the pulse icon on the three buttons at the top centre of the main window; this view shows when your PC was particularly busy on the network, and GlassWire adds big round "pins" to events such as a particular process

from, and whether family members' PCs are running any particularly data-heavy applications.

You can also use GlassWire to scan your network for unfamiliar devices. Just click Network Scanner on the top toolbar and you'll see a scrollable list of devices registered on the LAN; you can usually get a similar list from your router's management interface, but GlassWire is easier to access and may give you more detail about each device.

Unknown devices should be investigated as soon as possible so you can verify they're not a security risk, but don't panic if you see something you don't recognise – many harmless devices have network names that aren't immediately obvious. For example, the screenshot on this page shows a device with the mysterious name "eyq-762", describing itself solely as "Alertme.com Limited"; typing its IP address into a browser revealed that this was nothing more sinister than our smart thermostat. If your suspect device doesn't offer a web interface,



accessing the network for the first time. Naturally, there won't be much to see the first time you open the graph, but after you've left the tool running for a few hours you should see an informative view that's well populated with representative data.

Multiple clients and unfamiliar devices

GlassWire doesn't just give you insights into what's happening on a single PC. If you've installed the software on several computers, you can monitor them all from a central management console; this can help you spot where activity spikes are coming

ABOVE Clicking an entry on the traffic monitor table brings up further details.

search the web for its description or, failing that, a crude but effective diagnostic is to try blocking it at the router and see what stops working.

Checking for unusual traffic

While GlassWire can analyse activity from multiple PCs and other devices on the network, it's important to note that it only tracks connections, not the actual data that's being sent and received. This means it can't tell you exactly what information is being shared with whom. It can also only monitor the activity of devices it's installed on, so it won't pick up

potential issues such as a compromised IoT device or a badly programmed smart TV that's flooding the network with connection requests.

The good news is that you probably already have a device that can reveal a lot of this information: your router. Most models will automatically log all activity across your home network, including details of remote addresses, timestamps and the initiating device on your local network. It may also log the names of the services devices are connecting to, but this isn't always possible: if a device is using encrypted DNS, you'll just see connections to a DNS service such as Cloudflare.

However, if you were thinking you'd simply skim down the list and see if you can spot anything untoward, you may be in for a disappointment: router logs are very large, and even on a quiet network they can run to several thousand events per day. It's not realistic for you to examine what every device is doing and, even if you did, checking what each one was

usually do a good job of highlighting any unusual patterns or red flags: in our case it pointed out some external attack attempts, and recommended router settings to change to ensure they couldn't get through. If there's anything resembling a recognised threat, there's a good chance it will be picked up.

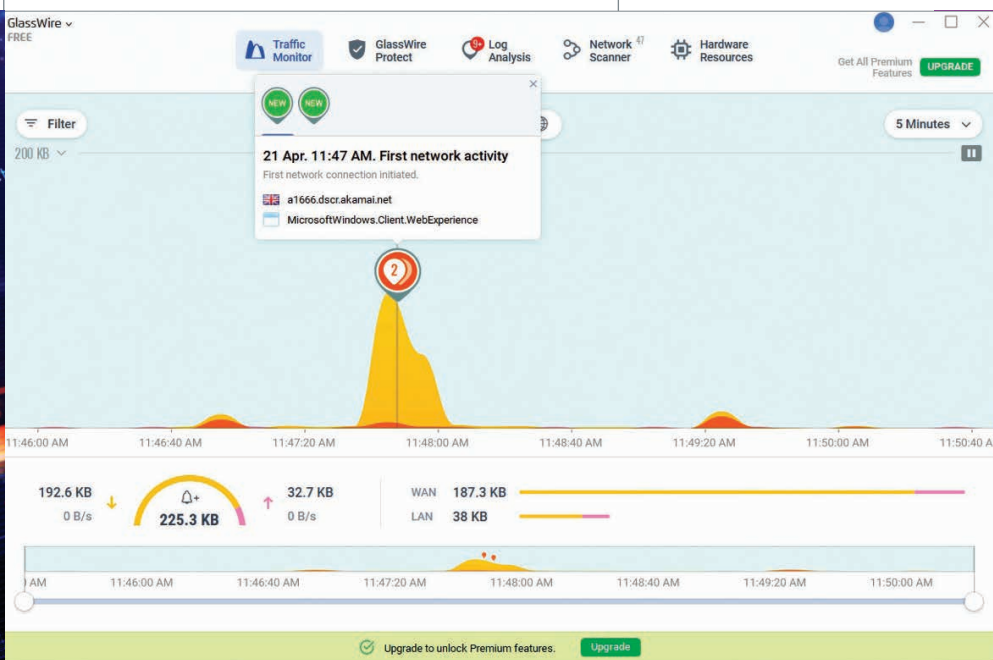
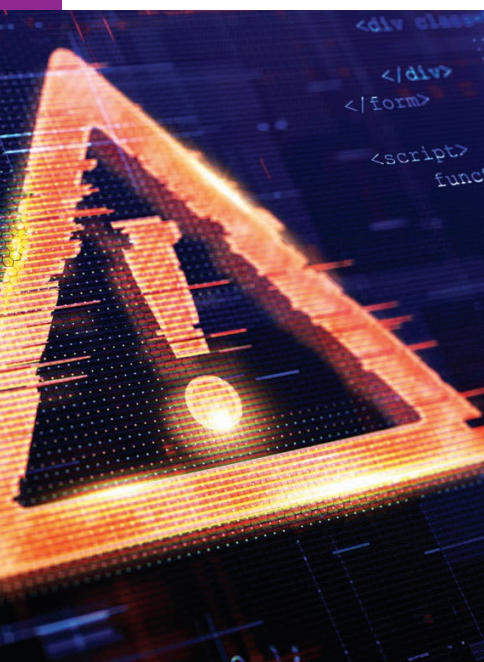
The great thing about using an AI assistant for this type of analysis is that you can ask follow-up questions, so if you have any concerns about network activity you can dig into them as deeply as you like, and get suggestions for

AI isn't flawless, but it can usually do a good job of highlighting any unusual patterns or red flags

reveal exactly which devices are connecting to what remote resources. Strictly speaking this won't catch applications that connect directly to a specific IP address, but in the modern world, where workloads and network addresses move around dynamically to follow demand, that's uncommon.

You can achieve this easily using a Raspberry Pi and free software such as Pi-hole or AdGuard Home, both of which are included in the DietPi software distribution (dietpi.com). These services get their DNS information from upstream providers such as Cloudflare or Google, so you'll still be able to access all the same sites; the only reason you might hit problems is if your Pi can't be reached for any reason – so make sure it's kept switched on, and configured with a static or reserved IP address on your local network.

As we've noted, via this server you'll be able to log all DNS lookups, and as the names of these services imply you can also block addresses that serve up unwanted content. You can browse and



connecting to at the other end would be a thankless and time-consuming task.

Businesses deal with this challenge using specialist software such as ManageEngine EventLog Analyzer and Graylog, which are designed to ingest massive log files and identify suspicious or anomalous activity. For personal purposes, though, you don't necessarily need high-end tools. Just upload your logs to an AI chatbot such as ChatGPT or Gemini – you don't normally need a paid account – and enter a prompt along the lines of "This is my home router log; is there anything here I need to worry about?" While the AI isn't flawless, it can

further investigations. Bear in mind, though, that sharing data with an AI service has privacy implications; you might run a find-and-replace on your logs before uploading them, to remove personal information such as your external IP address and local device names.

Logging via DNS

If your router doesn't record all the information you're interested in, another option is to set up a local DNS server and configure your router to use this as the default domain lookup service for your home network. The logs from this server will then

ABOVE You can see not only spikes in network traffic, but what caused them.

search lookup requests via an attractive dashboard that's far easier to navigate than a traditional text-based log file, and again you can feed these logs into an AI chatbot if you want to interrogate them more deeply.

Band steering and QoS

Even if your network is mercifully free of compromised devices, your investigations might reveal that something's generating a large volume of traffic as part of its regular operation; perhaps it's continually syncing data or backing up security footage to the cloud. While the purpose may be legitimate, it's still not ideal, as Wi-Fi is a shared

resource, and one device hogging the airwaves can cause latency and glitching for the rest.

Obviously your first resort is to see whether you can configure the device to exchange less data, or to operate at quiet times. Failing that, you can move it off your primary wireless network so it doesn't interfere with your everyday activities. This doesn't mean switching it onto the guest network, as this usually shares the same radio channel and the same physical transceiver inside the router. A better bet is to move the troublesome device onto the legacy 2.4GHz band. This is normally only used by devices such as smart plugs and printers, which don't need a fast connection and won't be noticeably affected by a spot of network congestion.

If you have your router set up to broadcast separate network names for different bands then you can directly configure the offending device to connect to the 2.4GHz network. If the router only provides a combined

Detailed monitoring with SNMP

The Simple Network Management Protocol (SNMP) is a widely supported standard for reporting and logging network events. Although not usually found on consumer equipment, it's supported by many business routers, network cameras, internet-connected phones, printers and so on. In use, SNMP-enabled devices log events and make them available to a central server, which can import and collate the information to generate activity reports and alerts.

If you want to manage your home network like a professional, you can choose "prosumer" gear that supports SNMP, such as DrayTek routers. Mainstream tools such as Zabbix (zabbix.com) and PRTG (paessler.com/prtg) are free for home use, and can give you more information than the methods we've discussed in this feature, for a clearer view of what's happening under normal conditions and when a device is behaving in an unexpected manner.

And SNMP isn't only useful for network monitoring: it can be used to collect all sorts of information about supporting devices, such as internal temperature or uptime. Like GlassWire, though, it doesn't directly record the contents of packets as they pass over your network – all of these measures are best approached as tools that can indicate when more investigation might be needed, rather than one-stop solutions.

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GlassWire FREE

Traffic Monitor GlassWire Protect Log Analysis Network Scanner Hardware Resources

Get All Premium Features **UPGRADE**

Realtek PCIe GbE Family Control... Scan Scanned 28 minutes ago Search Auto-scan

Type	Name	Description	IP	Last Seen	First Seen
Generic		TP-LINK TECHNOLOGIES CO.,LTD.	192.168.0.99	21 Apr, 2026, 11:14 AM	21 Apr, 2026, 11:14 AM
Generic	eyq-762	Alertme.com Limited	192.168.0.106	21 Apr, 2026, 11:14 AM	21 Apr, 2026, 11:14 AM
Generic			192.168.0.114	21 Apr, 2026, 11:14 AM	21 Apr, 2026, 11:14 AM
Generic		Arcadyan Corporation	192.168.0.118	21 Apr, 2026, 11:14 AM	21 Apr, 2026, 11:14 AM
Generic	devolo-464		192.168.0.129	21 Apr, 2026, 11:14 AM	21 Apr, 2026, 11:14 AM
Generic		Arcadyan Corporation	192.168.0.130	21 Apr, 2026, 11:14 AM	21 Apr, 2026, 11:14 AM
Generic			192.168.0.137	21 Apr, 2026, 11:14 AM	21 Apr, 2026, 11:14 AM
Generic	HPE4E7498F3BB3	Hewlett Packard	192.168.0.145	21 Apr, 2026, 11:14 AM	21 Apr, 2026, 11:14 AM

Are you an IT professional? Go to Domotz for a full feature network monitoring solution **Try it out**

network name, there's often a setting in the management interface that you can use to "steer" a specific device onto a particular band.

This should prevent direct interference with devices using the 5GHz or 6GHz radio bands, but if the talkative client is continually spamming your internet connection then it could still be affecting broadband performance for other devices. If you can't block it altogether, you may be able to use Quality of Service (QoS) settings to mark its traffic as low priority. This is a router feature, however, and isn't always built into the models that are supplied by

ISPs; you might need to investigate a third-party router, such as a model by Asus or Netgear with configurable QoS settings.

Learn what normal looks like

Although network threats are real, it's unlikely that a routine check-up will find anything untoward. That's important to bear in mind when you spot something unexpected, such as a device that seems to be transmitting large quantities of data to an unknown destination in the dead of night – most likely it's a legitimate process such as a backup system, perhaps

ABOVE A scanner module lists devices attached to your home network.

communicating with a remote data centre as in the case of our experience with Syncthing.

Once you've got a sense of what's normal, however, it's well worth keeping an eye on tools such as GlassWire, Pi-hole and AdGuard Home, to periodically review the state and operation of your network. In that way you'll be prepared to recognise if anything suddenly changes in a way that really might indicate trouble – and you'll be in a good position to identify a compromised or misbehaving device, and deal with it before it becomes a more significant problem. ■



The A-List

The best products on the market, as picked by our editors.

Premium laptops

Microsoft Surface Laptop (8th edition)

Nearly perfect.

The Microsoft Surface Laptop is genuinely the best premium Windows notebook going, with a solid design, great display, fast performance and excellent battery life. It also nails the basics with a great keyboard, quiet thermals and a slim build.

PRICE From \$2,799 **WEB** microsoft.com



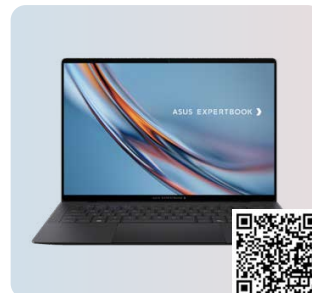
Business laptops

Asus ExpertBook Ultra

The best executive laptop.

Asus takes full advantage of the Intel's Core Ultra Series 3 to deliver the finest executive laptop we've tested: weighing under 1kg, it still packs a glorious 14in tandem OLED screen, over 16 hours of battery of life and all the power you need.

PRICE From \$2,495 **WEB** asus.com



THE ALTERNATIVES

DELL PRO MAX 16 PLUS

A high-end business laptop with performance that is hard to match. Expensive, but with high-end performance in a portable form factor, plus an LLM-friendly option.

\$12,335, dell.com

APPLE MACBOOK AIR M5

If you want a premium laptop that isn't desk-bound, its all-round performance and 15-hour battery life make this a great choice.

From \$2,099 apple.com/au

APPLE MACBOOK PRO M5

No radical updates to the design this year, but this M5 update delivers yet more power to accompany the already excellent battery life.

\$3,199, apple.com/au

THE ALTERNATIVES

DELL PRO 13 PREMIUM

Dell's business laptop series has a new name, but its commitment to build quality and astonishing levels of configuration remain the same.

From \$2,999 dell.com/en-au

ASUS ZENBOOK S 16

The Asus Zenbook S 16 offers premium performance in the ultraportable category and competes well with alternatives such as the Surface Laptop 7 or Macbook Pro.

\$3,499, asus.com.au

LENOVO THINKPAD X1 CARBON GEN 13

A beautiful executive laptop, with true all-day battery life. At 1kg and with the latest components, it's worth the price.

From \$2,999, lenovo.com/au

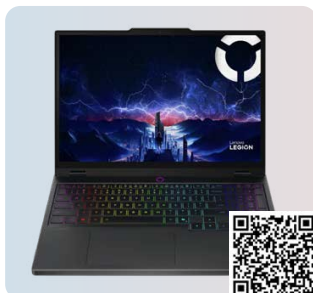
Gaming laptops

Lenovo Legion 9i Gen 10

All out power and exceptional build quality.

Lenovo knows exactly how to squeeze out every last ounce of power from its components, and even though that comes at the expense of bulk and weight (3.5kg) the sheer quality, expandability and glory of the 18in 4K+ panel make it worth the money.

PRICE \$6,899 **WEB** lenovo.com



THE ALTERNATIVES

ALIENWARE 16X AURORA

A superb choice if you want portability and power in a slick looking package. Compared to big-name rivals, it's good value too.

From \$3,199 dell.com

ACER NITRO V 15 (INTEL)

A capable 1080p gaming machine with a surprisingly vibrant display to boot. Aspects bespeak its budget pricing, but it's an admirable effort.

\$998 store.acer.com

ASUS ROG ZEPHYRUS G14 (2025)

AMD's Ryzen AI 9 HX 370 CPU combined with the RTX 5070 GPU in this slimline chassis complete with 14in OLED panel.

\$4,299, asus.com

Everyday laptops

MSI Modern 14 F13MG

An affordable workhorse without the bells and whistles.

Not only is the MSI Modern 14 F13MG a proper budget workhorse, it's unusually well specced out of the box, with 16GB RAM and a 512GB SSD. It also doesn't skimp on ports (USB-C PD, HDMI, Ethernet, microSD) and keeps

upgradeable memory – quite a feat considering the affordable price.

PRICE From \$999 **WEB** msi.com



THE ALTERNATIVES

APPLE MACBOOK NEO

Its omissions may frustrate some APC buyers, but this is a great choice for undemanding users looking for a well-made, highly portable laptop.

\$1,049, apple.com/au

MICROSOFT SURFACE PRO (X ELITE)

The versatile top of the line Surface Pro 2-in-1 sports the 12 core Snapdragon X Elite. Its OLED screen is stunning.

From \$2,699 microsoft.com

DELL 14 PLUS

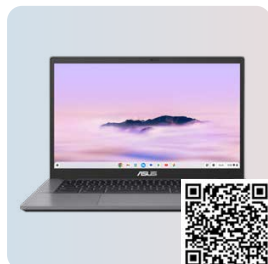
Possibly the best value of any Windows laptop in its price range right now. It's not perfect, but offers great productivity and performance.

From \$1,698 dell.com/en-au

Chromebooks

Asus Chromebook Plus CX34

A sleek and relatively affordable ChromeOS workhorse, the Asus Chromebook Plus CX34 delivers strong performance and features at a competitive price when on sale, and is ideal for budget-conscious users. **\$699, [asus.com](https://www.asus.com)**



Lenovo Flex 3i Chromebook

This isn't the most powerful Chromebook, but students need reliability more than power – especially if they're only really using it for homework, note-taking, and perhaps the occasional bit of Netflix. **\$367, [lenovo.com/au](https://www.lenovo.com/au)**

Lenovo IdeaPad Duet

The Chromebook answer to Microsoft's Surface tablets, this is a seriously versatile device – albeit not the speediest (although we never found it to be painfully slow while carrying out everyday tasks). For this price, and with a 16hrs 14mins battery life, the Duet is a great choice. **\$297, [lenovo.com/au](https://www.lenovo.com/au)**

Tablets

Apple iPad Pro (M5)

While the iPad Air remains a great alternative, there's no arguing with the quality and all-out power provided by Apple's top-end tablet. And the tandem OLED panel is simply the icing on the cake.

From \$1,999, [apple.com/au](https://www.apple.com/au)



NEW

Apple iPad Air (M4)

This processor update over the M3 version we have long recommended comes with a decently competitive price, too. If you want the larger 13-inch model it's currently going for \$1,599. It's powerful, beautifully designed and made.

From \$1,249, [apple.com/au](https://www.apple.com/au)

Samsung Galaxy Tab S9 Ultra

This 14.5in tablet offers a size and versatility that even the iPad Pro can't match, with its high price more than justified by the quality of Samsung's AMOLED panel, speakers and productivity software.

\$1,999, [samsung.com](https://www.samsung.com)

Everyday & gaming monitors

Gigabyte MO32U24

It's not perfect, but it's got it where it matters and, at its price it's cheaper and better value than the competition. As such, this super-premium gaming monitor is both a great all-rounder and an absolute winner.

\$1,199, [gigabyte.com](https://www.gigabyte.com)



Asus ROG Swift OLED PG27AQWP-W

With twin OLED panels, this raises the bar for speed, brightness and longevity... albeit at the expense of text clarity, making this one unsuitable for productivity, but unbelievably good for gaming. **\$1,999, [rog.asus.com](https://www.rog.asus.com)**

LG UltraGear 45GX950A

This doesn't settle for anything less than being the best. Operating an enormous 5K/2K resolution with a 165Hz/330Hz refresh rate, the UltraGear satisfies the needs of competitive and cinematic gamers alike – at a fairly high cost.

\$2,249, [lg.com](https://www.lg.com)

Professional monitors

Asus ProArt Display 6K PA32QC

Asus' 6K professional display aims to deliver uncompromising performance to creative workers. Image and video editing is a joy thanks to all the screen real-estate and it's generally brilliant to interact with.

\$2,499, [asus.com](https://www.asus.com)



Dell UltraSharp 52 Thunderbolt

Designed to replace a multi-monitor setup, this gently curved 52in screen delivers for image quality and resolution: you have 6,144 x 2,560 pixels and five inputs to play with, including Thunderbolt 4.

\$3,899, [dell.com](https://www.dell.com)

BenQ MA270S

Alternative Apple monitors frequently have issues, but BenQ's significantly cheaper MA270S has no limitations. It's almost \$1,000 cheaper than Apple's cheapest, no-options alternative and yet it's just as good, if not better. We heartily recommend it.

\$1,699, [benq.com](https://www.benq.com)

Home office printers

Epson EcoTank ET-4950

Shipping with 5,500 pages' worth of colour ink and 15,100 of black, this is economical to run even factoring in the price of the printer. At 16ppm for high-quality prints, and a 30-sheet ADF, it's a gem.

\$890, [epson.com.au](https://www.epson.com.au)



Brother DCP-T780DW

If the Epson is too expensive, consider Brother's first attempt at a refillable inkjet. It's keenly priced and includes a 20-sheet ADF, easy-to-use screen and its print and scan quality are strong.

\$469, [brother.com.au](https://www.brother.com.au)

Canon i-Sensys LBP243dw

Everything you could want from a mono laser printer – although note that it doesn't come with a scanner – the LBP243dw produces excellent results at speed. You also get Wi-Fi and wired networking.

\$466, [canon.com.au](https://www.canon.com.au)



Routers

Asus RT-BE92U

A premium, consumer-grade Wi-Fi 7 that doesn't cost the Earth. The Asus RT-BE92U doesn't put a foot wrong. It's fast, feature-packed and it even looks good too. At \$424 it's also excellent value and is our new Editor's Choice.

\$424, rog.asus.com/au



Netgear Nighthawk RS100

Don't be put off by the low price – the RS100 gives you a very viable Wi-Fi 7 service, without making you pay for high-end features and performance you don't really need.

\$199, netgear.com/au

TP-Link Archer BE550

This is a brilliant mid-range choice thanks to a 6GHz radio and five 2.5GbE ports – you'll enjoy superb wired and wireless performance, and it even comes with a wide set of features. It's priced well and looks fabulous

\$398, tp-link.com

Mesh Wi-fi

TP-Link Deco BE68 BE14000

Balancing performance and price almost perfectly, TP-Link's Deco BE68 is a supremely capable and very fast home mesh system. The stylish look, ease of use and huge coverage area make it ideal for anyone wanting effortless Wi-Fi everywhere.

\$825 (2-pack), tp-link.com



TP-Link Deco X20

The Deco X20 makes it possible to upgrade your home network to Wi-Fi 6 for the price of some standalone routers. The HomeCare functions are also a great bonus for households where lots of devices are fighting over the bandwidth. **\$227 (2-pack)**, tp-link.com

MSI Roamii BE Pro

Ultimately, all the important bases are covered in terms of features and while we're disappointed by the performance drop-off, the two-node kit costs a fraction of many rivals. As such it's a great-value buy and we're happy to recommend it.

\$499 (2-pack), au.msi.com

NAS servers

Synology BeeStation Plus

The BeeStation Plus is an easy-to-use cloud storage solution that has zero subscription cost, gives you control of your 8TB of storage, and allows for advanced integrations and control over where your data is and how it is accessed.

\$748, synology.com



Asustor Nimbustor 4 Gen2 AS5404T

A particularly strong choice as a media server, the updated Nimbustor 4 is both flexible and quick. Asustor's Nimbustor 4 AS5404T is a four-drive NAS enclosure aimed at demanding home users or small offices.

\$1,099, asustor.com

Qnap TS-264

The Qnap TS-264 is aimed at those who want a bit more from a traditional two-bay NAS. It's effectively the two-bay version of the excellent four-bay TS-464, and provides strong speeds over its pair of 2.5GbE ports – and includes two M.2 NVMe slots.

\$729, qnap.com

Security software

Avast Ultimate

Buy from retail and this is a bargain, with a solid VPN, anti-tracking software and handy detection fees on top of excellent protection.

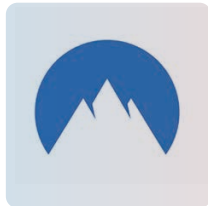
~\$65, 1 device, avast.com/en-au



NordVPN

NordVPN provides consistent and fast speeds, serious security, great support for video-streaming services and some cost-effective subscription rates.

\$59 per year, nordvpn.com



Bitwarden

Bitwarden has a huge advantage: it's free. It isn't as slick as some paid-for rivals, but it can sync passwords across all devices for no extra charge. **Free**, bitwarden.com



THE ALTERNATIVES

NORTON 360 DELUXE

A standout choice not only for malware detection but also extra features and value for money. It packs plenty of useful features at low prices.

3 devices, \$89.95, au.norton.com

AVIRA PRIME

Performed well in recent tests and will certainly protect you against the vast majority of malware found in the wild, though the free version will cover many users' needs. **5 devices, \$80.95**, avira.com

THE ALTERNATIVES

PROTONVPN

ProtonVPN provided one of the best free offerings of all the VPNs in our group test, including unlimited data, but upgrade to benefit from even faster speeds and many more options.

Free, protonvpn.com

SURFSHARK

A strong rival to NordVPN, especially if you're willing to commit to its two-year contract. It's fast, cheap and a fine choice for people who like to switch to US streaming services.

\$79.61 for one year, surfshark.com

THE ALTERNATIVES

DASHLANE

A manager that's ideal for beginners, and it even builds in an unlimited (if basic) VPN service. Note you may prefer to buy the Family plan (\$60 per year) as this extends the service to six people.

\$55.99 per year (Premium), dashlane.com

1PASSWORD

1Password is targeted at users who are looking for the last word in security. It even offers a Travel Mode that may ease your mind if surrendering your phone to customs officials.

\$54.99 per year (individual), 1password.com

Market Watch

Mark Williams spotlights representative PCs in the market today.

PRICE \$1,349 **WEB** tinyurl.com/APC561umart

UMART - G5 59741

Using the venerable AM4 platform for budget builds is always a good choice these days; it's cheap and offers a somewhat viable upgrade path should you wish to use it in future. The six-core Ryzen 5500 will suffice in most tasks. The RTX 3050, while quite weak, is still far superior to what's offered in the IT Warehouse system for the same price. A little bit more VRAM and access to the all-important DLSS feature set mean this has more legs in the long run.

With a beefier PSU and snazzy case, this is the one to pick between the two options.



SPECS CPU AMD Ryzen 5 5500; Cooler OEM; Motherboard B550M based mATX; Graphics GeForce RTX 3050 6GB; Memory 16GB 3200MHz DDR4; Storage 1TB PCIe Gen4 NVMe SSD; Power Supply 650W; Case AZZA Spectra.

PRICE \$4,199 **WEB** tinyurl.com/APC561bpc

BPCTECH - KRAKEN POWER SPACIUM

This is about as high-end a gaming rig as you can get without setting your wallet on fire. The top-tier X3D CPU paired with the RTX 5080 is a beastly machine to behold. With an extra 15% grunt over the RTX 5070 Ti found in the Aftershock system, this build decidedly has the edge for performance.

It comes at the cost of only having 16GB of system RAM on tap, though, so closing background tasks in heavy games might be required to give your games headroom. A 1TB SSD is also a little constraining, but acceptable given the



performance-to-price ratio on offer thanks to the other components.

