

# RYZEN 9 7950X3D REVIEW

AMD'S MONSTER GAMING CPU WORKS LIKE A PRO, TOO