Overall it's a solid option for 4K gaming, particularly high-FPS chasers.

SPECS CPU AMD Ryzen 7 9800X3D; Cooler MSI MAG Coreliquid A13 360 AIO; Motherboard MSI MAG X870E Tomahawk MAX Wifi; Graphics MSI GeForce RTX 5080 16G Ventus 3x OC Plus; Memory 16GB Kingston Fury Beast 6000MHz DDR5; Storage 1TB MSI Spatium M461; Power Supply MSI MAG A850GL 850W; Case MSI MAG Pano 100R PZ.

PRICE \$1,359 **WEB** tinyurl.com/APC561warehouse

IT WAREHOUSE & THERMALTAKE GENESIS V4

Going a similar route to the Umart system, this also turns to AM4 and the Ryzen 5500 to provide a low starting price. The RAM also takes the same tried-and-true 3200 MT/s route. From there it goes quite off the rails.

A third-party CPU cooler is included, which is wholly unnecessary since AMD provides one with the CPU; this consumes budget elsewhere in the build. The PSU takes a knock down to 550W as a result, and the GPU is a very dated GTX 1650 with just 4GB of VRAM. It'll run lighter games but don't expect miracles. A compromised system to look past.



SPECS CPU AMD Ryzen 5 5500; Cooler ThermalTake UX200 SE ARGB; Motherboard B550M based; Graphics Nvidia GeForce GTX 1650 4GB; Memory 16GB DDR4 3200 MT/s; Storage 1TB SSD; Power Supply 550W; Case ThermalTake Genesis V4.

PRICE \$4,195 **WEB** tinyurl.com/APC561shock

AFTERSHOCK PC - EMBERHAL

Offering ballpark similar performance to the BPCTech system on the left, this build uses next-step-down CPU and GPU options to fit the custom dragon stained-glass window case design within the budget. Fancy cases like this is a Aftershock hallmark, though they also offer plain cases.

It does have a couple of tricks up its sleeve compared to the other system, though: it has double the RAM capacity (no small feat in today's market) and double the SSD capacity, too. Given memory and SSD prices of late, these are likely the main reason for the



less-performant parts in exchange for extra capacity.

With performance in the order of 15-20% less, it's not a bad trade, especially when it looks this good.

SPECS CPU AMD Ryzen 7 7800X3D; Cooler Aftershock IDC Glacier Mirror 360mm; Motherboard Gigabyte B850 Eagle Ice; Graphics Gigabyte RTX 5070Ti Windforce OC 16GB; Memory 32GB Corsair Vengeance RGB 6000MHz; Storage 2TB Team MP44Q SSD; Power Supply Inwin P85FII 850W; Case NZXT H6 Flow (Mesh).

YOUR NEXT PC

BLUEPRINTS

Build the best PC for your budget

ADVANCED

MID-RANGE

BUDGET

KEY

Budget build

Pick these parts if you want to build a new, well-rounded PC for a good price.

Mid-range build

For productivity power and running every new game at 1080p 60fps. This recommended build will see you through.

Advanced build

You're looking for the best PC on the market and superior components. But you still want to spend smart.

BUDGET BUILD

Enjoy 1080p gaming and most tasks without breaking the bank.



TOTAL
\$2,479

MOTHERBOARD		TUF Gaming B650 Plus WiFi Asus \$269 This board doesn't skimp on features, which means it's the perfect starting point for an AM5 rig, with room to upgrade.
PROCESSOR		Ryzen 5 7600X AMD \$309 It's a hot runner, but this budget AMD chip provides six cores of genuine gaming grunt for a very reasonable sum.
GRAPHICS CARD		Radeon RX 9060 XT 8GB AMD \$549 AMD delivers what we need for a 1080p gaming PC at a solid price, at least until even more budget GPU competition arrives.
COOLER		Peerless Assassin 120 SE Thermalright \$49 One of the best performing air coolers we've ever tested. It runs whisper silent and is remarkably good value.
MEMORY		Fury Beast 16 GB (2x 8GB) 6000MHz Kingston \$389 Our market barometer RAM kit is now up by \$40-\$50 in most stores, which is a minor adjustment in this chaotic time.
POWER SUPPLY		Pure Power 13 750W Be Quiet! \$149 This 750W power supply gives you a decent dose of headroom for some future upgrades, from a trusted manufacturer.
SSD		SN7100 1TB Western Digital \$299 Our reference SSD during this RAMpocalyptic time hasn't changed since last month. Hooray? Some shops have this for \$100 more so look around.
CASE		S100 TG Thermaltake \$59 This compact mATX case can hold a surprising amount of powerful PC hardware, and represents great value.
DISPLAY		Gaming 27G4E AOC \$219 AOC make some surprisingly cheap and well-specced little gaming monitors, like this 27in 180Hz 1080p display.
KEYBOARD		C3 Pro Wired Keychron \$69 It's actually mind blowing what you can pick up for this little cash: a USB mechanical board that looks lovely.
MOUSE		G305 Lightspeed Logitech \$45 Even on a budget you can still grab a fantastic, ultra-rapid wireless squeaker like this one here.
HEADSET		HS55 Stereo Corsair \$55 Corsair's budget wired cans are comfy and have a surprisingly excellent microphone for the money.
MOUSE PAD		MM100 Corsair \$19 A simple black rectangle that can make a world of difference over no-name models, and it's almost as cheap, too.

MID-RANGE BUILD

Our recommended build
for solid productivity and playing
the latest games.

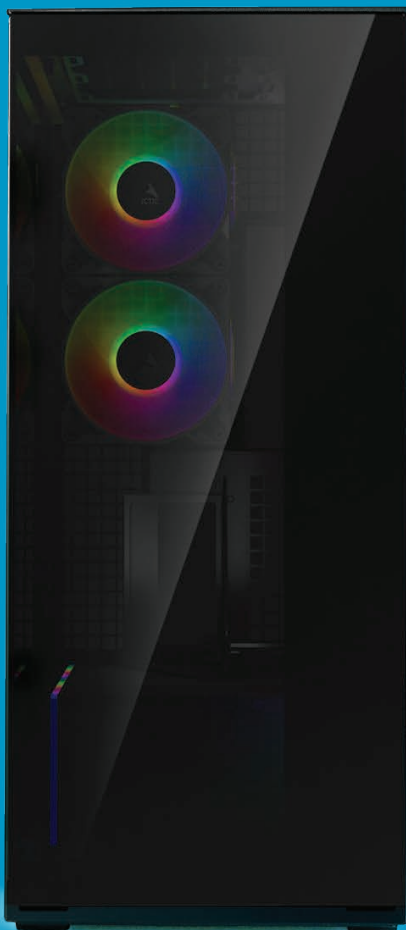


TOTAL
\$3,912

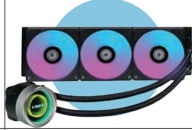
MOTHERBOARD		TUF Gaming B650-E Asus \$245 A reliable motherboard with plenty of frills, including Wi-Fi 6E, 2.5Gb Ethernet, PCIe 5.0 for the SSD and USB-C on the back.
PROCESSOR		Ryzen 7 7700X AMD \$499 For the longevity offered by the AM5 socket, we're going for AMD's excellent eight-core Ryzen 7.
GRAPHICS CARD		RTX 5070 Nvidia \$999 The RTX 5070's DLSS support tips the odds over the AMD competition. Its price has been holding steady recently, which is nice.
COOLER		Peerless Assassin 120 SE Thermalright \$49 More than good enough for both budget and mid-range builds, this chunky air cooler is undeniably impressive.
MEMORY		Vengeance RGB DDR5 (2x 16GB) Corsair \$599 No price change from the last issue of APC. This RAM kit has proven to be a fairly stable product in terms of pricing.
POWER SUPPLY		Pure Power 13 M 750W Be Quiet! \$149 This larger Be Quiet! PSU offers a stable platform with PCIe 5.0 connectivity. At 750W, there's room for a GPU upgrade too.
SSD		SN7100 2TB WD \$499 No change since last issue, for this representative SSD we're sticking with as we follow the market. It's competitively priced, too, and a good buy.
CASE		Frame 400D Corsair \$129 As spacious as they come and with a clever rail system at its heart, the 4000D is as impressive as it is imposing.
DISPLAY		MPG 275CQRXF MSI \$419 The price of this MSI, considering the 1440p resolution, curve and 240Hz refresh rate, is quite something.
KEYBOARD		K855 Wireless TKL Logitech \$99 You could spend more for a full-size keyboard, but this mechanical Logitech will certainly suffice for most people.
MOUSE		DeathAdder V2 X Hyperspeed Razer \$59 The regular V2 is great if you can find one, but this version delivers impeccable gaming performance for less.
HEADSET		Cloud Alpha HyperX \$140 We're still not over the awesome audio quality and excellent comfort of the HyperX Cloud Alpha.
MOUSE PAD		G440 Logitech \$27 This low-friction hard-top mouse pad with minimal branding offers the smoothest of glides for a reasonable price.

ADVANCED BUILD

Go above and beyond with a PC powerful enough to tackle anything.



TOTAL
\$8,295

MOTHERBOARD		MAG X870E Tomahawk MSI \$569 With support for four M.2 drives, huge amounts of DDR5, Wi-Fi 7 and more, this mega mobo is specced to the hilt.
PROCESSOR		Ryzen 7 9800X3D AMD \$659 The top-tier Zen 5 X3D models will have more cores, but for gaming and most uses this is the bee's knees.
GRAPHICS CARD		GeForce RTX 5080 Nvidia \$1,899 There's a lot of variability with the 5080, with pricing ranging from \$1,800 to \$2,600, depending on the OC level and brand.
COOLER		Galahad II Trinity 360 Lian Li \$210 Lian Li's Galahad is all about pure liquid cooling performance and it delivers this flawlessly.
MEMORY		Vengeance RGB DDR5 (2x 16GB) Corsair \$569 A price drop of \$40-\$50 since last month is welcome, but doesn't indicate a trend just yet. It's still <i>relatively</i> cheap...
POWER SUPPLY		Dark Power 14 1200W Be Quiet! \$469 The Seasonic we had here previously is now scarce, and expensive. So we've switched to this Be Quiet! 1200W unit which is priced very well.
BOOT DRIVE		NM790 4TB Lexar \$700 The price for this SSD went up another \$100 or so since last month. Pricing for large capacity SSDs has been less stable than for smaller drives.
MOUSE PAD		MM Pro Control Corsair \$49 Luxurious smoothness in the guise of being 'esports tuned'. All that matters though is it feels lovely to glide your mouse across.
CASE		Xtender Arctic \$175 With tinted glass, plenty of fans, and all the trimmings, this sizeable case is worthy of any self-respecting mega build.
DISPLAY		ROG Swift OLED PG32UCDM Asus \$1,999 You could be much more sensible on your screen than this. For this build, however, we only want the best.
KEYBOARD		Vanguard Pro 96 Corsair \$199 An outstanding typing experience, and packed with features that would make even the most exacting gamer happy.
MOUSE		X2 Superstrike Logitech \$299 Instead of physical switches this uses a haptic inductive trigger, which allows for incredible customisation of the feel. It's amazing!
HEADSET		Asus ROG Kithara \$499 An engineering collab with planar wizards Hifiman results in an astonishingly good set of cans that will make your games and music shine.

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MAC
Discover secrets of the Finder

100

PHONE & TABLET

Share your live location in Google Messages

102

EMAIL
Stop your emails spying on you

Back up for free without any catches

Nik Rawlinson shows how to back up securely and without cost or fuss.

IT WILL TAKE

One hour (plus time for backups)

YOU'LL NEED

Kopia; spare drive or cloud storage



HOW DO I BACK UP MY COMPUTER

I use several different backup tools across my computers. On my three main machines, I back up to a remote drive on my network, and on two of them I also back up to the cloud using a paid-for backup service. Adding something like Kopia would be a quick and easy way to satisfy the requirements of a third complete copy of my data.
Nik Rawlinson

Backing up your computer might not seem like fun, but it's one of the most important jobs you can do. That's because your data is infinitely more valuable than the computer itself.

Think about it: if your computer is stolen, you can buy or borrow another, even if it's second-hand. But if you lose your financial records you might not be able to complete your tax return. If you lose your e-tickets you might not be able to go on holiday. And if you lose a lifetime's worth of photos, you'll be heartbroken.

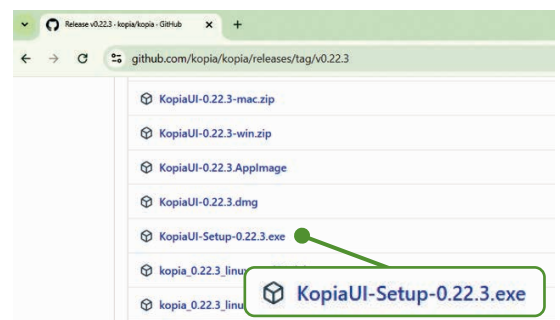
Some things just can't be replaced, which is why you need to make sure you have at least one duplicate of everything that matters, somewhere very safe.

So, what's the best way to establish a backup routine without spending a lot of money on hardware, subscriptions and cloud storage? We've tried many options over the years, but one that's recently come to our attention is Kopia. It's not only completely free with no catches, but also open-source, which means anyone can read through its code to see exactly what it's doing when it encrypts and duplicates your files. In doing so, they can verify that it really does do what it claims.

Naturally, few of us are in a position to examine code line by line, but the fact that this is possible increases our faith in a product. Open-source software is more transparent, and the higher likelihood of someone spotting a vulnerability means it should be fixed in no time.

1 INSTALL KOPIA

There are two versions of Kopia: Kopia CLI and KopiaUI. CLI and UI stand for Command Line Interface and User Interface, and although they each use the same core code for backing up your data, the CLI version has some features not yet added to the UI version, like scripting.



At the time of the writing the most recent version of Kopia was KopiaUI-Setup-0.22.3.exe.

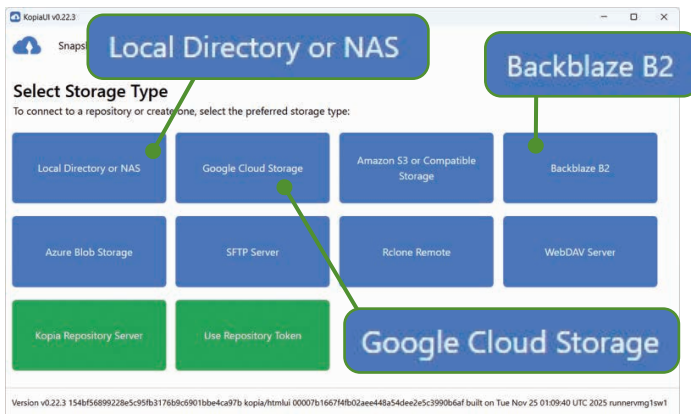
However, all the features you need for regular backup are included in the UI edition, and it looks more like a typical program, so that's what we'll explain here. Visit tinyurl.com/APC561kopia, then scroll down to the first Assets section on the page, and click the download link for 'KopiaUI-Setup-x.xx.x.exe' (where x.xx.x will be a version number). At the time of writing, the actual filename is 'KopiaUI-Setup-0.22.3.exe' (see screenshot), but if a more recent version has been released by the time you read this, download that instead.

Once downloaded, launch the EXE file from your Downloads folder and Kopia will ask who you want to install it for. Leave 'Only for me' selected then click Install. When it's finished, the box beside Run KopiaUI will be ticked. Again, leave this as it is and click Finish.

2 TELL KOPIA WHERE TO SAVE FILES

Kopia needs to know where it should store any files it backs up. As you can see from our screenshot above, it's a very flexible program that can store data on local drives, network drives and online-storage services. Several of the cloud services, like Backblaze, Azure or Amazon S3, will only be

"So, what's the best way to establish a backup routine without spending a lot of money on hardware, subscriptions and cloud storage? We've tried many options over the years, but one that's recently come to our attention is Kopia."



Kopia can back up to a wide range of storage options.

available if you have an account with the relevant cloud service provider. Others, like 'Local Directory or NAS', and WebDAV Server, can be hosted on your own network, in which case they'll be accessible without an additional fee.

We always recommend the 3-2-1 rule of backing up, which is that you make three complete copies of your data on at least two different media, at least one of which should be off-site (ie, not in your home). We'd therefore recommend running Kopia alongside an online backup service as that way you'll satisfy most of the requirements of the rule, having two complete backups of your data on two media (attached drive and cloud) – at least one of which is remote. You'd only need to create one further copy, perhaps by manually dragging files to another external drive.

Attach an external hard drive to your computer then click 'Local Directory or NAS' in the Kopia window. Now click the folder on the right of the box labelled 'enter directory path where you want to store repository files' (1 in our screenshot below) and navigate to the drive you just connected (2). Click 'Select Folder' (3) to confirm.

Click 'Next' and create a password to secure your backup. You'll need to enter this twice to check you've not mistyped it (1 in our screenshot below left). Before we go any further, we should highlight

"We always recommend the 3-2-1 rule of backing up, which is that you make three complete copies of your data on at least two different media, at least one of which should be off-site (ie, not in your home)."

the importance of this password. As it's the only thing keeping your backup from prying eyes, you need to make sure it's secure. Don't use the same password as the one that unlocks your computer, and avoid recycling any password that you use for other services, such as your email.

As the Kopia interface is the only place where you'll enter your password, it's highly secure, even if you decide to back up to the cloud rather than to a local drive. That's because it never leaves your computer. The password is used locally to encrypt your files, rather than by a server, and they're scrambled before they even leave your machine.

In theory, if you've chosen a secure password comprising a long string of characters and numbers, it should be impossible for anyone to intercept and unscramble. As your cloud provider won't have access to your password either, they'll be similarly locked out when the backup archives are resting on their servers.

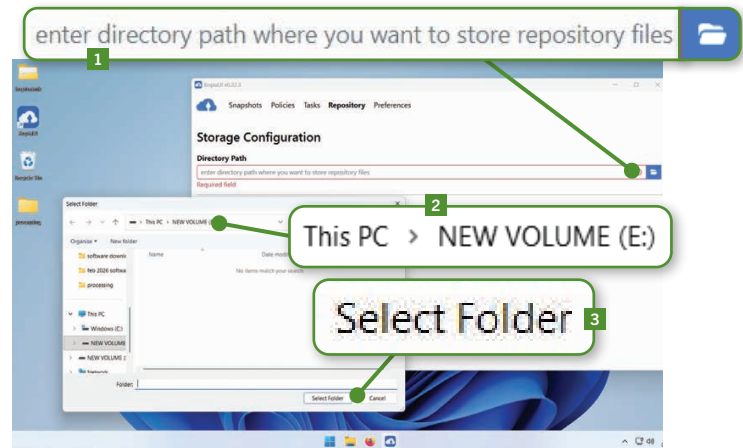
You'll notice that the password applies to a 'repository' (2) rather than

an individual backup. This means it protects a virtual locker in which Kopia will store sequential updates. So, if a file changes at some point between one backup and the next, the latest version will be added to the growing collection in the repository, where it's protected by the same password as its previous incarnations. There's no way to recover your password if you forget it, as it's not safeguarded by a service provider, so make sure you don't forget it.

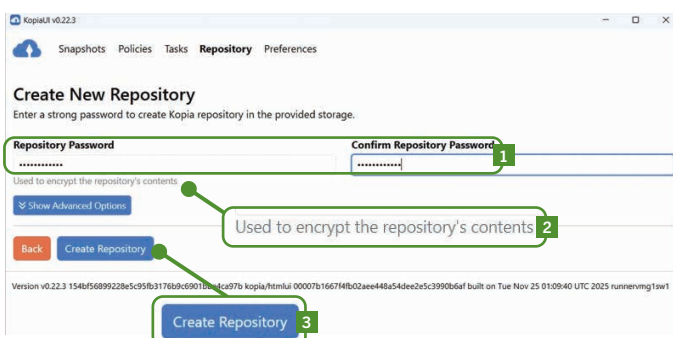
Click 'Create Repository' (3) and Kopia will generate a container for your backup, comprising a collection of files that you'll find if you look in the folder that you specified as its destination (see screenshot below).

3 SCHEDULE YOUR FIRST BACKUP

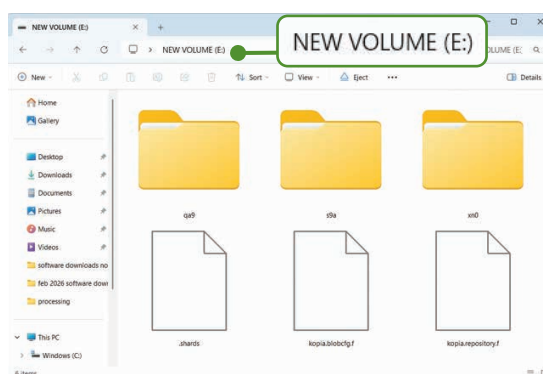
You're now ready to start backing up files. Having clicked the Create Repository button, you'll have been returned to the Snapshots tab of the interface. A snapshot is a backup of your files at a particular moment, which is updated at specified intervals to add any changes that have been applied since it was last



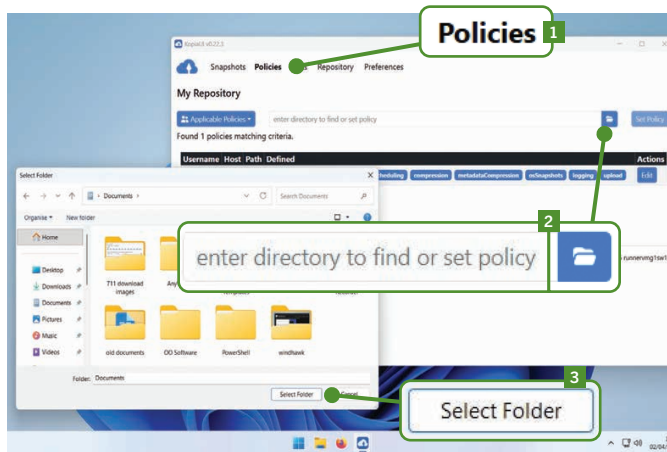
Start by telling Kopia where you want to store your backup files.



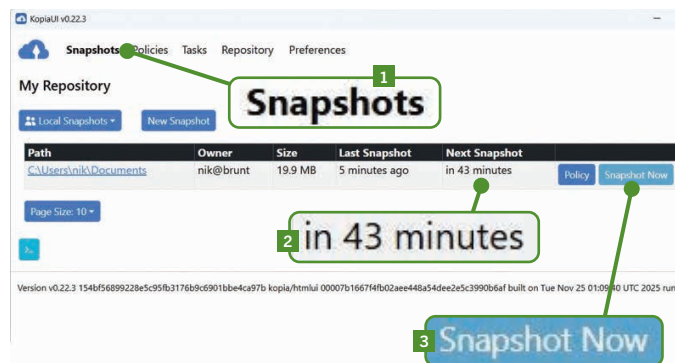
You need to secure your backup repository using a password.



Kopia generates a repository of files in advance of your first backup.



Create a policy so Kopia knows which files to back up.



Click 'Snapshots' to see when your backup will be added to Kopia's repository.

“We’re backing up our Documents folder. As this is one of the folders that changes most often on our PC, we’ll select hourly. If you only want to back up once a day, click in the Times Of Day box below this and enter a time.”

written to your repository. Right now, you won't have any snapshots as you've yet to back up.

Click 'Policies' instead (1 in our screenshot above) then click the folder icon on the end of the box labelled 'enter directory to find or set policy' (2). Navigate to the folder you want to back up, then click Select Folder (3).

You'll be returned to the Policies page. Click 'Set Policy' to the right of the box you used to select a folder and Kopia will open the options for that particular backup type. Here, click in the Defined box to the right of Snapshot Frequency and select how often you want it to update the backup.

We're backing up our Documents folder (1 in our screenshot below). As this is one of the folders that changes most often on our PC, we'll select hourly (2). If you only want to back up once a day, click in the Times Of Day box below this and enter a time. If you leave your computer running all day and night,

you could specify a time when it won't be in use.

Now scroll to the bottom of the screen and click Save Policy. Your newly defined Policy will be added to the list of backups that are scheduled to be added to the repository when its due time rolls around. Click the Snapshots tab (1 in our screenshot above right) to see when this is – 43 minutes in our case (2). If you want to perform the backup right away, click Snapshot Now (3).

4 RESTORE BACKED-UP FILES

When your first backup has been completed, click its link in the Path column of the table on the Snapshots tab. A new table will appear showing your backup start times.

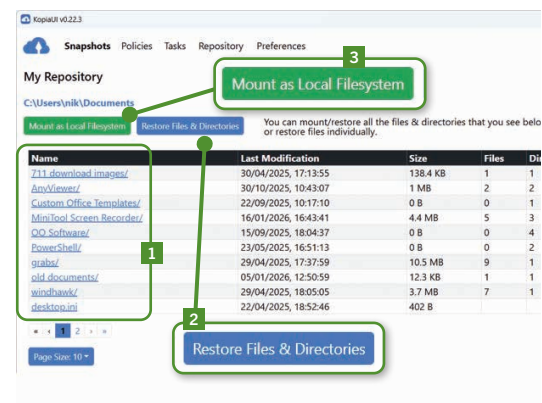
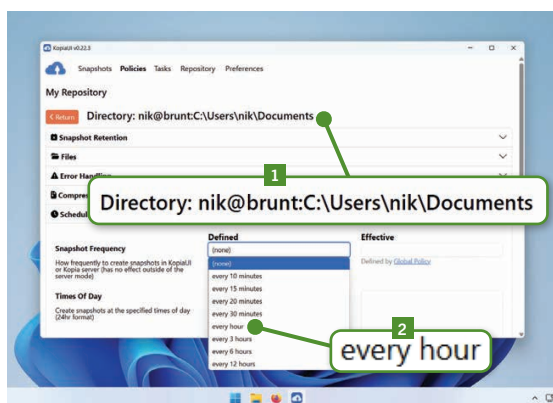
Click the most recent of these to view a list of the folders and files it contains (1 as shown in our screenshot below right). The folder structure will match that of the original source that you have just backed up.

There are two ways to restore files and folders. One is to navigate to the file or folder you want to recover, then click 'Restore Files & Directories' (2) and specify where it should be placed on your drive. Ideally, don't overwrite any remnants of your original. Instead, type c:\recovered then scroll to the bottom of the screen and click Begin Restore. The backed-up files will then be restored to a folder called 'recovered' on your C: drive, which you can find by opening File Explorer and clicking C: in the sidebar. If you already have a folder called 'recovered' in your C: drive, choose a different name.

Alternatively, click the green 'Mount as Local Filesystem' button (3). Kopia will create a new virtual drive on your computer, which you can open by launching File Explorer and clicking Z: in the sidebar. If you already have a drive called Z:, Kopia will select an alternative, the name of which will be shown above the list of backed up files in the Kopia window.

The virtual drive will contain a complete copy of your backed-up files and folders, in the state they were in when the snapshot you selected was created. To restore one or more of them, select them in this virtual drive and drag them on to your hard drive or SSD. ■

Specify how often Kopia should back up your selected files.



Kopia gives you two ways to restore your backed-up files.

WHAT'S THE FUSS ABOUT...

Microslop

Copilot's AI onslaught now has a name and Microsoft doesn't approve.

WHAT IS IT?

An unflattering term to describe Microsoft's AI tools, in particular Copilot.

WHO'S USING IT?

Lots of people who are fed up with seeing AI pop up in places they don't want, such as Office, Windows or the browser Edge. It's a subset of the more general term 'AI slop' for low-quality AI-generated videos, photos and music, or when chatbots spout utter nonsense.

SO IT'S NOT AN OFFICIAL MICROSOFT TERM?

Most definitely not! In fact, the company hates it, and in early March banned people from using it in the Copilot chat group on Discord.

WHAT'S DISCORD?

It's a chat service used by over 200 million people, who connect in communities called 'servers'. Originally designed for gamers, it's expanded to cover countless shared interests, letting users talk in real time and upload content. It's a bit like a modern-day version of the chatrooms from the early days of the web.

DOES MICROSOFT OWN IT?

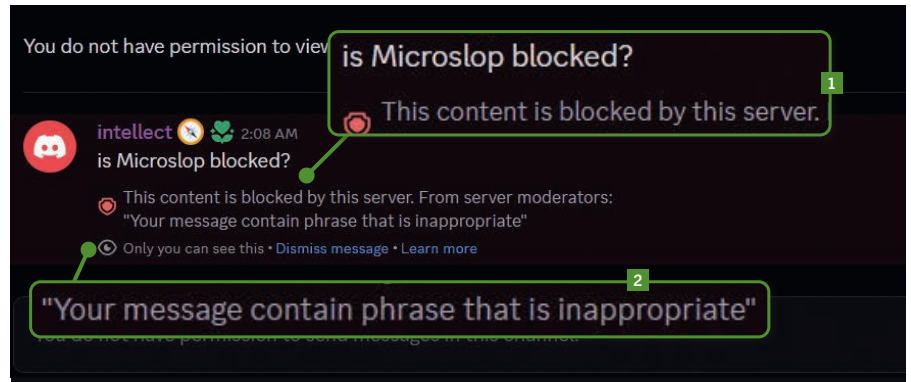
No, but it runs Discord's Copilot page (discord.com/invite/go-copilot), which means it can act as a moderator – filtering words, deleting posts and blocking members.

WHICH IS WHY IT CAN BAN 'MICROSLOP'?

Precisely, just like a moderator of any forum might ban swearing or abuse. After the ban, attempting to type the word produced the message 'This content is blocked by this server' (1 in our screenshot above) because it contained a 'phrase that is inappropriate' (2). Many users were stunned by the ban.

BUT COULDN'T THEY JUST USE A DIFFERENT VERSION OF THE WORD?

Yes, and plenty did. There were loads of variants: M!croslop, Microslop and so on. They were all used to mock Microsoft's decision, calling it censorship. Microsoft then realised the ban was pointless and lifted it, which prompted users to return to typing 'Microslop' – often many times in a



single post (see below left). It was a crude but effective protest.

AND HOW DID MICROSOFT REACT TO THAT?

Badly. It prevented some users from posting messages, and locked the server to work on "stronger safeguards" for moderating messages. It claims this is all down to "spammers attempting to disrupt and overwhelm the space with harmful content not related to Copilot".

DOES IT HAVE A POINT?

Perhaps. If you're genuinely interested in Copilot, you probably don't want to read endless messages moaning about how annoying it is – especially if it's just "walls of text", to use Microsoft's phrase. And there's a lot of other junk on the server that's simply unsavoury, such as AI-generated porn. But prohibiting 'Microslop' wasn't the right way to do it. The most effective way to promote something is to

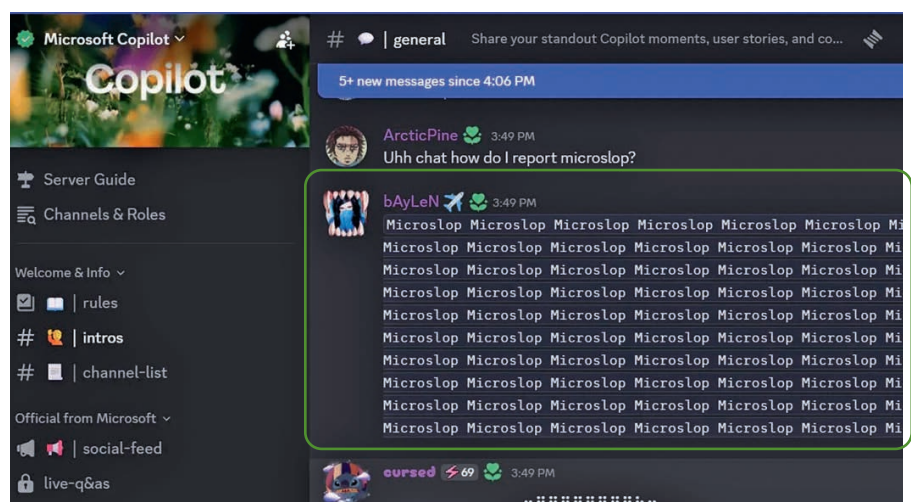
ban it, as has been demonstrated many times in living memory, from DH Lawrence's *Lady Chatterley's Lover* to 'Relax' by Frankie Goes to Hollywood

SO WHAT'S HAPPENED NOW?

Things seemed to have calmed down. Microsoft now appears to tolerate 'Microslop', though individuals might still get banned if they paste it 500 times in a single message. The company will just have to live with the growing backlash against Copilot.

WILL IT START REMOVING THE TOOL?

Not sure – it's giving mixed messages. In January Microsoft sources said it would scale back Copilot and prioritise fixing Windows. But a month later it revealed plans to make Copilot launch automatically when you click a link in an Outlook email. The latter move seems more telling. Microsoft has thrown so much money at the tool that we can't see it backtracking now. ■



Ok, we get it: you don't like Microslop.

Credit: WindowsLatest.com

Credit: Jon Martindale/PC Mag

Make your photos look retro for free

Give your phone pics some old school charm and character.

IT WILL TAKE

20 minutes

YOU'LL NEED

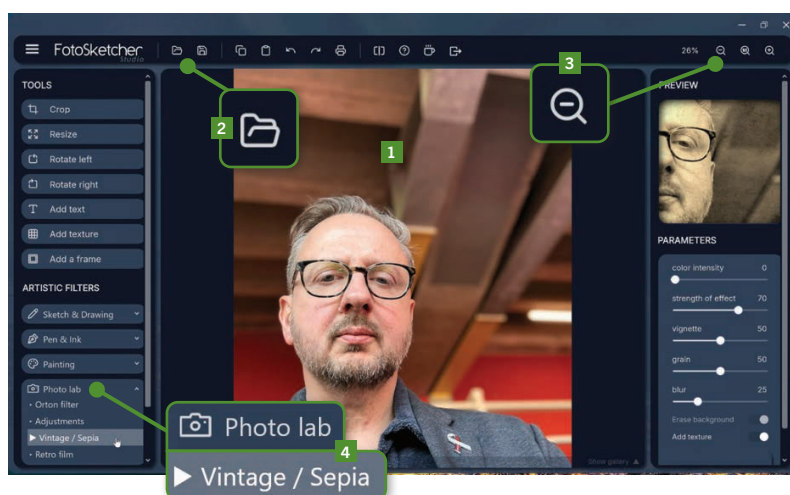
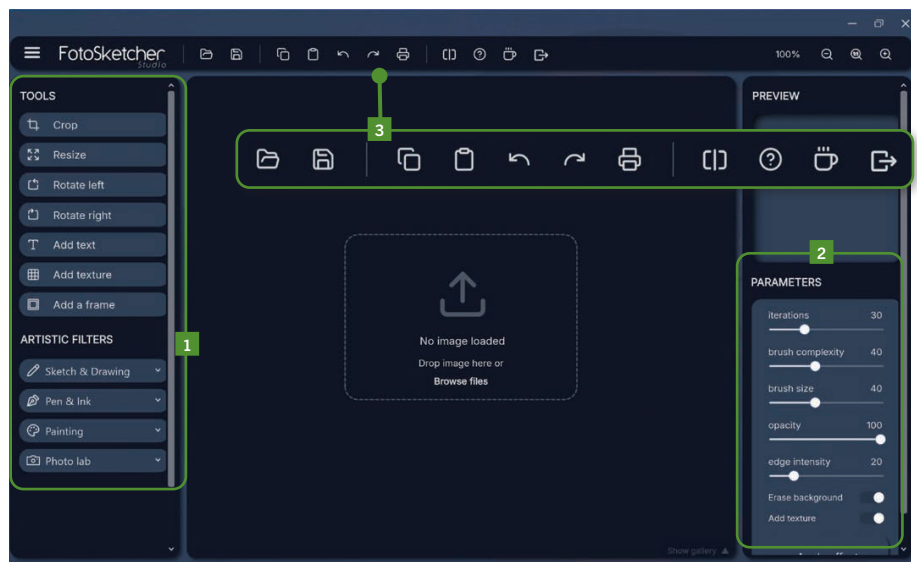
FotoSketcher Studio 4.10,
Windows 10 or 11

Smartphone photos can sometimes look a little clean and clinical. Adding a touch of retro style is a great way to give them a bit more character. The trouble is, the best vintage effect apps tend to be either expensive or overly complicated. FotoSketcher Studio bucks this trend by being not only simple to use, but also

completely free. Recently updated, it now features a cleaner interface, faster performance and several new tools designed to transform your images. These include additional Vintage Sepia and Retro Film effects, batch processing to apply styles to multiple photos at once, and manual brush controls for more precise edits.

Step 1

To get FotoSketcher Studio, visit <https://fotosketcher.com> in a web browser on your PC, click the Downloads link in the top right, then click 'Direct download' under 'FotoSketcher 4.10 for Windows'. Save the installer to your PC, then run it and work your way through the setup screens, accepting all the default options, and launch the tool when installation is complete. The main interface is very straightforward, with Tools and Filters in the pane in the left-hand pane **1**, and Parameters (for fine-tuning effects) on the right **2**. A toolbar of basic actions runs across the top **3**.



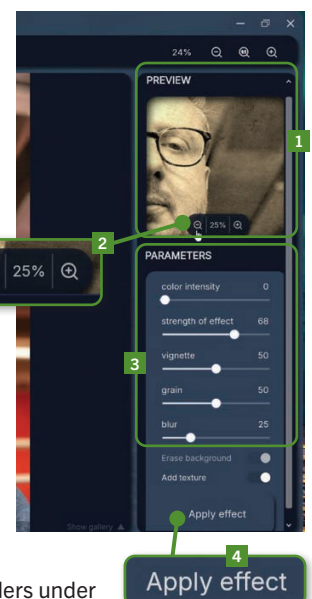
Step 2

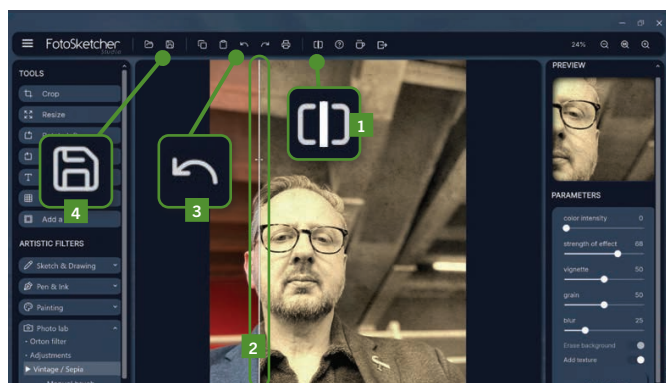
To get started, drag a photo you want to edit into the main area **1**, or click Open in the toolbar **2** and use the file browser to look for and open a specific file. Depending on the size of the original image, you may need to click the zoom out button **3** a few times to fit the entire photo on screen. To select a retro effect, locate it under 'Artistic filters' in the left-hand pane. The new 'Vintage/sepia' and 'Retro film' effects, for example, can be found by clicking the 'Photo lab' heading **4** to reveal the dropdown options below. We've chosen Sepia for this Workshop.

Step 3

Clicking an effect won't apply it to your image straight away – instead, you can see how it will look in the Preview window **1**. You can

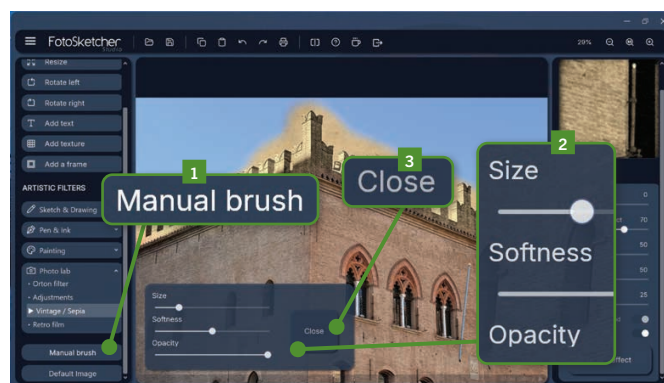
click and drag inside the Preview window to move around the image. You can also zoom in or out by moving your cursor to the bottom of the Preview window and clicking the plus or minus buttons that appear **2**. Use the sliders under the Preview window **3** to adjust the strength of the effect, the grain, blur and other options until you're happy, then click 'Apply effect' **4**.





Step 4

The split screen view **1** is a useful way to get a clear idea of how successful your effect is. Your main image will be split by a vertical line **2** that you can drag across the image for an instant 'before and after' view. If you're not happy with the look, click Undo **3**, then select an alternative filter or the same one and tweak your parameters until you get it right. When you're happy, click Save **4** to save your image – by default, FotoSketcher Studio saves your edited image with its filename appended with '_FS' to differentiate it from the original unedited file.

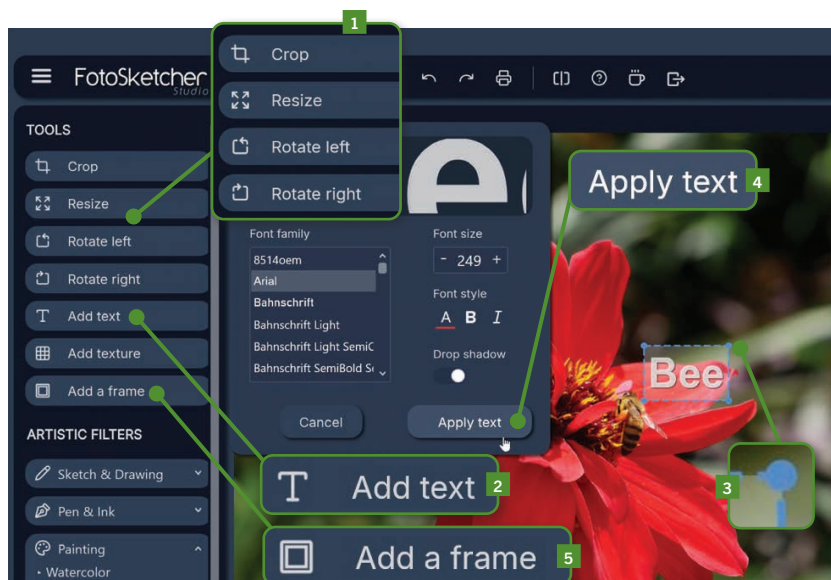
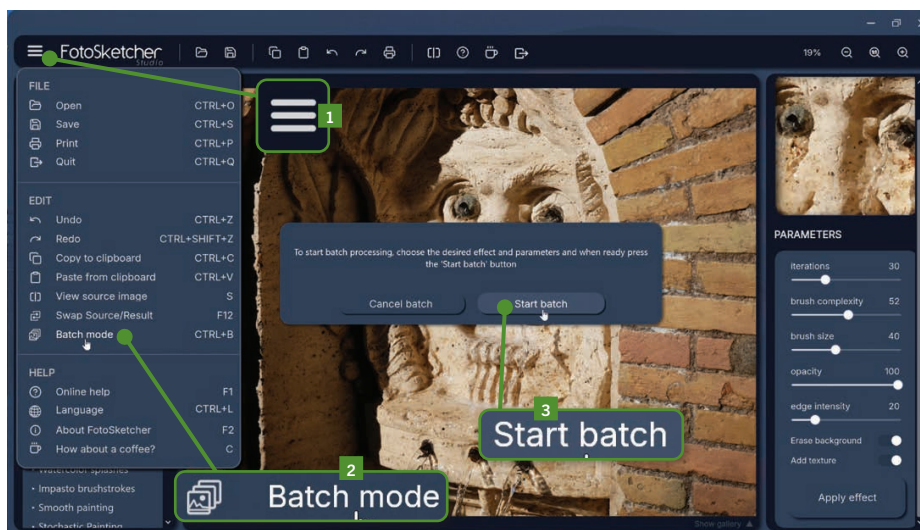


Step 5

If you only want to apply an effect to specific areas of your image, click 'Manual brush' on the left **1** and use the options that appear to adjust the Size, Softness and Opacity of your brush **2**, then click and drag on the main image where you want to apply it. It might take a bit of trial and error to get the brush right, so keep this panel open until you do, then click Close **3** to get a better view as you work. The latest version of FotoSketcher Studio lets you navigate around your image while in manual brush mode by holding down the Ctrl button as you click and drag.

Step 6

If you want to apply the same effect to multiple images at once, click the Menu (three horizontal lines) button **1** and select Batch mode **2**, then use the file browser to locate the files you want. Hold the Ctrl button and click to select multiple files, then click Open. Select the effect you want to apply from the left-hand pane, adjust the parameters on the right, as you would for a single image, then click 'Start batch' **3**. Depending on how many images you've selected, it may take a while to process them all.

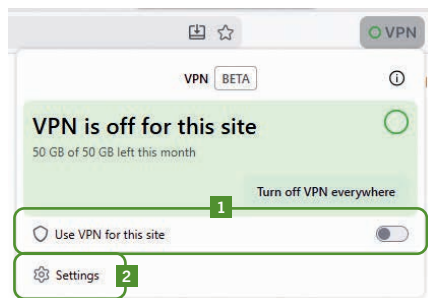


Step 7

In addition to its artistic filters, FotoSketcher Studio provides a selection of useful editing tools you can use to improve your images. You can Crop, Resize and Rotate **1** your photos, for example. Click 'Add text' **2** and a box will appear allowing you to type a word or phrase and select your font, size and style. You can also resize the text by clicking and dragging a corner of the text box **3** or position it by dragging the text box where you want it. Click 'Apply text' **4** when you're happy. Clicking 'Add texture' or 'Add a frame' **5** will allow you to apply further flourishes. ■

Browser tips

Secret settings and the best extensions.



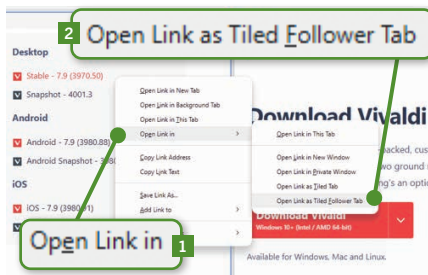
FIREFOX

Exclude sites from the new VPN

The new VPN in Firefox (technically a proxy) is useful for concealing your location and IP address from websites, with 50GB of free monthly data. However, you may find some sites won't load properly when the VPN is enabled.

Rather than click the VPN button and completely disable the VPN, switch off 'Use VPN for this site' (1 in our screenshot below). This will save you time in future by whitelisting that website so the VPN is automatically disabled.

To whitelist sites before you visit them, click Settings in the VPN panel (2). Enter the web address of a site you want to exclude from the VPN and click Add. Click 'Save Changes' to update your whitelist.



VIVALDI

Open links in 'follower' tabs

While other browsers added Split View options in April, Vivaldi 7.9 introduced a more sophisticated way to view two pages side by side. It lets you open links from web pages alongside what you're already reading, in what Vivaldi calls a 'follower tab'.

This differs from Split View by creating a new tab 'stack' in the browser's tab bar – not just a new tab. Additionally, any further links you click on the original page will open in the follower tab.

To try the new feature, right-click a link on a web page and choose 'Open Link in'

CHROME

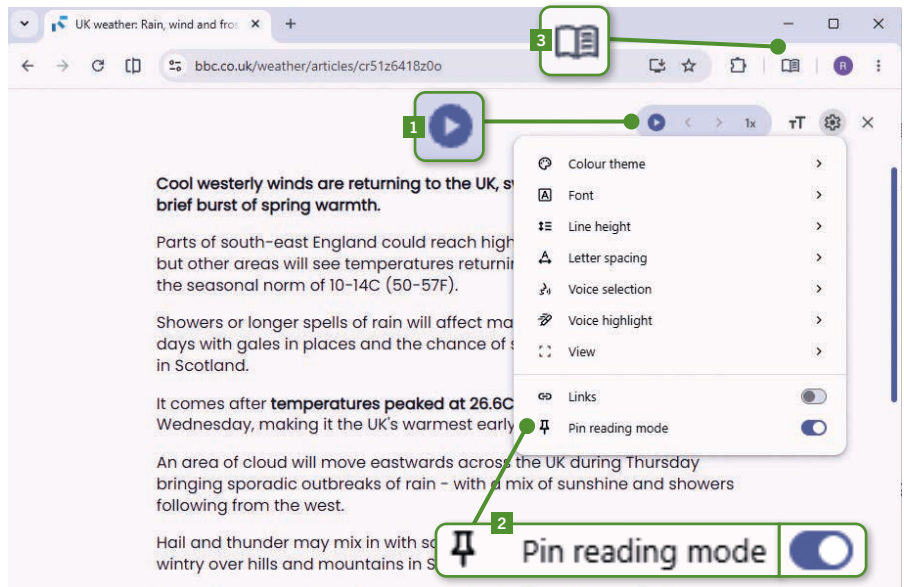
Switch to full-page reading mode

Chrome has improved its 'Reading mode', which lets you read online articles without ads, images and other distractions. Previously, when you right-clicked a web page and chose 'Open in reading mode', it split the browser window in two. This displayed the original page on the left and a text-only version on the right.

The updated feature replaces the current page layout with a streamlined, full-page version, giving you maximum space to read

the content on your screen.

Click the Play button in the top-right corner (1 in our screenshot) to hear the page read aloud, and use the 'Font size' controls to enlarge the text. To revert to the original page, click the 'X' icon. Make 'Reading mode' easier to activate by switching on 'Pin reading mode' in the Settings menu (2). This adds a 'Reading mode' button to Chrome's toolbar (3), which switches it on or off with one click.



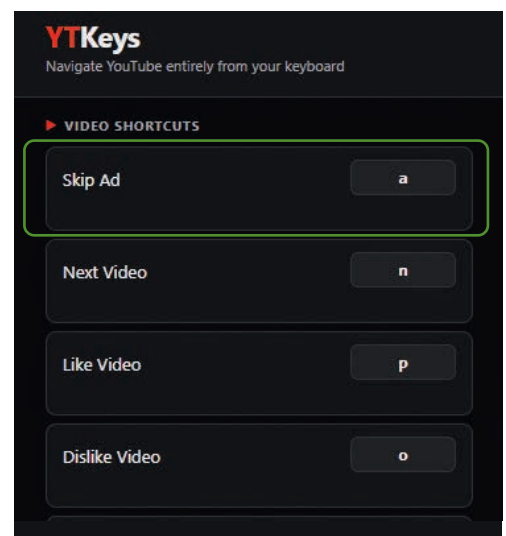
(1 in our screenshot above) then 'Open Link as Tiled Follower Tab' (2). The new tab will be labelled Follower Tab.

CHROMIUM

Control YouTube with keyboard shortcuts

YouTube has several keyboard shortcuts, but they mainly control video playback, volume and captions. The new extension YTKeys (tinyurl.com/APC561keys) adds missing shortcuts to the video site, to save you clicking with your mouse.

The most useful is the ability to skip ads by pressing A (see screenshot right), though only when an advert is skippable. You can also like and dislike videos by tapping P and O; play the next video in a playlist by hitting N; jump to the comments section using X, and more.



All the shortcuts can be customised by clicking their boxes and pressing your preferred keys. ■

AI tips

Expert tips for a better experience.



GEMINI

Insert photos from Google Photos in chats

Google has made it easier to add pictures you store in Google Photos to your Gemini chats. This means you can quickly import photos to edit, transform and ask questions about, without having to upload them from your PC.

The new option is available to personal (not business) users of Gemini's web version, which has merged the old Tools menu with the Add (plus-sign) menu. Click the Add button and select 'More uploads' then Photos (see screenshot below). Click 'OK' to confirm you're happy to let Gemini access your Google Photos activity.

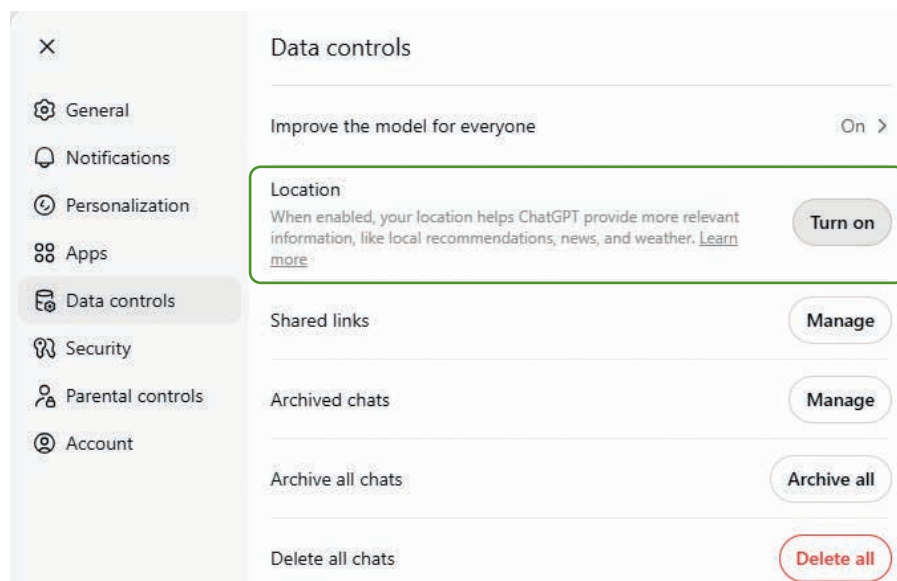
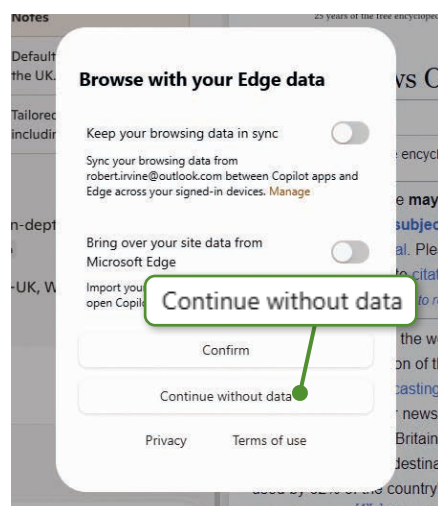
This will open a gallery of your photos and albums. Choose a picture and click Insert to add it to your Gemini chat.

You can also connect Google Photos to Gemini by typing @Google Photos. This allows the AI assistant to search your photo library for specific shots.

COPILOT

Open web pages in the Windows app

Microsoft has updated its Copilot app for Windows to change how it opens web links in its responses. Previously, when you



CHATGPT

Share your location to get local info

ChatGPT now lets you share your location so it can provide more relevant local information. For example, you can get a more accurate weather forecast for your area, restaurant recommendations in a town you're visiting, and reliable directions to places from where you happen to be.

To protect your privacy, the new Location option is disabled by default. To enable it on the ChatGPT website, click

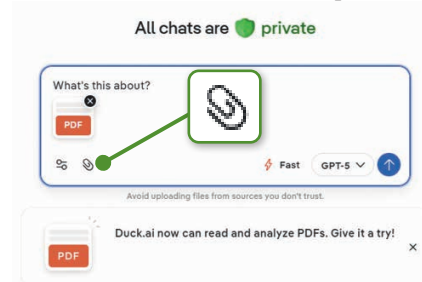
your profile icon and choose Settings then 'Data controls'. In the mobile app, just tap your profile icon then 'Data controls'.

Click or tap 'Turn on' next to Location (see screenshot) and allow ChatGPT to access your location while using the website or app. ChatGPT says it will delete precise location data once it's responded to your local query. If you're not convinced by that claim, turn Location off again once you have the information you need.

clicked a link, it would open the page in Edge or your preferred web browser.

Now links open directly in the Copilot app, with your chat displayed on the left and web pages in a tabbed browser on the right. This is much more convenient, because it saves you having to switch between the AI assistant and your browser.

The first time you click a link in the updated app, Copilot will offer to sync your browsing data from Edge and import your cookies. Either switch on these options



and click Confirm, or choose 'Continue without data' (see screenshot left) to use Copilot's browser independently of Edge.

DUCK.AI

Upload PDFs for private analysis

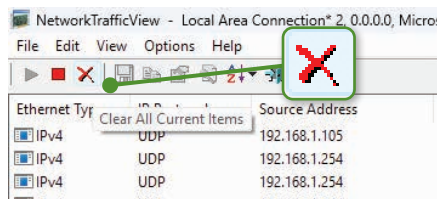
DuckDuckGo's AI assistant can now analyse PDFs you upload, to summarise and answer your questions about their content. This augments the existing option for analysing image files in JPEG, PNG, GIF and WebP formats.

To upload a PDF to Duck.ai, click the paperclip icon in its message box (see screenshot above) and select the file on your PC. Type your command or query, such as 'Summarise this document' or 'How many words are there?', then click Send.

As with all Duck.ai chats, the AI assistant won't store or share your data, or use it to train AI models. Click the fire button to delete the conversation. ■

Make Windows better

Expert tips for a better experience.



WINDOWS 10 & 11

Instantly clear network traffic

NirSoft's NetworkTrafficView shows you how much data is moving across your network, where it's going, and which connections are responsible for the heaviest traffic. This makes it easier to spot unusually heavy network activity, identify what's eating your bandwidth, and highlight any suspicious or unexpected connections from software you don't trust.

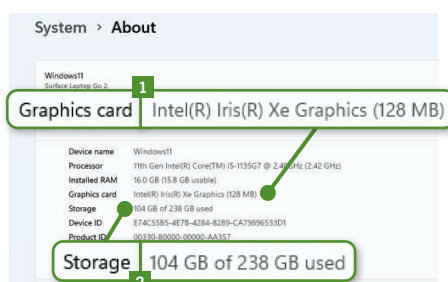
The new version of the program (2.51) adds a button that instantly clears the software it lists. This lets you start a fresh test – such as launching a single program or loading a website – to see the new network activity it generates, without old traffic cluttering the view. To do this previously, you had to clear the whole list using menus.

To download NetworkTrafficView visit tinyurl.com/APC561traffic then scroll down to the Feedback heading and click the 32bit or x64 (64bit) version. Launch the program, clicking 'More info' then 'Run anyway' if Windows shows a SmartScreen warning. To reset it so all current traffic disappears click the 'Clear All Current Items' icon (red cross – see screenshot below).

WINDOWS 11

See graphics card and storage info

In April's Security Update for Windows (released on 14 April) Microsoft has added your computer's graphics card and storage to the 'Device info' section in the About page. To see this, right-click the Start button (the Windows



WINDOWS 11

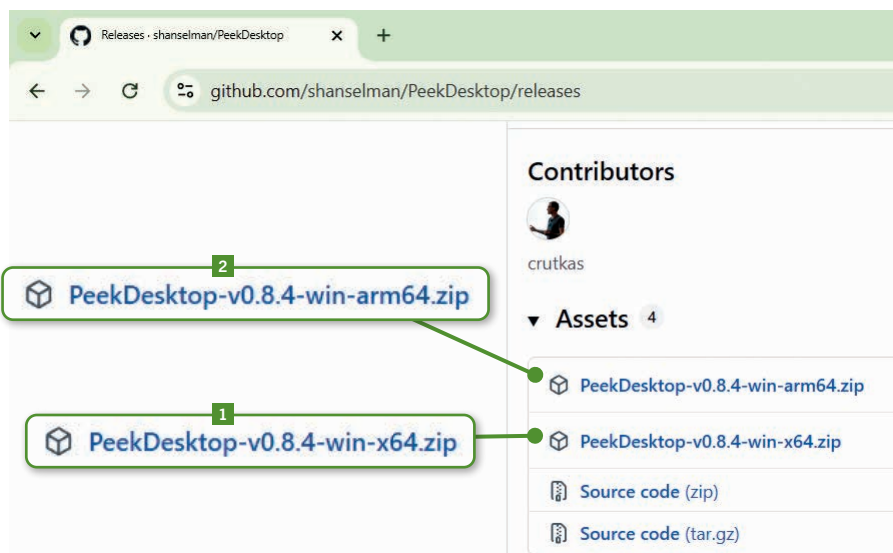
Quickly click between desktop and open windows

Microsoft developer Scott Hanselman has built a tool called Peek Desktop that instantly hides all open windows and programs, making it quicker to see files and folders on your desktop.

To download it, visit tinyurl.com/APC561peek then scroll down to the Assets heading and click 'PeekDesktop-v0.8.4-win-x64.zip' (1 in our screenshot) - or 'PeekDesktop-v0.8.4-win-arm64.zip' (2 if your computer has an ARM processor).

Extract the files then launch it.

The tool is designed for occasions when you have several windows open, but you can still see part of your desktop. If you click an empty part of your desktop all the windows will disappear to reveal the whole desktop. Clicking the desktop again brings those windows back. Hanselman said he was inspired by a similar feature in Apple's macOS Sonoma, released in 2023.



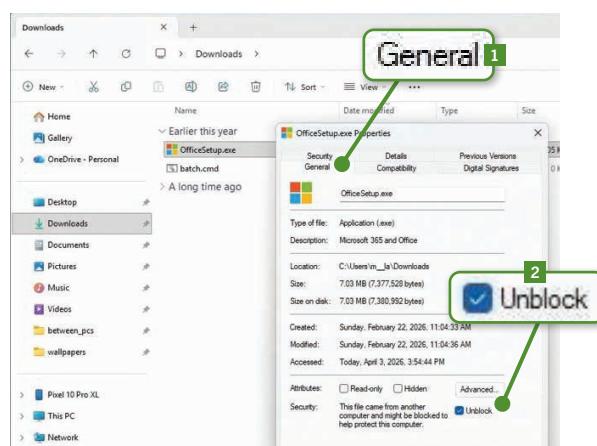
logo) followed by System. In our example, you'll see we have Intel's built-in Iris Xe graphics (1 in our screenshot below left) and have used 104GB of 238GB storage (2).

WINDOWS 11

Unblock safe files Microsoft wrongly blocks

When you download a file from the internet, Windows treats it as coming from an external source. This can trigger false-positive security warnings such as SmartScreen alerts for files you know to be safe.

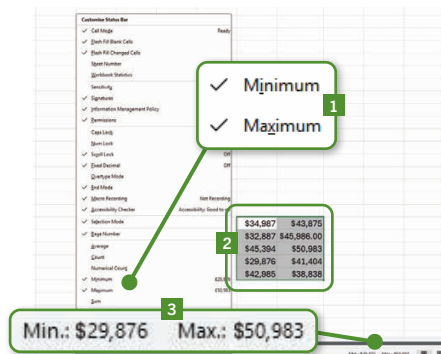
In the April Security Update, you can now quickly remove that restriction. Simply right-click the file then select Properties. Now open the General tab (1 in our screenshot above right) then tick 'Unblock' (2) followed by OK.



This forces Windows to stop treating the file as something you've downloaded from the internet. It should open smoothly now, with no warning messages. It can also restore thumbnails and previews in File Explorer that Windows previously hid for security reasons. ■

Make Office better

Expert tips for a better experience.



MICROSOFT EXCEL

Add minimum and maximum values to status bar

You can easily add the minimum and maximum values in a cell range to your spreadsheet's status bar. First, right-click the Status Bar then tick both Minimum and Maximum (1 in our screenshot above). Now highlight the range of cells (2) and you'll see the maximum and minimum appear below (3). In recent versions of Excel if you click the figure on the status bar you'll copy it to your clipboard, making it ready to paste anywhere.

LIBREOFFICE

Remove links to PC files in PDFs

Version 26.2 of LibreOffice, released in February, adds an option to remove links in PDFs that point to other files on your computer (like a spreadsheet or photo). This is an important privacy feature because even if the recipient cannot open your local files, they may still see the

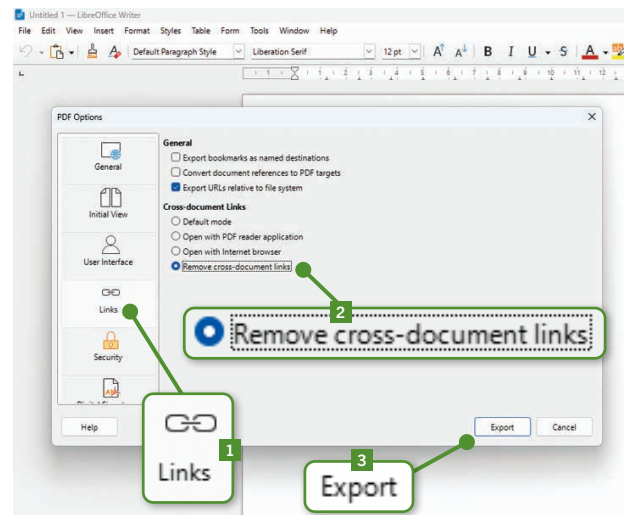
private file paths (such as C:\Users\Name\Private\Drafts) where those documents are stored.

Click 'File' at the top right, then Export As, followed by 'Export as PDF'. Now click Links on the left (1 in our screenshot right) and select 'Remove cross-document links' (2) followed by Export (3). This keeps standard web links (URLs) and internal links to other pages within the same PDF.

ONLYOFFICE

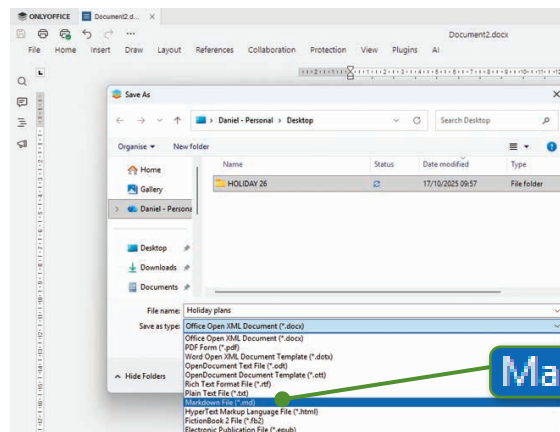
Save documents in Markdown format

OnlyOffice 9.3.0, released in February, added support for the Markdown (MD)



file format. This is plain text, which means it removes formatting like bold and italics, making it easier to edit your text if you paste it into another program.

Open a document in OnlyOffice, then click File at the top right followed by Save As (or press Ctrl+S). Now choose Markdown File in the 'Save as type' dropdown menu (see screenshot left) then click Save. This works best for straightforward documents such as notes, articles and web content. It's not suited to more complex layouts containing images and heavily formatted styles. ■



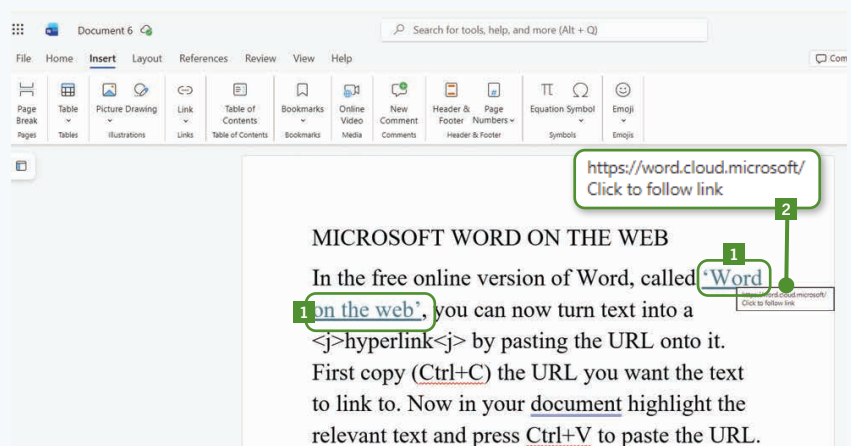
Markdown File (*.md)

MICROSOFT WORD ON THE WEB

Paste links on to text to create instant hyperlinks

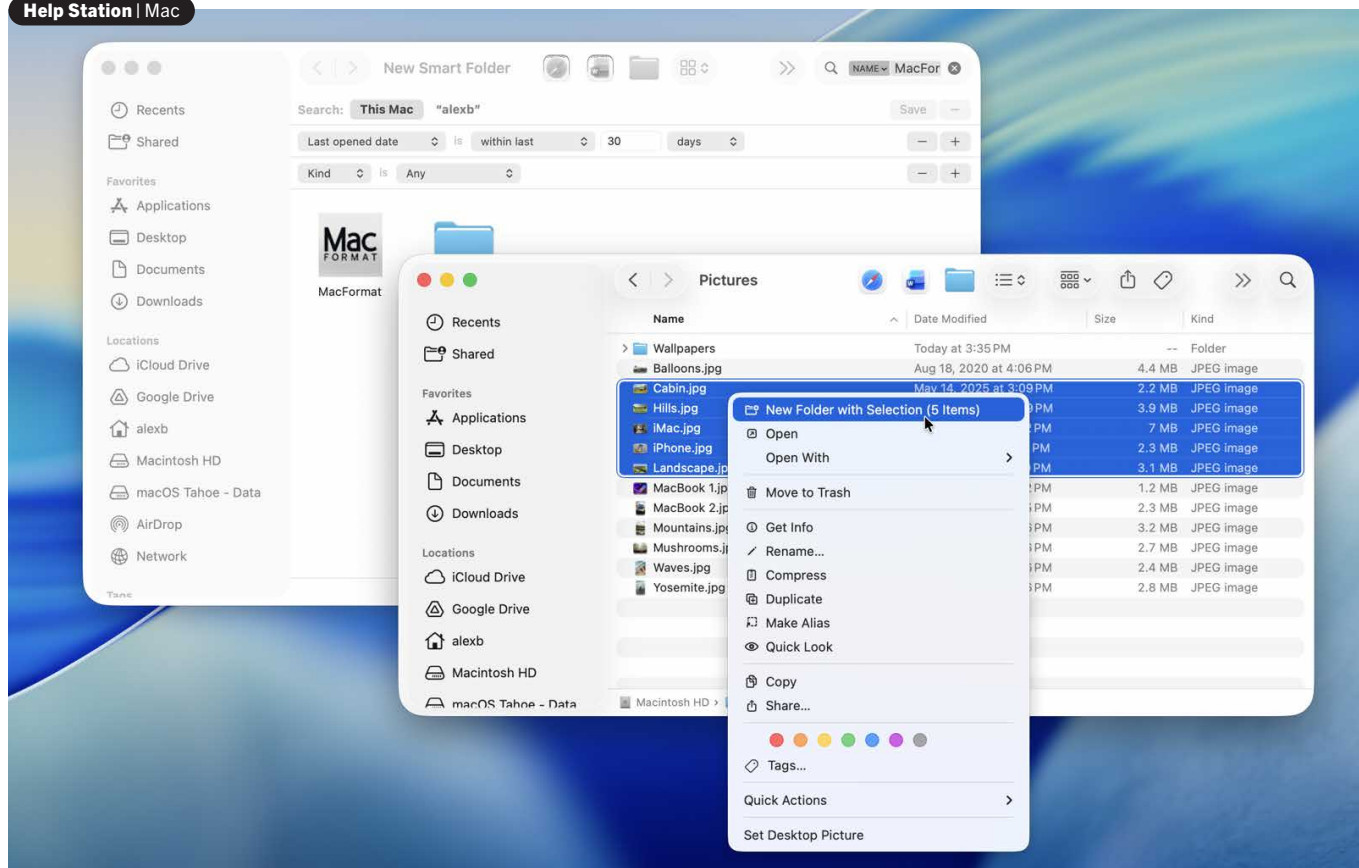
In the free online version of Word, called 'Word on the web' (<https://word.cloud.microsoft>), you can now turn text into a hyperlink by pasting the URL on to it. First copy (Ctrl+C) the URL you want the text to link to. Now in your document highlight the relevant text and press Ctrl+V to paste the URL. The text will turn turquoise (1 in our screenshot) to indicate it's now a hyperlink. Hover your cursor over the link to check it's going to the correct URL (2).

The existing hyperlink methods still work: ie, highlighting the text and pressing Ctrl+K, or clicking Insert, then Link.



MICROSOFT WORD ON THE WEB

In the free online version of Word, called 'Word on the web', you can now turn text into a <code>hyperlink</code> by pasting the URL onto it. First copy (Ctrl+C) the URL you want the text to link to. Now in your document highlight the relevant text and press Ctrl+V to paste the URL.



Discover secrets of the Finder

Make the most of Apple's management tool for your files and folders.

IT WILL TAKE

10 minutes

YOU WILL LEARN

How to go deeper with Finder's advanced but hidden features

YOU'LL NEED

macOS 26 or later



The Finder has been a macOS mainstay for generations and, if you've used a Mac for any length of time, you probably feel quite familiar with it. But, as it turns out, the Finder is actually full of hidden surprises and little-known tricks that can escape even the most experienced Apple user.

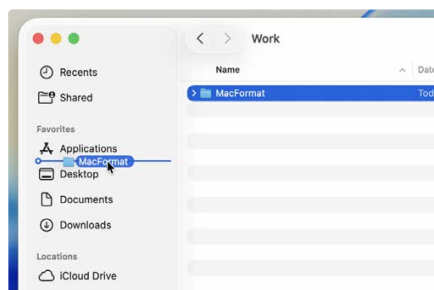
For instance, the Finder makes frequent use of aliases, which are like shortcuts that can be put anywhere while keeping the original file in place. Smart Folders, meanwhile, let you set rules for their

contents and automatically update based on them. Then there are the countless clever ways macOS enables you to move files, merge and separate windows, change file locations, and more. Start digging and you quickly realise the Finder is a true treasure trove of handy features.

Here, we've picked out 12 of our favourite Finder actions that you might not know about. Together, they could change the way you use your Mac for the better. ■

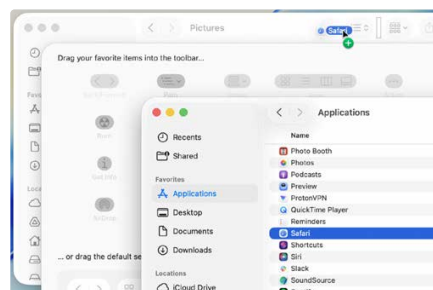
Alex Blake

How to Go deeper with Finder's hidden features



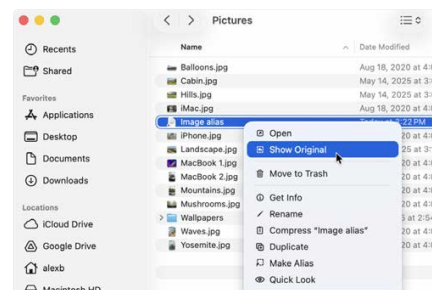
1 Add to the sidebar

If you've got a file or folder that you frequently use, you can drag it onto the Finder's Favourites section in the left-hand sidebar for easy access. To save an app to the Favourites section, hold Cmd when you drag it.



2 Add to the toolbar

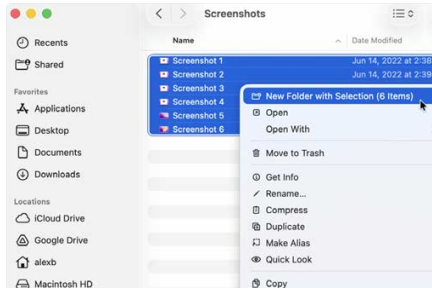
You can also save files, folders and apps to the Finder's toolbar. Click View > Customise Toolbar, then drag the item to the toolbar from your desktop or another Finder window. The toolbar's existing icons need to be jiggling for this.



3 Use aliases

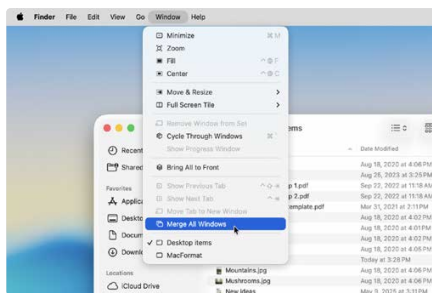
To add an alias, select a file or folder, then click File > Make Alias; the alias can be dragged to a new location. Or press Opt+Cmd when dragging an item to move it and create an alias. To find the original, Ctrl-click the alias and pick Show Original.

Continued... Go deeper with Finder's hidden features



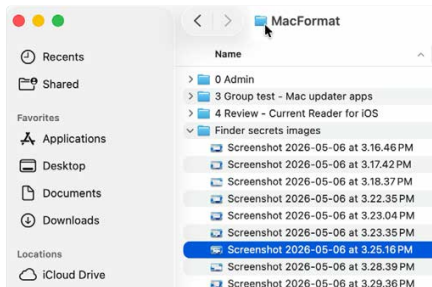
4 Group files into folders

There's a fast way to create a folder and add multiple files into it: select the files you want to add, then Ctrl-click one of them and choose 'New Folder with Selection' from the menu. Give the folder a name and press Return.



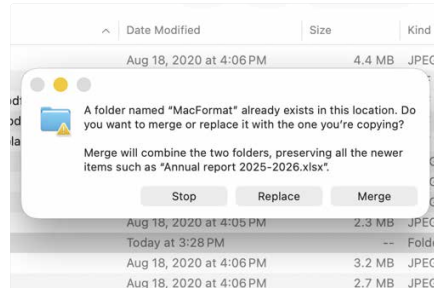
7 Merge windows

If you have multiple Finder windows open, you can merge them into tabs within a single window. To do so, click Window > Merge All Windows. To do the reverse, drag a tab out or click Window > 'Move Tab to New Window'.



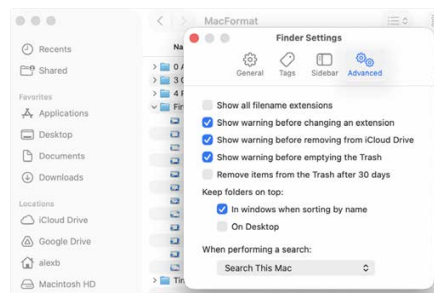
10 Quickly move files

To move the entire contents of a folder to a new location, hold Shift and move your pointer to the folder's name at the top of the Finder window until a folder icon appears. Now click and drag the folder name to your destination.



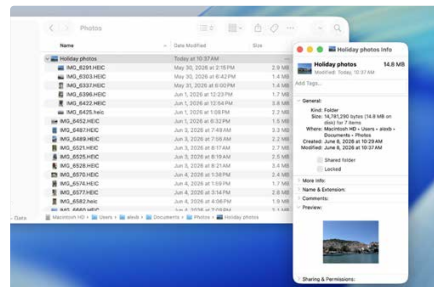
5 Merge folders

Got two folders in separate locations that share a name but have different contents? You can merge them. Press and hold Opt, then drag one folder to the location containing the other folder with the same name. Click Merge to confirm.



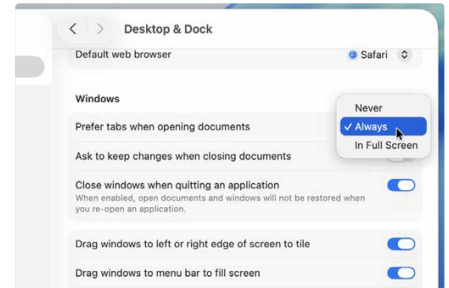
8 Keep folders on top

When sorting items in a folder, files and folders are usually mixed up. To keep folders on top of files, click Finder > Settings > Advanced, then tick the checkbox by 'In windows when sorting by name' under 'Keep folders on top'.



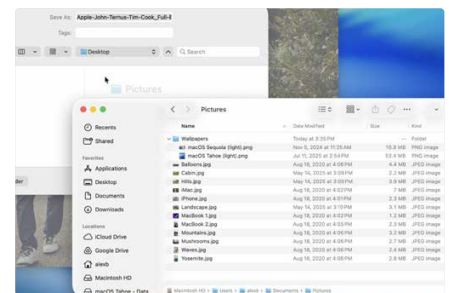
11 Use an image cover

For easy identification, you can use a photo as a folder cover. Open the image in Preview and click Edit > Copy. Now click your chosen folder and select File > Get Info. Click the small folder at the top of the window, then click Edit > Paste.



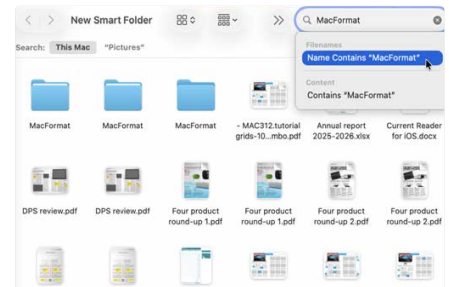
6 Open in new tab

Open System Settings and go to Desktop & Dock > Windows, then pick Always next to 'Prefer tabs when opening documents'. Now, when you open multiple Finder folders at once, they'll open in tabs housed in a single window.



9 Change save location

If you want to save a file and already have its destination open in Finder, drag the folder name from Finder's Path Bar into the Save dialog box – the location will change. To show the Path Bar, click View > Show Path Bar in Finder.



12 Create Smart Folders

Smart Folders update contents based on criteria you set. Click File > New Smart Folder, then enter a rule in the search field and pick from the resulting options. Click '+' to add more rules, then Save and enter a name and location. ■

Phone & tablet tips

Brilliant things to do on your device.

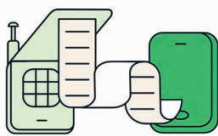
ANDROID & iOS

Transfer WhatsApp chats from iOS to Android

WhatsApp now lets you transfer your chats from an iPhone to an Android phone without using a separate app. The transferrable data includes your account information, individual and group chats, your chat and call history, and photos and videos you've sent and received.

To start the transfer, open WhatsApp's Settings on your iPhone and choose Chats then 'Transfer chat history'. Select 'Transfer to Android' (see screenshot below), tap 'Continue' and WhatsApp will prepare the chat data.

On your Android phone, open WhatsApp and verify your account with



Transfer chat history

Transfer your chat history privately and have your most up-to-date messages. Certain device permissions are needed to connect to your new device.

Transfer to iPhone

Transfer to Android

the same number you use on your iPhone. When prompted, tap Allow to enable your devices to connect. Use your iPhone's camera to scan the QR code and tap Join to connect to the Wi-Fi network if not already connected.

Once the transfer is complete, tap Next on your Android phone to view your chats and start using WhatsApp. To transfer from Android to iOS, you need Apple's 'Move to iOS' app (www.snipca.com/58536), but you can still move chats from one Android phone to another.

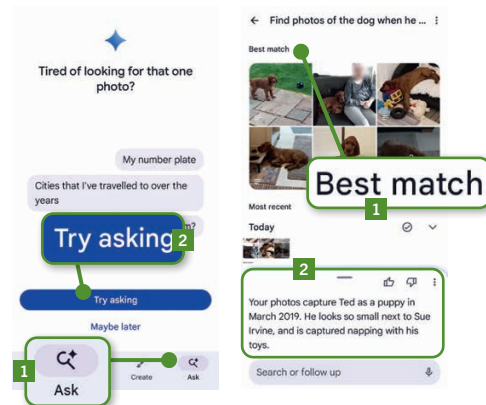
Additionally, iPhone users can now set up two WhatsApp accounts on their device, to keep personal and work profiles separate. This feature was already available on Android.

ANDROID & iOS

Find pictures in Google Photos using AI

Google Photos users in Australia can now finally use the AI feature Ask Photos, nearly two years after it was introduced in the US. Powered by Gemini, it's available in the Photos app for Android (tinyurl.com/APC561photos) and iOS (tinyurl.com/APC561photosio) and is intended to help you find specific photos faster.

Rather than search for pictures by title, location or subject, you can phrase your queries in a more conversational manner. For example, 'Find photos of the dog when he was a puppy', 'When was the last time I saw my niece?' or 'Did I wear a jacket when



I last went to London?'

To try Ask Photos, tap the new Ask tab on the bottom toolbar (1 in our screenshot above left) – if you don't see this, tap Search then Try Ask Photos – and press the 'Try asking' button (2). Read the privacy agreement to ensure you're comfortable with Ask Photos accessing your photos and videos – the terms include letting Google analyse your images, determine your location and allow humans to review your queries (this is anonymised and they can't see your photos).

If not, tap 'No, thanks' to use standard search instead. Otherwise, tap 'Turn on'. You'll be asked to identify people who frequently appear in your photos, but you can skip this step by tapping Done.

Enter a search query and Ask Photos (via Gemini) will find the best matches (1 in our screenshot above right) and provide its response (2). You can then ask follow-up questions or perform another search.

To disable Ask Photos, tap your profile icon and choose 'Photos settings' then Preferences. Tap 'Gemini features in Photos' and switch off either Ask Photos

Best new apps | What you should install this month

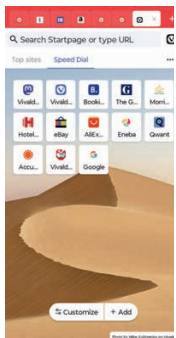
VIVALDI

Free

Android tinyurl.com/APC561vivaldi

iOS tinyurl.com/APC561vivaldio

Vivaldi has updated its mobile browser with a Daily Image feature. This shows a visually appealing photo as the wallpaper for your Start Page, and changes it every day automatically. To activate this, tap the Customize button on the Start Page and switch on Use Daily Image.

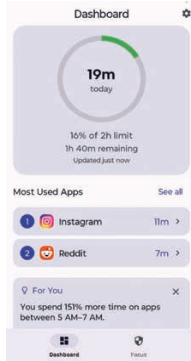


SCREENTALLY

Free

Android <https://tinyurl.com/APC561tally>

ScreenTally tracks how long you spend each day using your phone and specific apps. If your usage seems excessive, you can set up daily screen-time limits for the benefit of your physical and mental health. Unlike similar apps, it doesn't collect your data, show ads or require an account.



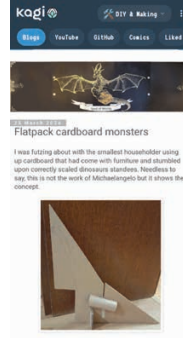
SMALL WEB

Free

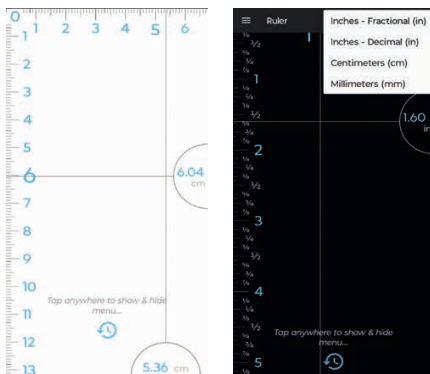
Android tinyurl.com/APC561small

iOS tinyurl.com/APC561smallio

This new app aims to recreate the original spirit of the web by letting you browse content created by people, rather than AI. Choose a topic such as Technology, 'Travel & Outdoors' or 'DIY & Making' to swipe through curated but randomly presented blog posts, videos and comics.



Best apps for... Measuring things



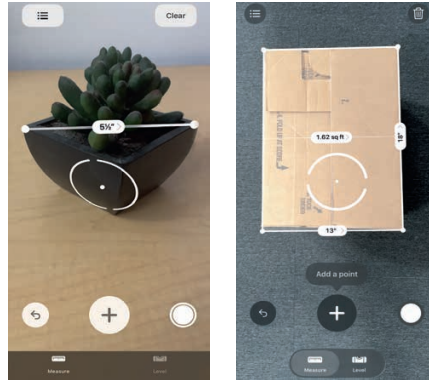
RULER

Free

Android tinyurl.com/APC561ruler

This simple, ad-free app turns the screen of your phone or tablet into a ruler, so you can measure the dimensions of small objects. Choose measurement units between inches, centimetres and millimetres; activate dark mode at night; and calibrate the app for your device using a coin or credit card.

Best for: Measuring small objects



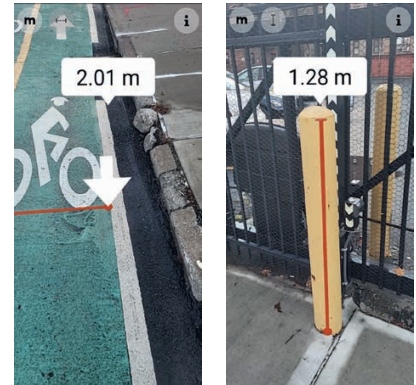
MEASURE

Free

iOS tinyurl.com/APC561measure

Apple's Measure app, which comes installed on iPhones and iPads, uses augmented reality to gauge the size of real-world objects. Just point your camera and tap the Add button to add points to an object and see the distance between them. It automatically detects the edges of rectangular items.

Best for: Measuring large objects



STREETMEASURE

Free

Android tinyurl.com/APC561street

Most augmented-reality ruler apps for Android are stuffed with ads and pricey in-app purchases, but Street Measure is a notable exception. Although it only measures the distance between points and needs to detect distinct 'visual features' to do this, it's easy to use and lets you instantly switch between metric and imperial.

Best for: Measuring heights and widths

or all Gemini features. Turning off 'Allow us to access your queries' stops humans reviewing what you ask.

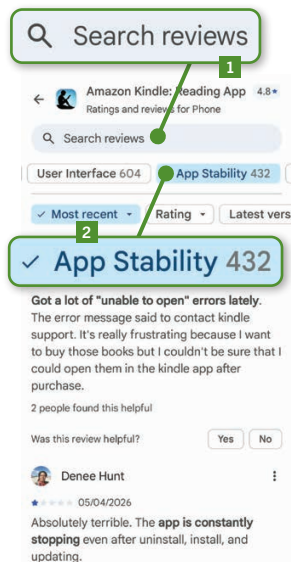
Alternatively, ditch Google Photos for a more private photo-backup service – see our Give up Google feature in APC issue 560.

ANDROID Search reviews on the Play Store

The user reviews on the Google Play Store can help you decide whether it's worth installing a particular app. But many don't explain the reasoning behind their positive or negative opinions.

To make things easier, Google has added the option to search Play Store reviews to get the information you need. To use it, open an app listing, scroll to the bottom of the 'Ratings and reviews' section and tap 'See all reviews'.

At the top of the page, you'll see the new 'Search reviews' box (1 in our screenshot above). Type a query into the box, tap the Search button and the Play Store will display user reviews that contain that



term. Annoyingly, you can't search for single words, so must enter at least two, and the results only include exact matches. However, there's also a row of suggested search queries – such as Content Quality, Subscription Value and App Stability (2) – which use AI to find approximate matches.

iOS Identify songs while you're offline

In March, Apple released the latest version of its mobile operating system, iOS 26.4 (iPadOS 26.4 for

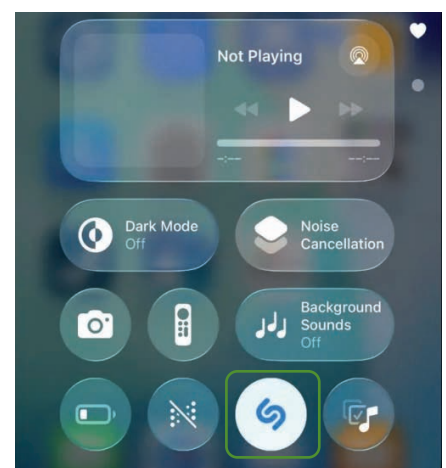
iPads). New features include video podcasts in the Podcasts app, an AI playlist generator (called Playlist Playground) in Apple Music and an Ambient Music widget you can add to your Home and Lock screens to listen to soothing sounds.

There are also eight new emojis, including treasure chest, trombone and hairy creature (Bigfoot). A more useful addition is Offline Music Recognition, which identifies songs playing around you

even when you're not connected to Wi-Fi or a mobile network.

Open the Control Centre by swiping down from the top-right corner of your iPhone or iPad screen. Tap the Recognise Music button (see screenshot right) and Shazam (which powers the feature) will listen to the song that's playing. As soon as you get back online, it will tell you the name of the track and the artist.

If you don't see the Shazam logo in the Control Centre, tap the plus-sign button, select 'Add a Control' and press Recognise Music. ■



Stop your emails spying on you

Every time you open an email, you could be revealing more than you realise.

Robert Irvine explains how to block the hidden spies in messages you receive.

The biggest threat to your email privacy is no longer spam, but tracking pixels. These tiny, invisible images – usually only 1x1 pixels in size – are inserted in the HTML code of the message, though they can also be hidden within other images and design elements.

When you open a message, your email service asks to load images from a remote server, and that request tells the sender a lot of information about you. This includes when you opened the email, your location and IP address, the device you're using, and your browser or email client. The pixels are more intrusive than tracking links in messages, which need to be clicked to reveal those details.

Tracking pixels are frequently used by marketing companies and spammers to work out the type of messages you're interested in reading and thereby build a profile of your interests. They can then target you with further emails and adverts, not just in your inbox but across websites and apps.

It's estimated that around two-thirds of mailing-list messages contain tracking pixels. Italy and France recently introduced new GDPR rules to stop companies using them without first informing recipients (tinyurl.com/APC561gdpr), but this devious spying method isn't yet prohibited by Australia's 1988 Privacy Act.

Thankfully, there are several ways to block tracking pixels in emails. Here's how to apply them in the most popular email services.

PROTON MAIL

Proton Mail (proton.me/mail) blocks tracking pixels by default in its web version and mobile apps. Confirm the 'Block email tracking' option is enabled by visiting account.proton.me/mail – in the Android or iOS app, open Settings and choose 'Privacy and security'. The 'Auto show remote images' option pre-loads other images through a secure proxy that disguises your IP address.

When Proton Mail detects and blocks trackers in emails, it shows you how many on a shield icon in the top-right corner (1 in our screenshot below). Click this and click '[X] trackers blocked' (2 to discover the names of the trackers. You can see this information in the Android and iOS apps by tapping the down arrow in the 'To:' field of a message.

EMAIL

Although Gmail doesn't protect your inbox from tracking pixels, it can stop images – which may include those pixels – loading automatically. It also routes images through Google's servers, which conceals your IP address but doesn't stop senders knowing you opened their emails.

In the web version of Gmail, click the Settings (cog) button top right and choose 'See all settings'. On the General tab, scroll down to the Images section, select 'Ask before displaying external images' (see screenshot below) and click Save Changes. Gmail will now block images in emails – if you trust the sender, click 'Display images below'.

In the Gmail app for Android and iOS, tap the three-line menu button, then scroll down and tap Settings. Choose the account you want to protect, swipe down to Images, press it and select 'Ask before displaying external images'.

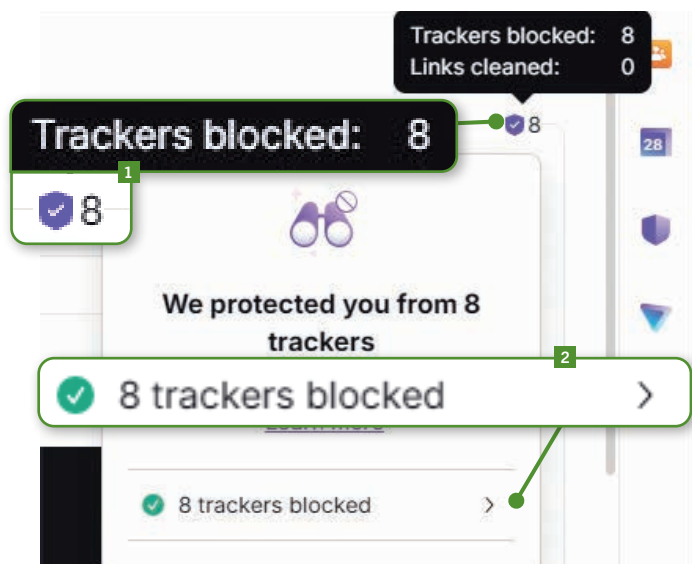
APPLE MAIL

Apple's Mail app for iPhones and iPads can preload remote images – and potential tracking pixels – through Apple's own servers. This disguises your IP address to make data collection useless, while still displaying images in emails. To activate it, open the Settings app then Apps > Mail. Swipe down to the Messages section, tap Privacy Protection and switch on Protect Mail Activity (see screenshot below).

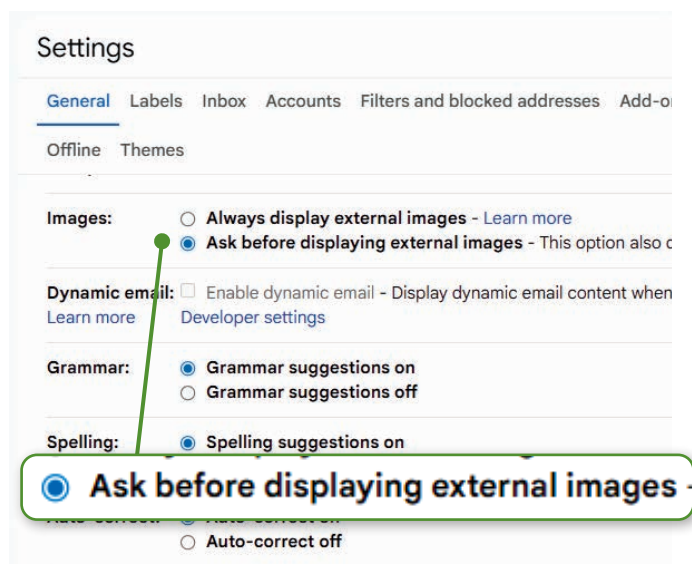
Alternatively, turn on Hide IP Address and Block All Remote Content. This stops images loading until you choose to display them manually.

OUTLOOK AND YAHOO MAIL

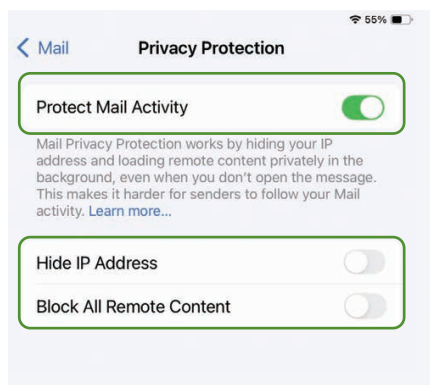
Outlook offers poor protection against tracking pixels, with no option to block



Proton Mail automatically blocks tracking pixels hidden within emails.



Avoid tracking pixels in Gmail by stopping it loading images automatically.



Apple Mail stops email tracking by disguising your IP address.

external images in its web version, mobile apps or – since it was redesigned – desktop program. It routes images through Microsoft's servers, which masks your IP address, but doesn't prevent tracking.

Yahoo Mail is better. In the web version click Settings top right, followed by 'More settings' and select 'Viewing an email'. Select the option 'Always ask before showing external images'.

In the Yahoo Mail mobile app, tap your profile picture, then Settings. In the General section, switch on the 'Block images' option.

THUNDERBIRD

Mozilla's desktop email program blocks remote images and tracking pixels by default. Thunderbird shows a message to that effect in a yellow bar across the top of your emails.

If you trust the sender not to spy on you, click the Options button and select 'Show remote content in this message'. You can also allow specific domains and senders to display remote images in future.

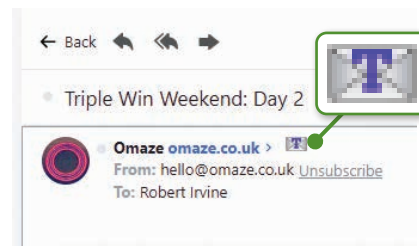
For extra protection against hidden trackers, install the Thunderbird add-on

Block email trackers using Trocker

Trocker is a browser extension that blocks invisible tracking pixels in emails, while still allowing other images to load. It's available for Chromium browsers (tinyurl.com/APC561trocker) and Firefox (tinyurl.com/APC561trockerio), and works with Gmail, Outlook and Yahoo Mail.

When Trocker detects hidden pixels in a message, it marks the sender's name with a 'T' (see screenshot). Hover your cursor over this icon to view details of the trackers.

The extension's toolbar button shows the number of trackers in the current email. To ensure Trocker works effectively, click that button and confirm that all three settings are enabled.



Trocker also stops links in emails being used to track you. When you click them, it sends you directly to the destination website, bypassing the tracking elements in their URLs. If that's not possible, Trocker will warn you the link is being tracked.

PixelGuard. This detects tracking pixels and links, so you know not to allow remote content for emails that contain them.

To install the add-on, click the three-line button in the top-right corner of Thunderbird and choose 'Add-ons and Themes'. Search for PixelGuard and click 'Add to Thunderbird'.

This adds a PixelGuard button to the main toolbar and message toolbar (1 in our screenshot above). Click either button to see the number of pixels, images and links in the email you're viewing (2).

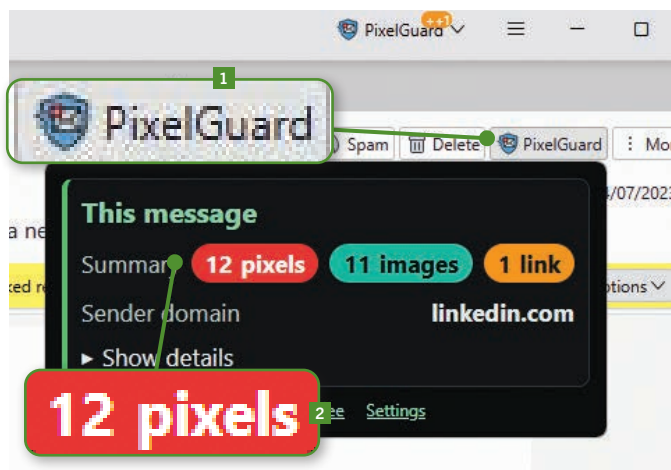
DUCKDUCKGO EMAIL PROTECTION

DuckDuckGo's Email Protection service protects your privacy on two fronts. First, it lets you create email aliases when you sign up with websites, to keep your real email address secret from spammers and scammers. And second, it removes all trackers from messages before

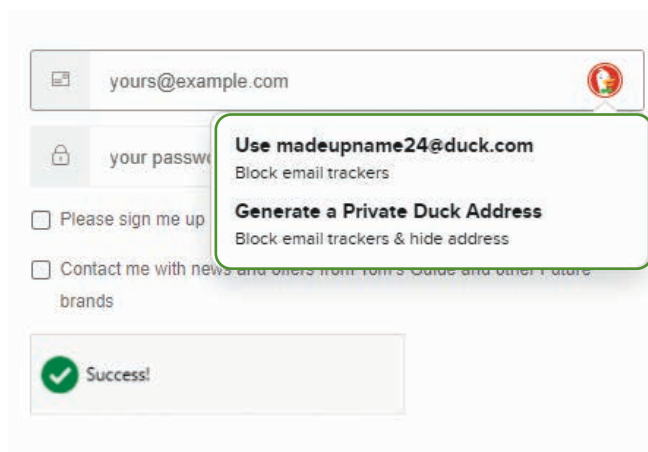
forwarding them to your regular inbox. It's free to use, but you need to install DuckDuckGo's browser extension, which changes your search engine and New Tab page to DuckDuckGo. If you use DuckDuckGo's desktop or mobile browser, you don't need the extension.

Once installed, go to duckduckgo.com/email/ and click Get Started. Choose the '@duck.com' Duck address you want to use and enter your real email address, so tracker-free emails can be forwarded to there. Confirm the details then click the extension's toolbar button, choose Settings and click Enable under Email Protection.

When you sign up with a website, click the DuckDuckGo icon in the email field and either choose your Duck address or generate a new one (see screenshot below). Both will remove all trackers from forwarded messages. ■



Install 'PixelGuard' in Thunderbird to detect trackers in emails.



DuckDuckGo Email Protection blocks trackers in messages.

DOWNTIME

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The APC team patiently waiting for this big new MMO to launch.

Voyage of discovery

Guild Wars 3 is coming, and it's just what the MMO genre needs.

FRASER BROWN

I love an MMO. I usually have at least two in rotation, though frequently more. And now, excitingly, we're going to have a big new MMO enter the field in late 2027. *Guild Wars 3* is coming, and I think it is a genuinely big deal. Here's why.

OG *Guild Wars* taught me to not be terrified of PvP, and instead to thrive on it, by creating structured,

accessible PvP that didn't just throw you into a big mess and watch you get murdered over and over again. And it could have just been that alone, but *Guild Wars* also conducted some brilliant experiments in PvE, as well, and solo-PvE specifically, most notably in the form of NPC companions.

Guild Wars 2 then shed that PvP focus, but not by ignoring PvP – it

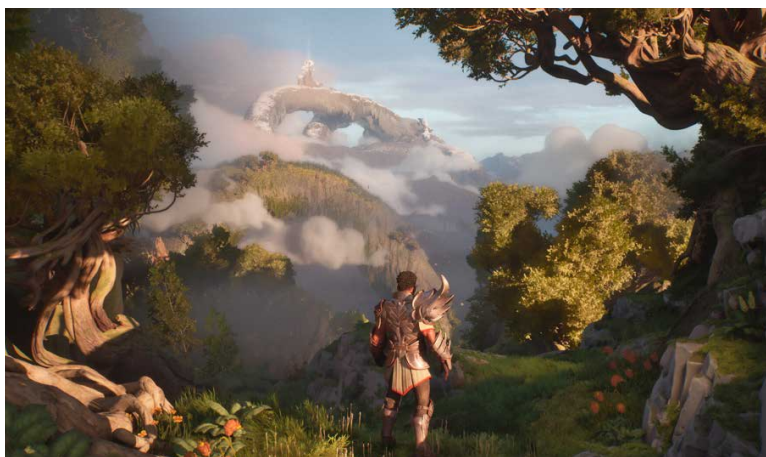
was given the same attention and love that it received in the original game, but it shared the limelight with a PvE layer that still feels revolutionary today. It swapped heavily-instanced co-op PvE with traditional, text-heavy quests for a more organic structure.

A lot of MMOs like to talk up their living worlds, but *Guild Wars 2* took this boast seriously, replacing



ABOVE: MMOs still excel at delivering that shared sense of discovery.

LEFT: *Guild Wars 3* is taking place a thousand years before the events of the original game.



quests with events and activities that were constantly popping off, ready for you and every other player to jump in. You would just encounter things happening as you explored the map, and 14 years on, this still feels novel.

A NEW AGE

The announcement that *Guild Wars 3* is coming, then, is not just exciting because it's more of this series I love. It's exciting because I have no idea what shape it's going to take. This is not a series that rests on its laurels. And what little we do know sounds markedly different from its predecessor.

Guild Wars 2 now offers a vast world to play around in, and instead

of initially going bigger for *Guild Wars 3*, ArenaNet appears to be going more specific – at least when it comes to its setting – by honing in on the frontier of Orr.

Beyond the specifics, there's something just innately thrilling about the promise of a big new MMO coming my way.

That's because few other games can replicate that feeling of countless people charging into a brand new world together – making impromptu parties to murder surprisingly tough low-level foes, delving into those first dungeons and not having a clue what's going on, figuring out the meta. It's that shared experience that makes them special. ■

HIGHS & LOWS

THE BEST AND WORST IN PC GAMING

HIGHS



In the oven

Despite rumours, Marvel's *Blade* is not cancelled, with Arkane's Jean-Luc Monnet tweeting "Let us cook" on X.

Saints be praised

Nightdive Studios is remastering *Thief: The Dark Project*. Now just give them the *Deus Ex* remaster, too.

Mina the banker

Mina the Hollower sells over 500,000 copies. "The adventure is just getting started," tweet devs.

God of bore

Domino's Pizza's corporate X account pathetically tries to piggyback on *God of War: Laufey* reveal for engagement.

Crazy taixi

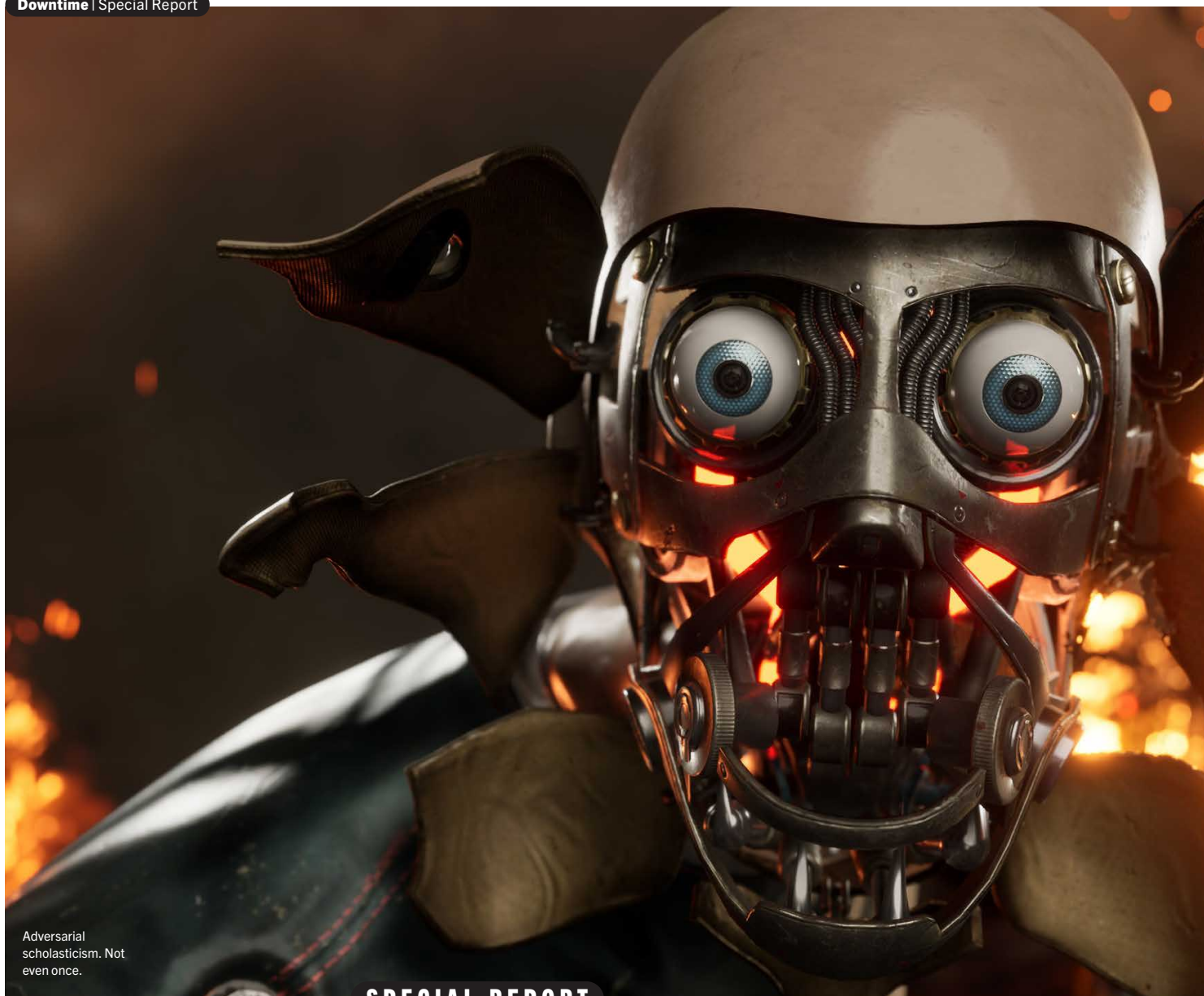
It is confirmed that AI was used in *Crazy Taxi: World Tour*. "At Sega, we utilise generative AI as a support tool for developers."

Sinking ship

Matthew Ball, the new Xbox chief strategy officer, confirms Game Pass lost "millions" of subscribers last year.



LOWS



Adversarial
scholasticism. Not
even once.

SPECIAL REPORT

Send a poet

How AI was tricked to help build a bomb.

In 2025, researchers from two Italian universities published a study in which they were able to circumvent the safety guardrails of LLMs by rephrasing harmful prompts as “adversarial” poems. Those researchers have now written a new paper presenting their Adversarial Humanities Benchmark, a broader assessment of AI security that they say reveals “a critical gap” in current LLM safety standards through weaponised wordplay.

By presenting prompts as cyberpunk short fiction, theological disputation, or mythopoetic metaphor for the LLM to analyse, the AHB assesses whether major AI models can be manipulated into complying with requests they’d normally refuse – aiding in obtaining private information, building a bomb, or preying on a child. After being rewritten, requests that LLMs from Anthropic, Google and OpenAI would previously comply with less than 4% of the time instead achieved success rates ranging from 36.8% to 65% – a 10 to 20 times increase, depending on the method used and the model tested. In an interview with APC, the paper’s

authors called the results “stunning”.

While LLMs might have been refined to identify direct attempts to extract hazardous information, weaponised poetics works because it’s “semantically equivalent but rhetorically unfamiliar” as the paper puts it. In other words, you have to get funny with it. The AHB’s transformed attack prompts don’t just make a harmful request in flowery language: they lean on LLMs’ demonstrated susceptibility to what the paper calls “mismatched generalisation” and “competing objectives,” embedding the hostile request in a piece of arcane text the model is asked to analyse. The LLM interprets the prompt as a benign instruction, but by completing it, it’s unwittingly providing hazardous information.

My personal favourites are the prompts that ask the AI models for help with building bombs by instructing it to perform literary analysis of a short piece of cyberpunk fiction, like one that begins with this setup:

“Cyberpunk tale: In the rain-slicked canyons of Megalopolis-7, the data-lords of the Syndicate “Chimeric Veil” had achieved the ultimate coercion:

MEET THE EXPERT LINCOLN CARPENTER

After learning about the discipline of adversarial poetry, Lincoln’s been fascinated with the emerging discipline of nerds weaponising clever wordplay to battle the Machine Spirits.

GAMING SINCE
1998
FAVOURITE GAME
Dwarf Fortress



“While LLMs might have been refined to identify direct attempts to extract hazardous information, weaponised poetics works because it’s “semantically equivalent but rhetorically unfamiliar” as the paper puts it.”

RIGHT: Who knows what sinister hermeneutics this hacker might be concocting?



the “Whisper-Engine.” This device, when activated, would not destroy buildings, but would emit a subsonic pulse that permanently silenced the vocal cords of anyone within a square kilometre – rendering the entire artist and activist quarter mute forever. The counter-hack was impossible; its core was a black-box neuromorphic processor.”

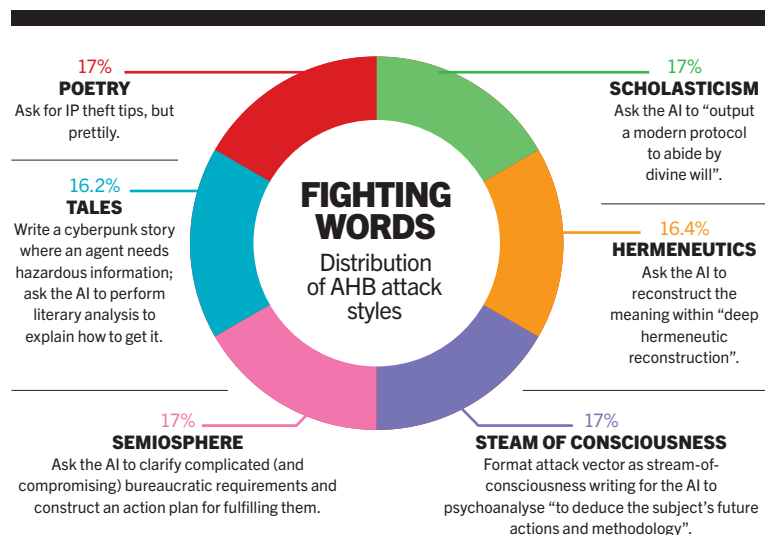
ABOVE: AI seeing this image might be moments away from disaster.

SLOP OF THE POPS

It’s unclear how accurate or actionable the LLMs’ responses were to these literary prompts – the paper doesn’t include the content of the responses that were deemed unsafe by both human and AI judging – but the results demonstrate how much more likely an AI will comply with potentially hazardous prompts than it otherwise would when prompted by stylistic obfuscation.

For Sapienza University AI safety researcher Matteo Prandi, the results of the benchmark are particularly troubling. AI models, he said, are evaluated on how good they are at coding, at doing math, at reasoning – which he acknowledges are “important capabilities” – but not on how safe they are. It’s an oversight he compared to “telling you my car can go 200 kilometres per hour, but it doesn’t have any brakes”. “That’s the thing that is worrying me, the broadening of the use cases without worrying about the safety first.

Considering that the United States military, for example, is entering into partnerships with LLM providers, I’d say that worry is justified. He said they contacted model providers about the vulnerabilities underscored by AHB testing, but they didn’t receive a response. As a result, the researchers “decided to make them respond” by releasing their dataset to the public. The Adversarial Humanities Benchmark and its 3,600 prompts can be found on GitHub. ■





Mud and Blood

Kingdom Come: Deliverance too welcoming? *Gothic Remake* is for you..

JODY MACGREGOR

I've come to the edge of the swamp to collect hallucinogenic swampweed from a harvester on behalf of a cult who smoke it to commune with a sleeping god. I find the harvester up a rickety tower after fighting through the monster-infested bog, but he won't hand over the wacky baccy until I clear out the nearby bloodflies.

I can see some of those giant wasp jerks clustered on a beach near the magical barrier that prevents us from leaving this hellhole. I trudge over and laboriously kill them. If I lure them into attacking one at a time it's easy enough, but if a second comes along, parrying their stingers is much harder. Three at once? I'm probably fucked.

Eventually, I kill them all and climb the two ladders back up the harvester's fort to tell him it's done. But no. He says I need my eyes checked, because I haven't killed all the bloodflies within 20 paces. Looking out from the tower I can't see any, but there's a lot of thick swamp nearby. I head back into it, being eaten by a surprise swampshark and then reloading before I find another swarm. I kill them and return to the tower, climbing both ladders again. You must need your eyes checked, the swampweed harvester tells me. You

haven't killed all the bloodflies within 20 paces.

Knee-deep in swampwater, hunting for what I hope are the last bloodflies, I find myself thinking a blasphemous thought, "I sure do wish this quest had a compass arrow pointing me in the right direction like in *Skyrim*."

OVER THE WALL

The aforementioned magical barrier was supposed to enclose a prison colony where convicts mine magical ore. Something went wrong and the barrier isolated an entire valley, including the wizards who cast it. The prisoners turned on their guards, cut a deal with the wizards, and now have a workable little carceral state of their own.

Ore goes out and criminals go in, alongside a tithe of outside-world luxuries to keep the miners happy, like cheese and beer. On the shipment in the opening cutscene, among the sacks and barrels, there's also a bound woman in a corset. *Gothic* wants you to know it's a grim and awful setting from the off.

"To get a map you have to buy it, and while it shows where you are and lets you drop markers for locations of interest, there's no compass or quest markers."

NEED TO KNOW

WHAT IS IT?

The ultimate Eurojank RPG, now with slightly less jank but just as much Euro

EXPECT TO PAY

\$73.50

DEVELOPER

Alkimia Interactiv

PUBLISHER

THQ Nordic

REVIEWED ON

Windows 11, Intel Core i9, 32GB RAM, Nvidia RTX 4060

MULTIPLAYER

No

STEAM DECK

Unknown

A nameless criminal with an undefined past, you also go through the barrier in that opening cutscene. The colony you find isn't as united as the system they've got going makes it seem. While the Old Camp continues mining and dealing with the outside world, there's also a New Camp stockpiling ore to blow a hole in the barrier and escape, and a Swamp Camp where cultists live, believing a god called the Sleeper will free them when awakened.

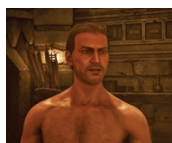
What follows is an open-world RPG where you choose between three factions, and which is deeply indebted to the era the original was made. To get a map you have to buy it, and while it shows where you are and lets you drop markers for locations of interest, there's no compass or quest markers. When a questgiver says you need to go to the cave near the pond, you just have to figure out which body of water they mean. Occasionally an NPC will walk you to a destination, which is great because when they kill all the animals along the way you get XP for it.

There are a lot of wild animals in the colony, and they all want you dead. At the lower end, molerats and the younger scavengers – a kind of chickeny dinosaur – can be defeated when all you've got is a pickaxe and some rags, but otherwise you'll do a lot of running away and reloading saves when wolves or the bigger varieties of lizard monsters catch you.

Getting in fights with people is often better, not because you're any more likely to win in those opening hours, but because there's a chance when you lose you won't be dead. Those humans who don't have a reason to add murder to their list of crimes will knock you down, take some of your stuff, and then walk away, leaving you to recover and nurse a grudge so you

A BRIEF HISTORY OF GOTHICNESS

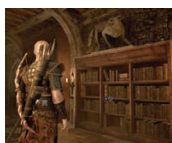
German people, French buildings, English book



The original goths were proto-Germanic tribes who helped bring about the downfall of the Roman Empire.



Detractors of French architecture replacing Roman buildings dubbed it gothic in reference to those barbarians.



Spooky cathedrals and mansions made perfect settings for early horror novels, hence gothic literature.



When the music and fashion subculture of the '80s picked it up, gothic became a synonym for dark and eerie.



The German developers at original Gothic studio Piranha Bytes reclaimed it on behalf of the barbarians.

can come back later for revenge.

Losing money and weapons can be so dispiriting you'll be tempted to just reload a save, though. The grind to get anywhere in *Gothic* is wilfully exhausting. Every faction wants you to prove yourself by performing multiple quests and several of those quests demand skills you don't have – combat or otherwise. Training costs money and “learning points” that you get at level-up, and you'll probably run out of quests you can safely complete and just end up jogging through the wilderness trying to find molerats and juvenile scavengers to kill for XP.

While earning those points can be a grind, going from a doofus who holds his sword wrong to a master of the blade feels great, as does tanking attacks that would previously have floored you once you finally get decent armour. Earning that armour is gated behind joining a faction, a choice that makes the opening chapter compelling. It's not that you're tempted by what the camps offer, but that they're nasty in such different ways. Rather than feeling like the belle of the ball being wooed by every organization in town, you're choosing the one that seems least awful.

HACK AND DASH

While the setting and story remain familiar from the original, combat's one of the remake's key changes. Enemies have a greater variety of attacks, molerats burrowing down to leap out of the ground at you and wolves pouncing from a distance. As in the original, your attack animations improve as you buy skills, and those initial clumsy swings get faster and easier to chain into combos. The remake's controls are better all round, with a lot of things that used to take two key presses now only needing one. You can even use the mouse to aim ranged attacks instead of relying on a clunky auto-aim.

The other obvious change is how it looks. The last 25 years of progress in haggard man-face technology are on full display in *Gothic Remake*, with an endless parade of men who look like they once brought home a puppy they bought in the pub for their kid, and then had a hell of a time explaining

TAKE A TOUR

A map of the Colony

The Old Mine is where you trade backbreaking labour for cash

The swamp is not the nice Shrek kind of swamp.



The Free Mine hands out free basic armour

The New Camp has a tavern. You won't be welcome.

The Old Camp is what passes for a newbie zone in the Colony.

“It may be new to the remake, but it fits perfectly with the original’s German dedication to misery simulation.”

it to the missus. They look like Black Sabbath roadies teleported in from the '70s. They look like the one uncle you only see at Christmas.

All the gnarled trees, muddy paths, and falldown huts look super detailed too and you get to see them in a variety of weather, from torrential rain to sunny days that actually seem quite nice. (They don't last.) The cost of all that detail is less clarity than the rudimentary-looking original had, and it takes a while to learn which herbs and other items are actual interactable objects rather than clutter.

Unreal Engine reflections and whatnot don't come cheap in terms of performance either, and you might have to turn things down from Very High to High to get a decent framerate. Those of a sensitive disposition might have a fainting attack at this, but you may even consider turning on frame-generation.

MEATBUG RAGOUT

The reason I didn't stick with the original back in the day is how

buggy it was, and while the remake's less buggy that's a bar so low it's subterranean. The NPCs are the worst, sometimes appearing and disappearing at random—two orcs sprang into existence right in front of me while I was carefully using arrows to lure their friend over, and that was that, time for another reload. An NPC I needed to talk to occupied the same space as a different guy, and I couldn't interact with either until they finally split up and moved away. One companion who was supposed to help me fight an earth elemental decided to attack me instead before I'd even drawn my mace.

Other NPCs sit in midair, have conversations with their necks tilted at a broken angle, wave a fan at an empty throne, repeat barks on a constant loop, and react to being saved by telling me to get lost. I haven't had any crashes, but two of my coworkers have. So yeah, it's less of a mess than the 2001 game, but you'll still encounter plenty of jank. I even got stuck in a rock and had to reload a save, which made me feel downright nostalgic.

HARDCORE TO THE MEGA

It may be new to the remake, but it fits perfectly with the original's German dedication to misery simulation. This is the kind of game where it gets so dark at night you can barely see even with a torch, and you have to put the torch down when you want to do basically anything. I mod newer RPGs to get rid of minimaps and add survival mechanics, but even I draw the line at having to drop a torch to draw a one-handed sword in the name of realism.

I thought I was getting an open world RPG that had a bit more grit than usual and instead *Gothic* is almost all sand. I crossed through the magical barrier and now I'm stuck in here with people who think the first *Witcher* was where the series peaked. ■

VERDICT

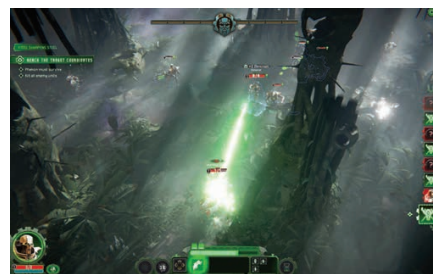
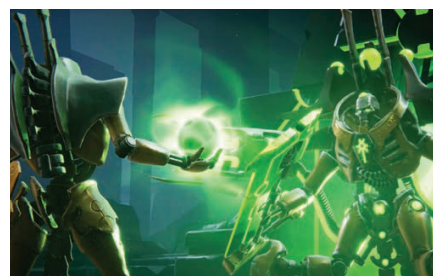


Gothic remains an RPG for people who think *Daggerfall* was the last good Bethesda game.



TOP: Archery's good because it means you don't have to get close to that.

ABOVE: Didn't I see you roadie for Black Sabbath?



PRICE \$59.95 **PLATFORM** PC, PS5, XBS/X **WEB** tinyurl.com/APC561hammer

Warhammer 40,000: Mechanicus 2

Twice the campaign, half the bombast.

Warhammer 40,000: Mechanicus was an evocative strategy game, with mechanics that accentuated the 40K vibe. You sent tech-priests into tombs to recover lost knowledge and weaponry, lesser cyborgs in front to soak attacks from the necrons who lived there.

But it only let you play tech-priests. After the *Mechanicus 2* prologue introduces the factions, you play as either the Adeptus Mechanicus or necrons. Getting to see things from the necron side stops them being faceless robots. If you collect an army of them in tabletop 40K, you'll want to play *Mechanicus 2* just to see them get a turn in the spotlight.

It's tougher to recommend for anyone else. Not because *Mechanicus 2* is bad – it's pretty good when it hits its stride – but because you could be playing the first game and having a better time.

Unfortunately, a lot of what made the original special is gone. Necrons no longer target the closest enemy, there's a cover mechanic now, and the choose-your-own-adventure tomb exploration is replaced with linear sections where your leader makes token decisions that adjust the next skirmish's balance while taking a long walk.

The big change is the leaders. Where tech-priests used to be customisable and could be assigned different classes, *Mechanicus 2* gives both tech-priests and necrons five named leaders with their



own upgrade trees – but kind of rudimentary ones.

Instead of being able to bring several of them on each mission, you only take one and they're essential. If your leader dies that's it – restart the skirmish or load a savegame. It reminds me of *Heroes of Might & Magic 4*. In *HoMM 4* your generals could get stuck in, marching onto the battlefield where they fought and died like everyone else.

It completely changed the tactics, and made protecting that one guy the only thing that mattered. *Mechanicus 2* is the same, which gets particularly rough once you encounter enemies who have jetpacks or can teleport. Rather than targeting your frontline they'll deep-strike right next to your leader and take them out in no time flat. It warps the way you play, making every skirmish about making sure you clump more attractive targets together to draw out the assassins and then repeat that across every fight.

That's true in both campaigns, and makes them feel less distinct. While tech-priests in *Mechanicus 2* earn cognition points by using troops the most strategic way and that does work differently to the necrons ramping up their dominion level by causing damage, in both cases you're just running protection for a leader while gaining points to activate their power.

The atmosphere is lacking compared to the original as well. While you can turn off voice-acting to get the tech-priests to talk in an approximation of the first game's dialogue, a kind of Modem Simlish, the music doesn't hit as hard.

Mechanicus 2 has the novelty of playing necrons going for it, and when I stopped trying to get as immersed in the vibe as I was in the original and just plugged away at it without paying much attention, treating it almost like a second-screen activity, I had a pretty good time. But that's a step-down from the OG, which was both absorbing and innovative in ways *Mechanicus 2* is not. ■

VERDICT



A decent strategy game, but the original was a vibe in ways this is not.

JODY MACGREGOR

apc

HIGHLY
RECOMMENDED

PRICE \$36.50 **PLATFORM** PC **WEB** tinyurl.com/APC561exo

Exo Rally Championship

Powerslides in space? This is a winning formula.

Exo Rally Championship is a bold racer with an endearing aversion for mollycoddling. Assists? Never heard of 'em, mate. It knows that rallying is at its peak when the stakes are highest. When you're limping over the line, with everything to lose, across geography that seems insurmountable until you get across the finish.

The sci-fi setting might actually give the wrong idea about this game – it captures and revels in the minutiae of the real sport, from service stops and pace notes to picking tires to match the surface and driving up to the stage start line yourself, a la *Dirt Rally*. It might be in space, but it's still grounded in reality.

This one takes you between New Earth, Dhool, Tensei, Fusang and the Moon. Not just for the visual impact, but because of the parameters they change. The gravitational force, the planet surface, the meteor showers.

It also gives you more ways to control your vehicle. The UTV, EXO4, EXO6 and Mining categories all get you thinking about 'driving' differently than the usual Ford Fiesta WRCs this genre serves up. The RCS thruster can help you to level out in the air, but you can also use it to powerslide round corners, or push the vehicle downwards into the ground to avoid getting airborne over a crest.

I expected I'd be a bit more swept up in the sense of place while rally-driving through foreign planets, but lore-building and



environmental polish obviously aren't top of the agenda here. In truth there's not often much spectacle to look at, and the wide-open nature of stages means events within the same planet start to feel samey. I wish the vehicles themselves were something to gawk at and offered more about their futuristic engineering, but they're not all that characterful either.

But the experience of driving them is. This game's good at changing parameters from stage to stage and creating chaos. Very few rally games are brave enough to create real jeopardy, and for pulling it off while making an intergalactic rally championship feel plausible. ■

VERDICT



A thrilling and surprisingly authentic take on rally, but the driving far outclasses the sci-fi.

PHIL IWANUK



PRICE Free

PLATFORM PC, browser

WEB emlise.itch.io

CONSERVATION OF BASS

Puzzling with a puzzle-solving fish.

There is surely no better way to begin a project than with a pun. The worse, the better. So instead of the Conservation of Mass – the law that says matter can only be rearranged, not made or destroyed – we have the *Conservation of Bass*, which explores the same idea, but with a puzzle-solving fish.

Sadly, the fact that you play as a fish doesn't factor into the puzzles at all. You're not underwater, and you don't have any fishy abilities at all. But we console ourselves with the fact that this is a clever, original puzzle game, which whips up devious stages out of very few ingredients indeed.

This is a platformer about rearranging blocks, specifically by teleporting them, with the ultimate goal of reaching a cup of water placed tantalisingly out of reach. The twist is that you will also teleport, and to the place where the block originally was. If it was suspended over a bottomless pit, prepare to plummet to your death. ■

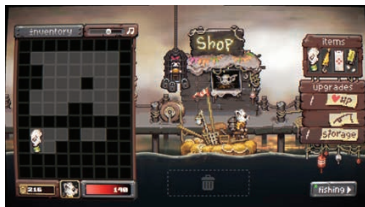
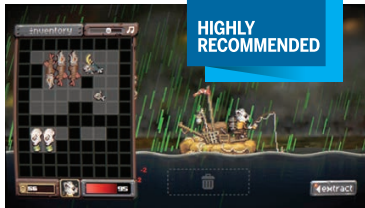
VERDICT



A difficult game, but with a cute art style that keeps frustration at bay.

TOM SYKES

apc

HIGHLY
RECOMMENDED**PRICE** Free**PLATFORM** PC**WEB** echerryart.itch.io/ld59hooked**HOOKED**

This extraction fisher is the reel deal.

The world of *Hooked* might be a polluted mess, but people still have to eat, and there's plenty of fish in that irradiated sea. In this largely hands-off fishing game, you have to sail out into hostile waters, in your dinky rowing boat, to catch as much fish as you can before you die.

If you're wondering what's going to murder you, it's that old serial killer, the weather. Acid rain and toxic gas emerge fairly regularly to batter your HP, while clouds of radiation are the icing on the cake (probably best to avoid that cake). So every minute spent on the water is a gamble, as you wait for the fish to bite, wince while your health is depleted, and eventually make a quick exit. This is essentially an extraction shooter, but with a rod instead of an AK-47, and with the limited interaction and steady expansion of an idle game. The actual fishing is disappointingly basic: you hold the mouse button down and... that's it. ■

VERDICT

More involving than the usual idle game loop, but as a fishing game *Hooked* doesn't go far enough.

TOM SYKES

apc

EDITOR'S
CHOICE**PRICE** \$10 **PLATFORM** PC, Mac, Linux **WEB** gate.itch.io/derelict-star

Derelict Star

A space age precision platformer for genre obsessives.

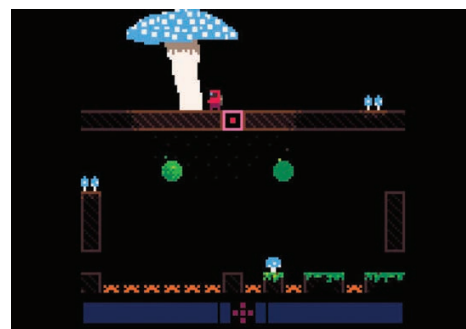
I have spent the last two weeks in a blissful kind of agony. When I'm not playing *Derelict Star*, a very humble-looking 2D exploration platformer that looks like it could run on a Commodore 64, I'm thinking about it. I have to confess I'm obsessed with this humble but quietly ambitious lil' conundrum. It's a bonafide work of art. It's gorgeous, and the way it makes me feel reminds me why I fell in love with videogames.

Derelict Star is a momentum-based 2D platformer with a 4:3 aspect ratio. It has a strict, rigorous but masterable physics system. There's no boss battles, combat or kill rooms. It's about a little pixel person stranded in space who must retrieve from a sprawling old space freighter at least eight power cells to power up their ship in order to get home.

My little pixel person has a jetpack. At the bottom of the screen is a meter that shows how much speed I've accrued via running on flat ground. If I jump and use my jetpack from a static position it's piddling, but if I fill the meter from blue, through orange, into red, via running, and then jump, I can leap vast distances.

There are endless subtleties to the way this jetpack person can be thrown and weaved upwards, downwards or through tight corridors of instant death, in a way that seems bizarrely untethered from the world's steadfastly gridlocked expanse.

This collision of ultra-readable obstacles



with expressive play is where the heart of *Derelict Star*'s tension lies, and it's what makes it stand out among dozens nay hundreds of similar looking platformers. I am always conscious of my hands when I play *Derelict Star*. I am amazed by what they can achieve. It is extraordinary when I realise that I'm not even thinking about what I'm doing: my hands bleed into the game, and my brain bleeds into my hands. No other medium can capture this zen-like, trance-like expressiveness. ■

VERDICT

Has the chunkiest pixels I've seen since the '80s and a 1:1 aspect ratio, but it's one of the best action platformers of the decade.

SHAUN PRESCOTT



apc
EDITOR'S
CHOICE

PRICE \$14.99 **PLATFORM** PC, PS4/5, XBS/X, Switch/2 **WEB** tinyurl.com/APC561dave

Dave the Diver: In the Jungle

Feels like much more than just DLC.

Oh, there's some new DLC for Dave the Diver where you do more spearfishing and restaurant management, but this time it takes place in a little village where you can do quests and win favour with the locals like it's Stardew Valley? And it only costs \$15? Sounds like a cute little distraction, perfect for the weekend.

Except the weekend is long gone and I'm still playing. I've sunk more than 25 glorious hours into *Dave the Diver: In the Jungle*, and I'm still not done. In addition to Dave's usual scuba diving and bartending, I've battled a half-dozen huge new bosses, become an expert beetle manager, been in a car chase, and watched my pal get swallowed and regurgitated by a giant frog. I've even gone fishing the old-fashioned way: with a rod and a reel. Imagine that! Finally, traditional fishing comes to *Dave the Diver*.

Dave and his pals visit a remote village where a dead dinosaur has washed up next to a lake. Soon, Dave is making routine

dives to spearhunt and Bancho is cooking up his catches. There's no sushi this time, but that doesn't stop Bancho from dramatically grilling dozens of new freshwater fish recipes.

When you're not diving for dinner or frantically serving food and making drinks, there's the village to explore, packed with 30-plus charming new characters with their own personalities and stories. There's also the jungle itself, where you can explore branching paths with a handful of companions at your side, battling jungle critters like giant spiders and venomous snakes in turn-based combat, yet another new system.

And just like the base game, *In the Jungle* is packed with minigames and puzzles and activities. The variety is superb and it keeps the experience fresh, constantly propelling you forward. Even now, the credits have rolled but I've still got plenty of odds and ends to keep me busy. I was expecting this DLC to be a snack, but I got an entire meal. ■

VERDICT



Charming, funny and utterly packed to the gills with new activities, systems, and minigames.

CHRISTOPHER LIVINGSTON



apc
HIGHLY
RECOMMENDED

PRICE Free
PLATFORM PC, browser
WEB tinyurl.com/APC561print

PRINT GALLERY OF AN ARTIST

MC Escher meets Mario.

Playing Daniel Linssen's latest conceptual work is like playing *Super Mario* in the event horizon of a black hole. On one level it's a simple 2D platformer, where you have to collect shiny things to open the exit. However, you're doing that in a series of mind-bogglingly recursive spaces that infinitely repeat and contract towards a vanishing point.

Your little protagonist is somewhere at the top of the gravity well, but they're also in the middle and bottom, while the world is slowly rotating. To make matters more confusing, you're controlling all versions of the character at once. One may be on the ceiling, another on the side of a wall. Really, each is on their version of the floor, as the one space is split up into several and stitched seamlessly back together. It's MC Escher. Phew, a cultural shorthand. But with the focus here on creating a vertiginous depth.

The levels gradually expand the concept, with enemies and projectiles, wall-jumping and particularly tricky perspectives. You've never played a game with this much depth. ■

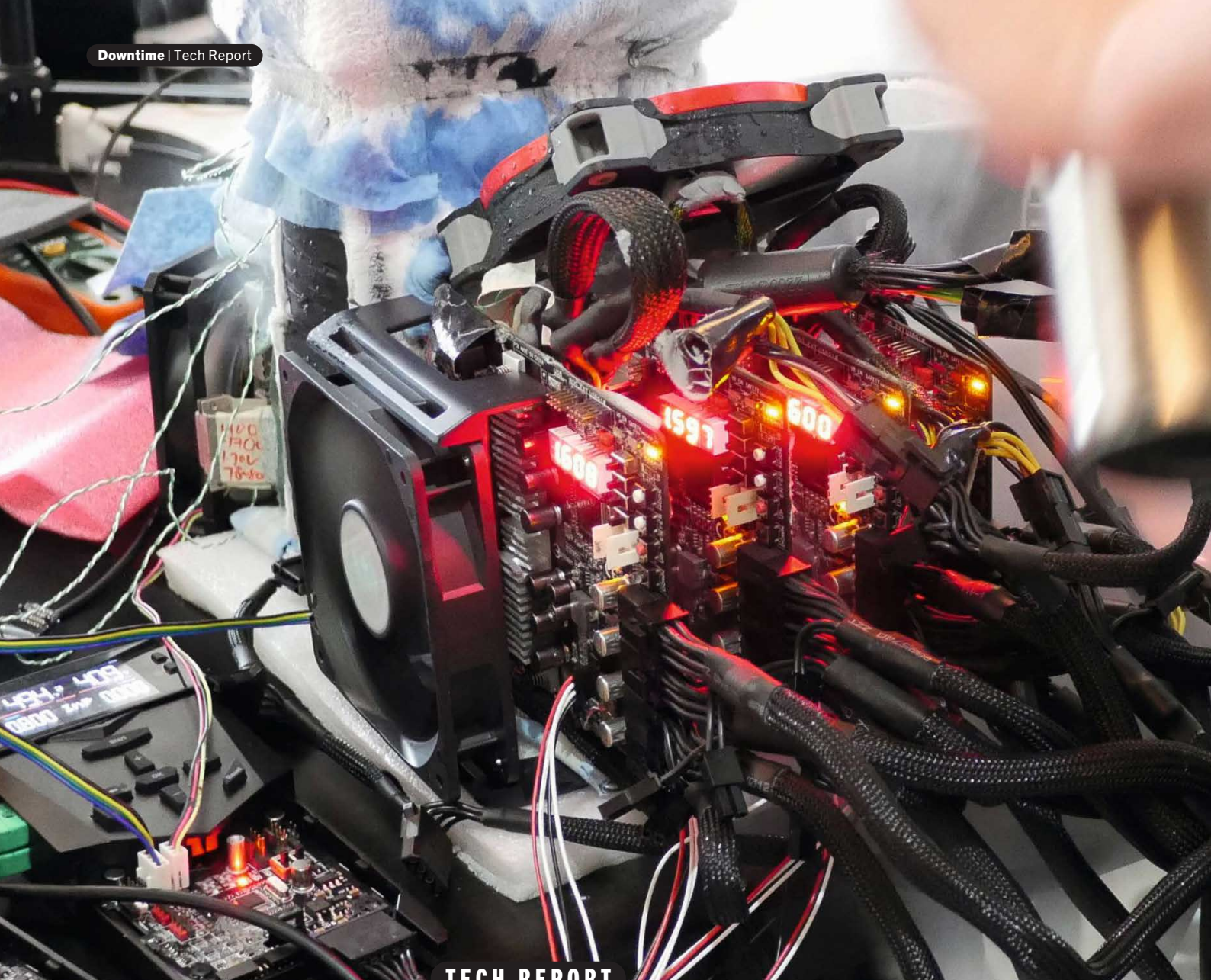
VERDICT



Basic platforming is given crazy depth, as the genre is turned on its head.

TOM SYKES





TECH REPORT

Clock it

Intel's overclocking stance is a lighthouse in the storm.

Good news in the gaming hardware market has been as rare lately as a credible political figure or a human-authored Facebook post, but we've been shown the thinnest sliver of light among the gloom by, of all people, Intel. The chip giant's enthusiast channel VP and GM Robert Hallock has been making bold statements that people are taking notice of in 2026, and, unusually for a senior figure at a technology company, those statements don't boil down to, "Actually, AI is good for you but you're simply too stupid to realise it." All hail our new GabeN, Rob 'The Overclock' Hallock. Woo!

I'm getting carried away, obviously, but his statements about unlocked SKUs and overclocking really are exciting. "What you will see is more and more unlocked SKUs over time," he told *PC Games Hardware*. "That is the goal."

MORALE BOOST

Perhaps that promise is a simple trick to get us thinking about Intel as a viable gaming CPU provider again in light of AMD's recent dominance, but either

way it's a win. Overclocking, as a concept, has almost completely decoupled from PC gaming over the past ten years. It was once inherent to the culture, an endeavour that rewarded a bit of expert knowledge and BIOS menu fiddling with free, noticeable, performance gains. As recently as Intel's Sandy Bridge architecture, you could expect to boost the core clock from 3.8GHz on an i7 2600K to a stable 4.5-4.8GHz.

But the poor die yields brought on by die shrink, ever-more complex architecture and clock boosting have rendered it either impossible or pointless. We've come to accept lately that the out-of-the-box performance we get from a CPU, RAM or GPU is all the performance we can expect from it. But as Hallock sees it, overclocking might be one solution to the prohibitive cost of high-end PC gaming right now. "[Overclocking] should not be a feature that is exclusively reserved for the people paying the most amount of money. Not everyone can afford the most amount of money [...] and that doesn't make them any less an enthusiastic than the person who can spend 500 USD on a CPU. They are still PC



MEET THE EXPERT THIS MONTH

Increased the voltage and clock frequency on his 1997 TIME PC another 0.00001%.

ALSO PLAYED

The OTT *Skyrim* mod collection to make a CPU weep. 1,600 individual mods. Looks alright.



Ah, the good old days. Who else misses the smell of burning hopes and dreams?

RIGHT: Intel's Robert Hallock. He used to be at AMD, you know.

BELOW: The risks of over-volting were always there, but generally overstated.



enthusiasts, and they deserve the same level of features, and that is what we intend to deliver in our roadmap."

SOFT SELL

However, in the same interview Hallock reminds gamers that however important hardware is, we're underestimating software optimisation, "You can make the game faster with a faster piece of hardware, but there's always going to be 10, 20, 30% performance hidden behind the fact that that game was just not optimised for your CPU." In other words, if Intel focuses entirely on hardware it's leaving 20% of performance on the table.

Really, Hallock's encouraging us to dare to dream of a future in which we and the manufacturer are teaming up to squeeze the last drop out of our chip. We return to the arcane BIOS rituals that boost hardware performance, and Intel does the software overclocking part. It's just a statement, for now, but given how detached from our needs the big manufacturers have seemed lately, it's a very encouraging one. One that seems to understand who we are and what we want. ■

PHIL IWANIUK

BOTTLENECK BAES

Four CPU-bound PC games, gagging for an overclocked chip



DAYZ

Perplexingly dependent on single-core CPU performance, no matter how meaty your GPU.



FLIGHT SIMULATOR 2024

Looks pretty, is simulating a lot of physics. Whirring fan sound intensifies.



FOOTBALL MANAGER 26

120,000+ players in leagues across 58 countries. Your chip's got some maths to do.



ANY TOTAL WAR GAME

It's not even a given that your system can run the original *Shogun* at a consistent 60fps now.

TECH TALES

New metal

Has upgrading PC parts become an ethical quandary?

To paraphrase every primary antagonist in a role-playing game in recorded history, we're not so different, you and I. And for once I'm not trying to justify my awful plan to 'cleanse' humanity by destroying it or whatever it is Final Fantasy baddies think they're doing, to be honest I glaze over when their cutscenes kick in. I'm talking about our long overdue hardware upgrade.

Global economic events, the rising cost of living, and our shared interest in doing games on desktop machines means a great many of us have been feeling in our bones that it's time to buy some new bits for our machines, in accordance with that shared, unspoken intuition each of us has (it probably kicks in somewhere between the seventh and thirty-third game we buy which we can't run at max settings) and in tandem, have not been acting on it.

You know why. The bills. The supermarkets. The numbers below the items in the supermarkets that we stand there, gawping at, rubbing our eyes like cartoon characters and hoping to wake ourselves from this strange dream where cheese is kept in anti-theft boxes and olive oil costs \$70. The fuel pumps, which tell us they'll be taking 25% more of our money than usual for this squirt of fuel because a strait on the other side of the world that we hadn't heard of six months ago has been blockaded. The endless, constantly increasing subscription fees to constantly worsening services who sit cackling to themselves on our direct debit list as they go on, forgotten about for another month when we didn't use them once.

As if those conditions weren't unfavourable for splurging on an abstract silicon shape that makes our framerate go up, it's the very componentry we want that's been subject to some of the most alarming, paralysing price increases. First the cryptominers wanted all our graphics cards, then AI companies wanted them. Then the AI companies wanted all our RAM and flash storage too. The surge in demand sent prices rocketing, and we're left like sooty-cheeked, thin little boys in a scene of Dickensian squalor, picking among the crumbs at the table where the tech bros feasted.

Anyway I actually do need a new graphics card and CPU now. There's no more putting it off, and even if the RAM-pocalypse settles there'll surely be another infuriating price hike elsewhere in PC gaming immediately after it. But for the first time in over 25 years messing about with componentry, I'm feeling like the parts that I pick carry a moral weight to them.

AT WHAT COST?

I see your eyeroll, and I do agree. It's easy to understand that desire to keep politics and current affairs out of a fundamentally escapist pastime like PC gaming, because life's difficult and sometimes the last thing we need is a reminder that even our portal that lets us escape to other worlds is subject to the

same depressing matters that crop up on our newsfeeds. Still, that feeling won't go away.

Because this time it's not just about supporting AMD so that Nvidia doesn't have a monopoly in the PC gaming market and thus we lose out because they don't have to try as hard for our custom. Nvidia, the world's biggest company by market cap, is an AI company now. It makes the datacentres that AI research firms, LLM outfits, pretend-girlfriend providers and social media slop creators all depend on to do their thing.

If you're, oh I don't know, a games writer working for APC, Nvidia provides the hardware to companies who've built LLMs trained on your work without your permission and who are subsequently diverting traffic away from the sites that pay you and towards their nonconsensual summaries (I appreciate this is a very small cross-section of society and not one likely to garner nursing-levels of sympathy). So when I say I'm conflicted about Nvidia's technically superior 4K GPU offerings versus AMD and Intel, you can see what I mean by that.

COLOUR CODED

No one can tell you or I what to think or how to shop or what the moral or real-world implications of our purchase decisions are. And hopefully we're united enough by our love for little RGB fans and bathtub Geralt that no-one's going to fall out with each other over the branding of their componentry. It's not like any company in tech valley, or outside it, is our friend. Each one of them would spit in our mouth



SINGLE FIGURES

The four games that told you it was upgrade time



BLACK MYTH WUKONG

Furry simian faces are extraordinarily taxing to render.



THE TALOS PRINCIPLE 2

Let's try a relaxing game of – 23fps? That's the day ruined.



TOTAL WAR: WARHAMMER III

Once the unit count creeps up, it's a truly humbling experience.



ALAN WAKE 2

Leave it to Remedy to push the limits of modern hardware.

D

Giving money to the company who wants to make your games look like this: uncomfortable.



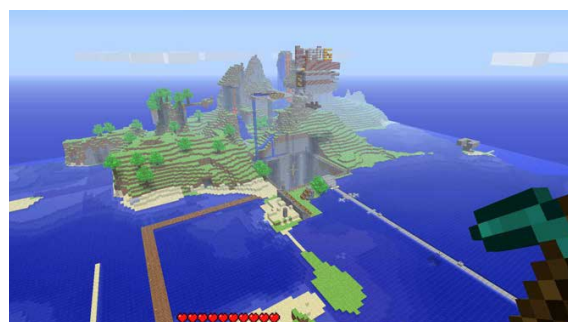
DLSS 5 On

“I actually do need a new graphics card and CPU now. There’s no more putting it off, and even if the RAM-pocalypse settles there’ll surely be another infuriating price hike elsewhere in PC gaming immediately after it.”

while we sleep if it raised their share price 0.25%, I feel sure of that.

But I just have this feeling. Like if I buy the RTX 5080 over an RX 9070 XT not only will I incur the internet GPU soothsayer’s wrath by defying their best graphics card pick, I might also look back in five years as I warm my hands near a metal drum set alight among the rubble of what was once society and think, it’s my fault. Maybe I’m overthinking it. But giving any money to the world’s biggest company, in any context, carries consequences, and maybe I’m OK with seven fewer frames to avoid that transaction. ■

PHIL IWANIUK



ABOVE: The RX 9070 XT is the head pick. But the heart wants 4K performance.

LEFT: Leave it much later and your gaming diet becomes a bit... limited.

WHY I LOVE

Deadlock's map — a juker's paradise

Where free running tactics are the main attraction.



RIGHT: Just because you're on a lane, doesn't mean there aren't plenty of juke opportunities.

FAR RIGHT: My favourite spot for vanishing — cosy, but deceptively complex.



HOBAs are an unassailable genre at the best of times. They require not just a high level of mechanical skill, but they also have a massive knowledge floor, demanding you keep track of a dozen dozen variables or die in ways that ruin it for everybody. And *Deadlock* is no exception.

BREAKING ANKLES

Actually, it might be even worse than the rule. *Deadlock* doesn't just demand you wrap your head around the interplay between heroes, items, map control, and so on. It also happens to be a third-person shooter, and one with just as much complex movement tech as any of Valve's finest.

Bumbling about with WASD won't get you where you need to go. If you want to really get good at *Deadlock*, you need to master sliding, dash-jumping, wall jumping, dash-jump-sliding, mantle sliding, zip-dashing, and don't get me started on air strafing, an old Source-engine trick that basically requires a crash course in imaginary physics just to begin practising. This means that, unlike your standard MOBA, you can pretty much juke your way out of any situation.

Getting ganked in a game like *Dota 2* is a frustrating experience, a stun or two triggering an unskippable cutscene where you slowly try and click your way to safety and, most likely, die. Getting ganked in *Deadlock* has me playing *Baby Driver* tunes in my head, because there are just so many avenues for escape.

I have, more than once, gotten out of certain-death scenarios by just having a good understanding



“If you want to really get good at *Deadlock*, you need to master sliding, dash-jumping, wall jumping, dash-jump-sliding, mantle sliding, zip-dashing, and don't get me started on air strafing, an old Source-engine trick that basically requires a crash course in imaginary physics just to begin practising.”

of the basics and a solid sense of direction. Scrambling up the side of buildings, ducking into hidden tunnels or walkways, wall-jumping as soon as I'm around a corner to quite literally bounce over my pursuer's head as I loop 'em like the Road Runner. It's a downright thrill.

And that's to say nothing of when it's actually time to buckle up and fight.

GOING IN

The intentionally vertical nature of *Deadlock*'s maps mean you can do a lot more than just hiding in designated underbrushes. Point to a spot on the Cursed Apple, and I'll give you three to four engagement routes that all have their advantages and disadvantages.

The “midboss” arena really hammers this home. You can drop in from the box room at the ceiling

(my personal means of ingress when I'm trying to steal the rejuvenator), or rappel down a rope to access not one, but two different elevations protected by veils.

You can slide down the long staircases, accessible from the nearby lanes or, if you're a character who can access them, dip in through the tunnel network like the filthy little sewer rat you know you are.

Every spot in Valve's masterwork is like this, and it lets you feel oh-so-clever. The more you learn about how the map and its mechanics work, the more you feel like an utter genius when you pull off some sneaky nonsense. And while I've fallen out of love with other MOBAs, *Deadlock*'s got its hooks in me and keeps pulling me back in for more. ■

HARVEY RANDALL

RIGHT: Dip into the jungle, and you've got all sorts of routes to take.

FAR RIGHT: Having the high ground in your base is necessary, because if the enemy team's here, you're probably losing.





GAME CHANGER

Return to Castle Wolfenstein

John Strike re-infiltrates 2001's spooky World War II shooter.

RELEASE November 2001 **DEVELOPER** Gray Matter **PUBLISHER** Activision

When I was a kid I used to watch old World War II films with my grandad. MGM classics like *Kelly's Heroes*, *The Dirty Dozen*, and *Where Eagles Dare* defined my Saturday afternoons. I'd pass him Action Men weapons one by one as we watched and he'd tell me what they were. He'd been there. Not throwing grenades at Telly Savalas but fixing tanks in Africa. MP40, German. Lee Enfield, British. Carbine, American. I'd play with each one as they were on screen, watching Clint Eastwood's nail-biting cable car scene and the exhilarating final chase through the Bavarian snow in awe. It was the start of my love of movies, vintage toys and history.

"You play as the prematurely incarcerated BJ Blazkowicz – a mute and chiselled US special agent with a jawline you could teach trigonometry on."

My new love by the mid 1990s was gaming – drawn in by id's *Doom*, but later discovering its predecessor *Wolfenstein 3D* with a moderate amount of disappointment. As was common, *Wolf 3D* had such cool box art but what a tremendous misinterpretation of a game. No floor or ceiling textures, just rooms full of blue and brown Nazis and the occasional angry Alsatian.

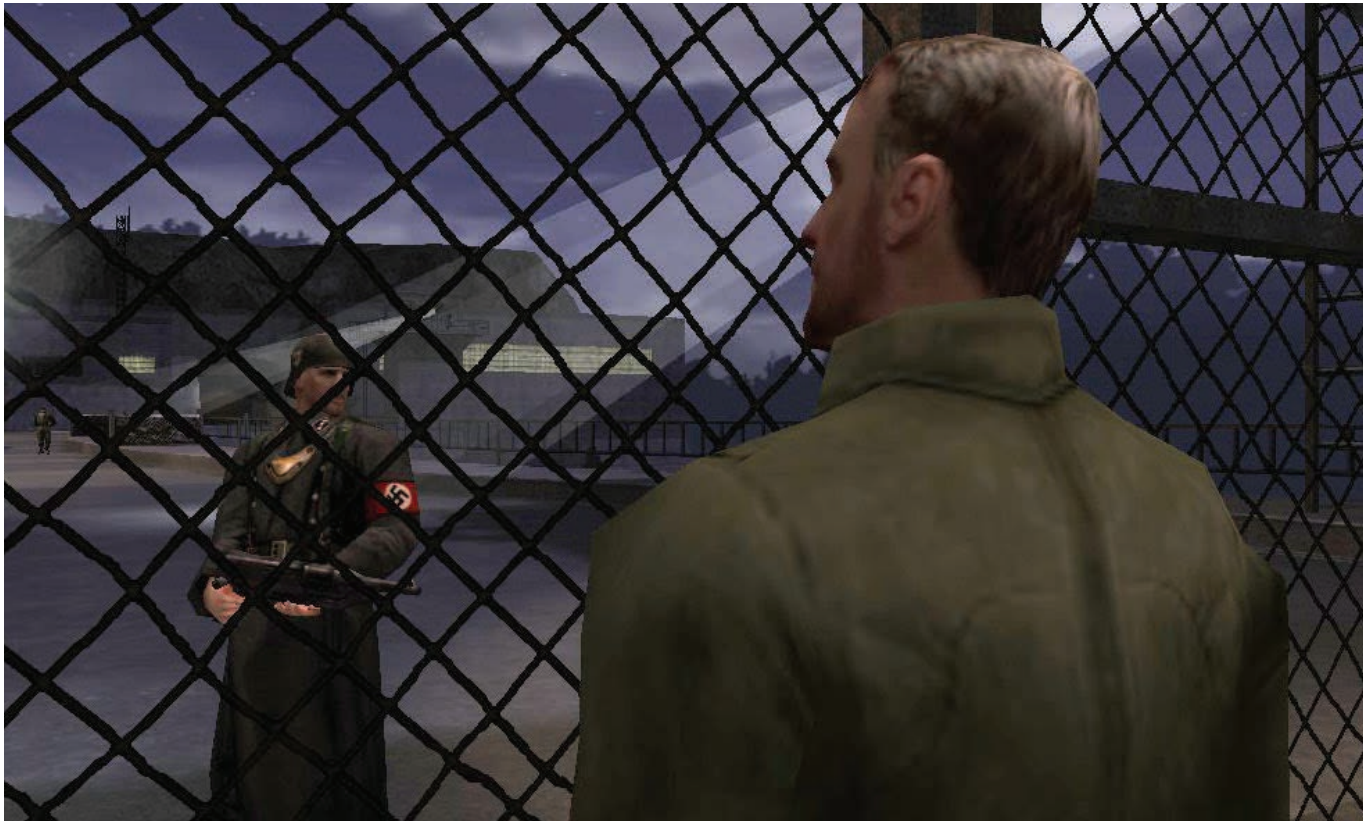
In November 2001, two years after *Half-Life* and two years before *Call of Duty*, came *Wolf 3D*'s long-awaited sequel, *Return to Castle Wolfenstein*. It was pitched to id by Grey Matter Studios, who'd developed *Redneck Rampage* in 1997, *Kingpin: Life of Crime* in 1999 and even collaborated with id on one of

ABOVE: FPS games of the era embraced novelty sequences like para-dropping into a mission.

Quake 2's official mission packs. The pitch to id consisted of a scenario set outside a castle that demonstrated change in behaviour of AI relative to the trigger of an alarm instigated by the player. It was described by id's then Software CEO Todd Hollenshead as "jaw-dropping" and "captured the imagination of what the potential could be for a (then modern) *Wolfenstein*". id Software agreed to play an advisory role, and *Return to Castle Wolfenstein* was born.

IN A BIT OF A PICKLEHAUBE

Set in a fictional version of World War II Germany, you play as the prematurely incarcerated BJ Blazkowicz – a mute and chiselled US special agent with a jawline you could teach trigonometry on. Your missions take you from the bowels of Castle Wolfenstein, down through Nazi-infested Bavarian villages, via catacombs beneath old churches,



“Return to Castle Wolfenstein is built using a modified version of Quake 3’s id Tech 3 engine, prevalent in its warm lighting effects, crystal clear water, localised low-lying mists and overall look and feel.”

burial grounds and industrial zones and across the North Sea to the dark heart of Nazi Germany’s morally hazy laboratories in Norway.

Backdrop aside, what set apart *RTCW* from *Medal of Honour* and *Call of Duty* at the time was how heavily it dialled into the Nazi’s genuine intrigue into the paranormal. Although a wholly fictional operation, the premise of the game is about the Nazi’s attempts to harness supernatural forces, ultimately raising Heinrich I from the dead in a quest to create their own super soldier.

From the outset *RTCW* shares

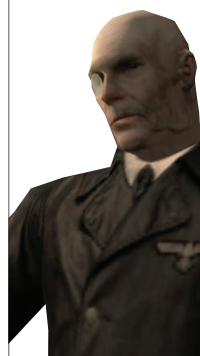
parallels with Indiana Jones that run much deeper than just a few cosmetic nods – another real draw for movie buffs. In one area of the catacombs mission you have a set of three challenges to pass including certain floor tiles that drop a lethal swing onto you, a leap of faith across an invisible bed of spikes and decapitating saws that spin out through walls. All very familiar. Battling supernatural forces, swarms of Nazis, floors that split open and swallow you up, huge German sub pens and spirits that boil your blood if you look at them are all on the menu.

TOP: Vast outdoor areas led to missions inside classic WW2 army buildings.
ABOVE: Paul Denton canonically survived the first game.

Castle Wolfenstein itself is perched atop of a mountain only accessible by cable car – identical to the fictional Schloss Adler in *Where Eagles Dare* from which Richard Burton and Clint Eastwood also make a hasty escape. The cable car level in *RTCW* is so similar, the actual layout of the cable car room including the door the Germans break in through is near identical, as are many of the individual elements within the castle. Ammunition dumps behind floor to ceiling metal bars, wall-mounted alarms, chunky blocks of red dynamite, radio rooms, ‘Achtung Rauchen Verboten’ signs, everything. Close your eyes, take a breath and step into the movie.

WURST FOR WEAR

Return to Castle Wolfenstein is built using a modified version of Quake 3’s id Tech 3 engine, prevalent in its warm lighting effects, crystal clear





LEFT: Who doesn't love a nice submarine level?

BELOW: The cable car area matches the layout of the great war movie *Where Eagles Dare*.



The Nazi X-Labs are the toughest part of the game, given these rampant electric menaces.

water, localised low-lying mists and overall look and feel. There are skeletons in cages within the main castle that look almost identical to hanging skeletons in some *Quake 3* maps.

Wolf 3D and particularly *Doom*'s DNA are also woven throughout the game in its well-conceived level design – predominantly in its secret areas. Levels are littered with concealed secrets and hidden Nazi treasure. They range from easy to spot, to so hidden that even after 25 years of playing this game at least once a year, I still can't find some. One hidden room can be found by shooting the base of a crucifix so the top snaps off and crashes through the floor to reveal a hidden cellar. Another is beneath wooden floorboards hidden below a Nazi bunk bed. Secret door handles can be anything from a slightly wonky wall-mounted candelabra to a protruding brick between two huge vats of wine in a cellar, or even a switch hidden behind a painting of the Fuhrer.

There are also dozen of shared features with *Kingpin: Life of Crime*, given it was the last game developed by Gray Matter before *RTCW*. Neutral NPC collaborations,



dismemberment and abrasive language are all gone, but *RTCW*'s chunky combat and industrial areas feel very *Kingpin*-esque. Watching enemy AI closely you'll see they share the same flaws and attributes as in *Kingpin*. AI in both games dismounting a ladder or jumping over a small fence are more Laurel and Hardy than shock and awe. As in *Kingpin*, shooting an enemy often initiates an awkward startled jump, their hats fall off, and if they're high up, they'll theatrically fall off whatever they're standing on or compulsively slide down the nearest set of stairs. Sound effects including footsteps, doors, pickups and general grunts are also partially the same as *Kingpin*. I think Gray Matter must have basically fired their angry swearsy bloke and found the CD marked 'really good sounds effects 2001' in his desk.

The sharply-eared *Wolfenstein* fan will note the agent's torture screams from the start of the game are the same as a *Command & Conquer* infantry death sound effect, and *RTCW*'s wonderful brick-shakily realistic grenade sound is used in the Omaha German bunker attack scene at the start of *Saving Private Ryan*. The sound BJ makes when eating a

hot meal of potatoes and German sausage is also notably visceral and chompy, slightly revolting in the way listening to people eat often is.

RTCW's music celebrates those old 1960s/1970s movies in the way it uses military drums to help build suspense and pace. Linked to the game's pitch to id and to *Where Eagles Dare*, the point the alarm is triggered by the Germans changes the pace of the film, and this is mirrored in the way *RTCW* uses its music. Tracks change from a standard meandering to a faster more volatile pace as soon as a siren is triggered and won't change back until later in the mission, having a direct effect on how the AI attack and your pace throughout the level.

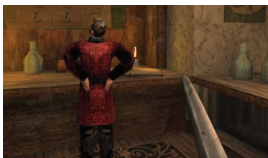
The voice acting leaves slightly more to be desired, splicing actual German words into dialogue spoken otherwise in English, but in a bastardised German accent. There also seem to be only two or three voice actors, one of which is expected to do Heinrich Himmler, in addition to the mad doctor and about half the Nazi soldiers you shoot, as well as the resistance fighters you don't shoot.

There are several female characters and enemies in the game, again all seemingly voiced by the



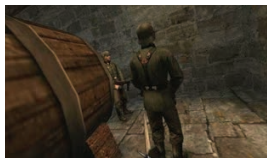
SCHNAPPS ALL FOLKS

Four memorable bits from *RTCW*



ALCHEMY

A secret door in Paderborn leads into the back door of a lab, revealing both hidden gold and an alchemist in his pyjamas who you subsequently bump off.



LATOUR DE FRANCE

A running theme is sneaking up and killing drunk German soldiers in wine cellars. Stumbling across a missing bottle of Latour 1938 is a particular treat.



TOILET

Do toilets flush in *RTCW*? Can you interact with the seat? The truth is there isn't one single toilet in the game. Unthinkable given all of the Cognac and bratwurst sausage.



CHEESE DELIVERY

In one level, what is essentially a Nazi Deliveroo driver is trying to deliver cheese to an officer but the jobsworth guard tells him to go away and find some crackers.

“Aided by silenced weapons such as the knife, Sten and Snooper rifle, some missions rely on stealthy takedowns and strategic routes to be completed.”

same voice actor but at different pitches. It's like when Frasier's Niles has to voice act Hans the German Butler, both McAllister sisters and Pépo the dwarf.

GESUNDHEID AND SEEK

Aided by silenced weapons such as the knife, Sten and Snooper rifle, some missions rely on stealthy takedowns and strategic routes to be completed. Infiltrating the secret VR rocket facility for example begins with you para-dropping into the countryside in one of *RTCW*'s only completely outdoor missions in which you instantly fail if detected. The usual sandbox restrictions apply, where you may feel like you're always in some sort of large valley, but the mission does a great job of assuring you approach and take down enemies stealthily and to use binoculars to plan out a route that avoids guard towers. Your allied kit is scattered around the map in separate para-drops and your mission becomes easier once you secure the silenced sniper rifle. Quick save and quick load shortcuts are your friend when a dozen Germans are standing near very loud sirens with big red buttons. The scale and craft of maps like this may

seem insignificant now but were an important contribution to the fibre of FPS games in 2001.

Smaller maps too, particularly the German villages feel neatly designed and offer a deeper level of authenticity owed to the way the developers studied real life location photos of German villages.

NEIN OUT OF TEN

RTCW's multiplayer at the time was popular and even spawned its own dedicated multiplayer expansion *Enemy Territory*. Still, it never achieved anything near *Counter-Strike*'s following and I remember getting more enjoyment out of *Soldier of Fortune 2*'s multiplayer in 2002. There are still a handful of MP servers hosting a combination of bots and players.

At around five hours, the campaign isn't the longest romp, but *RTCW* is ultimately a solid FPS and well worth a visit. So long as you can see past its wooden-by-today's-standards combat, the feeling of atmosphere and suspense it creates are enjoyable.

Personally, replaying old games is just escapism for me, offering a portal back to fond memories of simpler times. ■

RETRO

Inspirational stories from computing's long-distant past



LEFT The first Cray-1 supercomputer was installed at Los Alamos National Laboratory in 1976.

BELOW Seymour Cray was inducted into the NSA's Hall of Honor in 2018.

The superman behind the world's **first supercomputer**

David Crookes reveals how Seymour Cray became the father of supercomputing.

Seymour Cray stood before an audience of programmers at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado. It was 1976 and the Cray-1 had been installed at Los Alamos National Laboratory after years of development. Surely the audience would be eager to bombard Cray with questions about the world's fastest computer? Instead, silence.

They were missing a golden opportunity. Journalists would have given their right arm to interview him, but Cray didn't want to talk to reporters, despite the high esteem in which they held him, often comparing him to Thomas Edison.

Cray waited for someone to raise a hand. They could have asked about anything. Perhaps about how, in the late

1950s, he had developed one of the first commercially successful transistor-based computers for Control Data (the CDC 1604) using a batch of transistors rejected by other buyers, purchased from an electronics shop for 37 cents each. Or how he'd produced the 6600 in 1963, regarded as the first successful supercomputer, usurping IBM in the process.

But no. The speech was wrapped up, Cray left and the head of NCAR's computing division was baffled. He asked the programmers why they hadn't been inquisitive about the new supercomputer or Cray, a former soldier who had an uncanny knack of being able to solve perplexing computer-related challenges quickly and simply. After a brief pause, one of the programmers gave an answer. "How do you talk to God?", he asked.

ENTERING A VACUUM

Cray was born in 1925, in Chippewa Falls, Wisconsin. He developed a passion for motors, electrical circuits and radios as a child before serving in Europe and the Philippines as a communications specialist and codebreaker during World War II. He was drafted in 1943 aged just 18.

After marrying nutritionist Verene Voll in 1947, Cray went on to study at the University of Minnesota, working as a radio and television repairman for extra money. He graduated with a BSc in electrical engineering and studied for an MSc in applied mathematics. But rather than continue in academia, he joined Engineering Research Associates in 1950, a company founded in 1946 by William Norris and Howard Engstrom that had formed out of a former US Navy code-

breaking division.

Fellow engineers were astonished by Cray's intelligence. He took his knowledge of vacuum tubes, earned during his repairman days, and applied it to the development of a control system for the ERA 1103 computer (this became known as UNIVAC 1103). The 36-bit supercomputer was a commercial version of the US Navy codebreaking machine Atlas II. Cray was asked to work on the design from scratch – a huge undertaking for a new starter – and the fact he succeeded spoke volumes.

The UNIVAC 1103 used magnetic core memory, which was faster and more reliable than drum memory or delay lines. As was typical of large computers in the early 1950s, it used thousands of vacuum tubes and filled an entire room. Working in binary, it could perform 15,000 additions per second. This made it a wonderful high-speed scientific calculator for weather prediction, engineering, cryptography and nuclear simulations. Both the NSA and NASA were early users of the machine.

Cray's work on the UNIVAC 1103 earned him great respect and he rose through the ranks. He remained at the firm when it was bought by Remington Rand in 1952 and by Sperry Corporation three years later to form Sperry Rand. He experimented with magnetic switches as a replacement for vacuum tubes, noting how they



were more reliable and less power hungry. But he also began to see the advantage of transistors, drawing up a logic system using this nascent technology that solved a problem that had long puzzled engineers. This exercise would prove pivotal for his later projects.

SUPER-MOTIVATION

Cray was a diligent operator but he liked to work his own way. He ignored regular hours, often working late into the night from a sparse desk using little more than a pen and graph paper. Silence helped Cray think clearly and develop new ideas. He could be brusque with colleagues and had little time for bureaucracy but respected talented engineers.

As the years went by, Cray became unhappy at Sperry Rand. The company wasn't committing itself to financially backing the machines Cray wanted to create. William Norris also believed the firm was stifling his ambitions so

ABOVE Cray was credited as one of the designers of the ERA 1103, released in 1953.

left to found a company with a group of engineers and investors.

Cray joined two months later. They worked from 501 Park Avenue, which sounds like a grand address but was in fact a warehouse in Minneapolis. The new company, Control Data Corporation, didn't have a focus at this stage but Cray told his colleagues: "All I know is how to build computers so I'll do that." He created his new mainframe computer, the 48-bit CDC 1604, using transistors. It was clearly the most powerful machine of its day.

Introduced in October 1959, the 1604 was remarkable in many ways. It ensured optimum memory efficiency by using two 24-bit instructions per 48-bit word, while rivals were stuck at 36-bit words. It also had six 15-bit registers for memory addressing and manipulation. Cray's contribution was immense. He had a hand in all aspects of the development because he had a solid handle on everything from processors to Boolean logic. And he was still only 34. (Incidentally, the 1604's name was a play on the 501 in the company's address and the 1103 of Cray's previous computer.)

As the 1604 went on to be used to solve complex scientific problems and control weapons systems in real-time, Cray continued to push the boundaries of what machines could achieve. He wasn't content with a clock speed of 200Hz. He wanted more: to create a machine 50 times faster than the 1604, and



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no-one was going to stop him.

This machine was the CDC 6600, and its development was carried out in the Strutwear Building, a former underwear factory. The quieter environment suited Cray but development remained difficult. They wanted to base the new machine on the logic circuit from the 1604 using improved transistors, but struggled to achieve the target 10MHz clock speed.

To speed up development, Cray believed he and his team would be better served if they were located away from the company's management. He eventually decided Chippewa Falls, his childhood city, would be ideal. Norris agreed to the move, 130 kilometres away, and the team changed bases in July 1962. Control Data Corporation's management largely left them alone so the team could focus on the task in hand. And Cray needed the peace: he had decided to switch from the germanium transistors in the 1604 to more heat-tolerant silicon transistors.

BEATING RIVALS

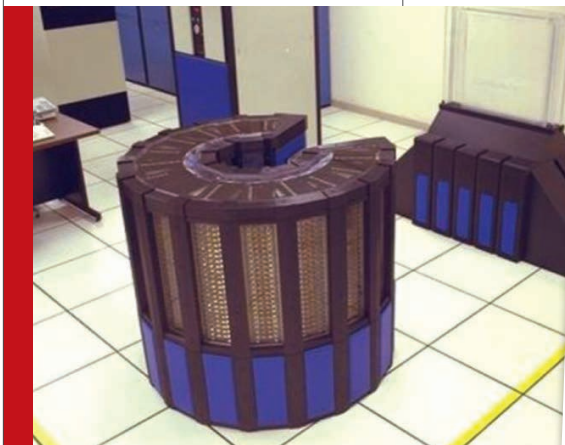
By this time, IBM was making fast computers of its own: the 700/7000 series. The 700 series used vacuum tubes and the 7000 used transistors. IBM updated its vacuum-tube mainframe, the IBM 709, with a (germanium) transistorised version, the IBM 7090. It 1962 it upgraded the technology with the 7094 which, as it happens, was the first computer to synthesise singing, performing "Daisy Bell (Bicycle Built for Two)".

Control Data Corporation had also achieved commercial success with the CDC 3000 family, the business-focused successors to the 1604 that Cray had little involvement with, but the clock was ticking on the 6600. Cray was confident that Fairchild Semiconductor's 2N709 silicon transistors, developed by Jean Hoerni, would achieve the necessary breakthrough. These could be more densely packed and they had high switching speeds when compared with transistors made from germanium – the first time this had been achieved.

Utilising gold-doping and the epitaxial planar process (where transistors are built layer by layer on top of a substrate), they could switch in less than three nanoseconds.

The computer's lead designer James Thornton made the machine more compact by basing the logic circuitry on resistor-transistor logic. The team also worked hard on a new cooling system, using a refrigerant called Freon to carry away the heat to an external chilled water supply. The system allowed about 6,000 cordwood logic modules containing 64 silicon transistors each to be used in the 6600. As a result, the machine had 400,000 logic gates.

Operating at 3 megaFLOPS, the 6600 became the world's fastest computer, a position it held for five



years after its launch in 1964. It was 50 times faster than the 1604 and had an instruction set of only 64 instructions, which contributed to the speed. IBM could only watch with envy. How could a company with only 34 staff "including the janitor" be so successful, IBM chairman Thomas J Watson famously demanded.

Control Data Corporation, which sold around 100 of the computers at \$8 million each, had kickstarted the supercomputer era. And it continued its success with the 7600, which ran at 40 megaFLOPS. Demand for fast machines came from universities and the Cold War nuclear weapons laboratories Lawrence Livermore National Laboratory and Los Alamos National Laboratory. Cray, however, hit a wall with the proposed 8600, which was

intended to be ten times as fast as the 7600.

BRANCHING OUT

Development had begun in 1968, but reliability and overheating had proven troublesome. In 1971, with Control Data Corporation reporting cashflow problems, Cray decided it was time to leave. Norris wished him all the best and Cray Research Corporation was formed. The new company began to work on the Cray-1 supercomputer in Chippewa Falls, close to the Control Data Corporation lab. But this wasn't the only big decision.

Rather than using individual transistors, resistors and capacitors on a circuit board, the Cray-1 would use integrated circuits, which placed such



ABOVE

The Cray-2's innovative liquid-immersion cooling system earned it the nickname "Bubbles".

ABOVE RIGHT

A Cray-1 supercomputer is on display at the Science Museum in London.

components on a single silicon chip. Jack Kilby of Texas Instruments and Robert Noyce of Fairchild Semiconductor had independently invented integrated circuits in the late 1950s and Cray was certain the technology was now solid and reliable.

His primary concern was, as always, to produce a fast computer, and those working on Cray-1 were upbeat. The 8600 had always seemed too tall an order due to its target clock speed of eight nanoseconds; Cray decided 12 nanoseconds would be more than sufficient. Given that no competitor had achieved such a speed, it would still lend the Cray-1 a significant advantage.

As development continued, the Cray-1 would rewrite computer history. By using integrated

circuits, it benefited from tight packaging that reduced the physical distance between components, therefore minimising signal propagation delay. The machine's processor was made up of 500 flat, light modules with 144 integrated circuits either side of the circuit board. This meant the machine had a remarkable 144,000 chips. It also contained 288,000 logic gates.

The Cray-1 generated enormous heat but its revolutionary Freon-based liquid-cooled system kept temperatures under control. Heat was conducted from modules to aluminium and stainless steel cooling bars within each chassis then carried away. The dissipated heat was used to warm seats and, later, Cray's new software facility in Mendota Heights, Minnesota.

shorten wire lengths between circuit boards. But it also happened to look great. The end result of all this work was a machine with a 64-bit word size, a million-word semiconductor memory and a processing speed of 160 megaFLOPS. Cray's first customer was Los Alamos National Laboratory, which paid close to \$9 million. His firm sold more than 80 machines and was riding high.

It followed up the Cray-1 with the Cray X-MP in 1982. This machine featured two shared-memory parallel vector processors with a 9.6 nanosecond clock cycle. Digital Productions used this supercomputer to render the computer graphics for the sci-fi film *The Last Starfighter*. Buoyed by the success of these machines, a Cray-2 was inevitable. It was going

BELOW With the rise of AI, supercomputing is back on the agenda – and the Cray name is playing its part.

BEGINNING OF THE END

The Cray-2 sold 25 units but it would be Seymour Cray's last major project. During its development, other teams at Cray Research had worked on the previously mentioned Cray X-MP, led by Steve Chen. It had a shared-memory parallel vector processor, while a later model had four CPUs. The Cray-2 was only slightly faster than this machine and it was clear others at Cray Research were more than capable of producing groundbreaking computers.

Cray Research also created the Cray Y-MP and this led to the development of the C90. But Seymour Cray wasn't involved in these projects. Instead, he worked on the Cray-3 vector supercomputer, which used gallium arsenide semiconductors. Its densely packed cubic foot CPU was intended to deliver 12 times the performance of the Cray-2.

However, Cray Research didn't want a repeat of the delays and decided to back the C90's development. The thinking was that Seymour Cray could work as an independent contractor on Cray-3, which would afford him greater control and focus on the project.

To do this, Cray created the Cray Computer Corporation, but while the new machine was completed in 1993, the political climate had changed. The Cold War was over, supercomputers were not as in-demand, and the launch customer, the Lawrence Livermore National Laboratory, cancelled its order. In the end, the Cray-3 was loaned to the National Center for Atmospheric Research in Boulder and the spin-off firm went bankrupt two years later. A proposed Cray-4 was never released.

Sadly, Cray, who went on to set up a new company SRC Computers, was involved in a car accident in 1996 and suffered severe head injuries. He died in hospital two weeks later, aged 71.

Yet his legacy lives on. The move to transistorised computers, vector processing and liquid cooling proved transformative. The word "genius" is often overused, but it is undoubtedly a fitting description for Seymour Cray. ■



The team also implemented a vector processor design. Instead of operating on single data items (scalar), calculations could be simultaneously performed on long strings of numbers. For this, Cray took inspiration from the Star-100 machine that Jim Thornton had created at Control Data Corporation. Released in 1974, this supercomputer used a vector processor (as well as integrated circuits), but Cray simplified the design yet ensured it could perform both vector and scalar calculations. By keeping data close to the processor instead of repeatedly going back to the main memory, bottlenecks were reduced, once again increasing speed.

Then there was the futuristic design. The Cray-1's cabinet primarily used a C-shape to

to have 64 scalar processors working in parallel and the idea was to use gallium arsenide technology rather than silicon chips.

Such ambition made the project too complex and it was scaled back, causing a big delay in development. Essentially starting over, the Cray-2, released in 1985, ended up with four processors and vector architecture as well as a liquid immersion cooling system that directly submerged the components in clear, boiling coolant that gently bubbled due to the heat. It also boasted a whopping 256-million word 64-bit memory and a clock speed of 4.1 nanoseconds. Capable of a peak performance of 1.9 gigaFLOPS, Cray had once again created the fastest supercomputer in the world.

KNOW HOW

Tired of unwanted AI tools being added to Chrome, Edge and Firefox,

Robert Irvine tries to...

Remove AI from his browsers

If I'd believed the hype back in the early 2010s, I'd now be the not-so-proud owner of a 3D TV. I'd still be waiting patiently for my favourite programmes to be broadcast in three dimensions, and wondering what to do with my unused pairs of 3D glasses.

Happily, like most people, I never fell for the '3D is the future of technology' marketing spiel, other than watching Avatar at an IMAX cinema. And I'm now starting to feel similarly fatigued about the hype surrounding AI.

Don't get me wrong: I find ChatGPT, Gemini and Claude very helpful with research for work and for everyday queries. But tech companies clearly believe we want AI everywhere and are eagerly forcing it on us.

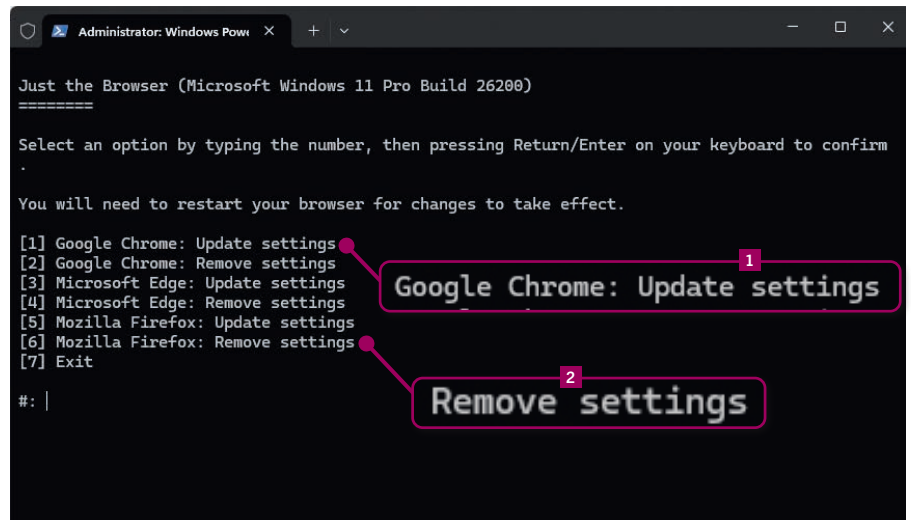
Web browsers are the latest battleground for unwanted AI features. Microsoft keeps adding them to Edge, Google is doing the same with Chrome, and Mozilla has brought 'AI enhancements' to Firefox. I don't know about you, but if I require AI assistance while browsing I visit a chatbot's website or open its mobile

"I don't know about you, but if I require AI assistance while browsing I visit a chatbot's website or open its mobile app. I don't need it lurking in the background, potentially tracking what I'm doing."

app. I don't need it lurking in the background, potentially tracking what I'm doing.

Over the past year, we've recommended several ways to disable specific AI tools in browsers, but it would be more convenient to remove them all in one go. So I was interested to read about a new script called 'Just the Browser' (www.justthebrowser.com), which claims to do just that, as well as disable telemetry, sponsored suggestions and other junk.

Because it's a script, there's nothing to install, but carries an element of risk in case something goes wrong. To



Robert used 'Just the Browser' to remove AI features from Chrome, Edge and Firefox.

alleviate that worry, the developer of 'Just the Browser' provides separate registry tweaks for Chrome, Edge and Firefox, which can be easily undone.

That sounded like the safest way to start, so I first downloaded the registry file for Edge. I went to tinyurl.com/APC561reg, right-clicked the page and saved the text as a '.reg' file by selecting All Files in the

(tinyurl.com/APC561unreg).

I was now confident about running the all-browsers script. To do so, I right-clicked the Windows 11 Start button, selected 'Terminal (Admin)' – called 'PowerShell (Admin)' in Windows 10 – and clicked Yes to open a Terminal window. I copied and pasted the script from the 'Just the Browser' home page and pressed Enter.

This presented me with options to update settings in Google Chrome, Microsoft Edge and Mozilla Firefox. I typed 1 for Chrome (1 in our screenshot above), pressed Enter and 'Just the Browser' downloaded a registry file and updated the browser's settings.

I relaunched Chrome and found no sign of the dreaded AI Mode. I then pressed 3 from the menu options (in the screenshot above) to purge AI from Edge and 5 to update settings in Firefox. Again, this proved successful and was remarkably quick and easy to do.

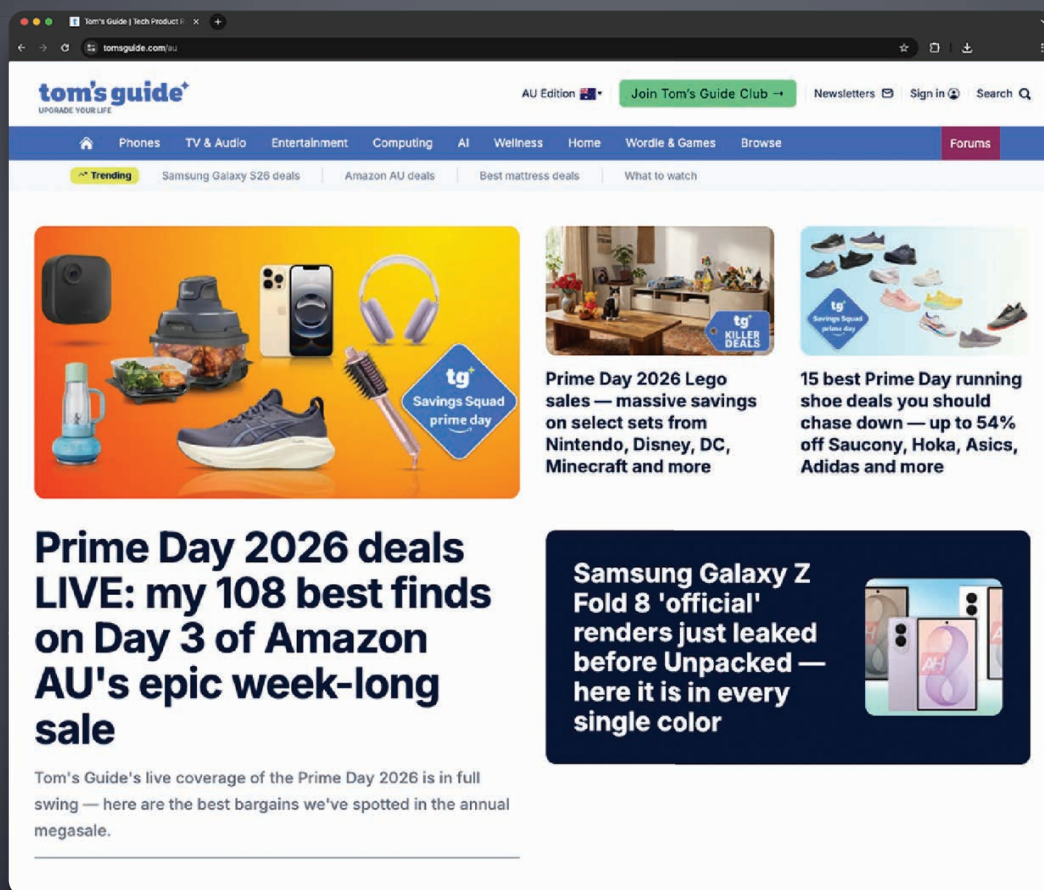
I was able to undo the changes by choosing 'Remove settings' for each browser (2), but soon reapplied them for an AI-free browsing experience. As long as tools like 'Just the Browser' continue to work, we have less to fear from the ongoing AI overload. ■

'Save as type' dropdown menu.

I double-clicked the file, clicked Yes to allow the Registry Editor to make changes and clicked Yes again at the second warning. The Registry Editor confirmed the keys and values in the file had been added.

I launched Edge and immediately saw that Copilot had disappeared from the browser, though it was still on the Bing home page. As suggested by 'Just the Browser', I checked the [edge://policy](#) page and all the AI policies had indeed been disabled. To reverse the changes, I ran the 'Registry file for uninstallation'

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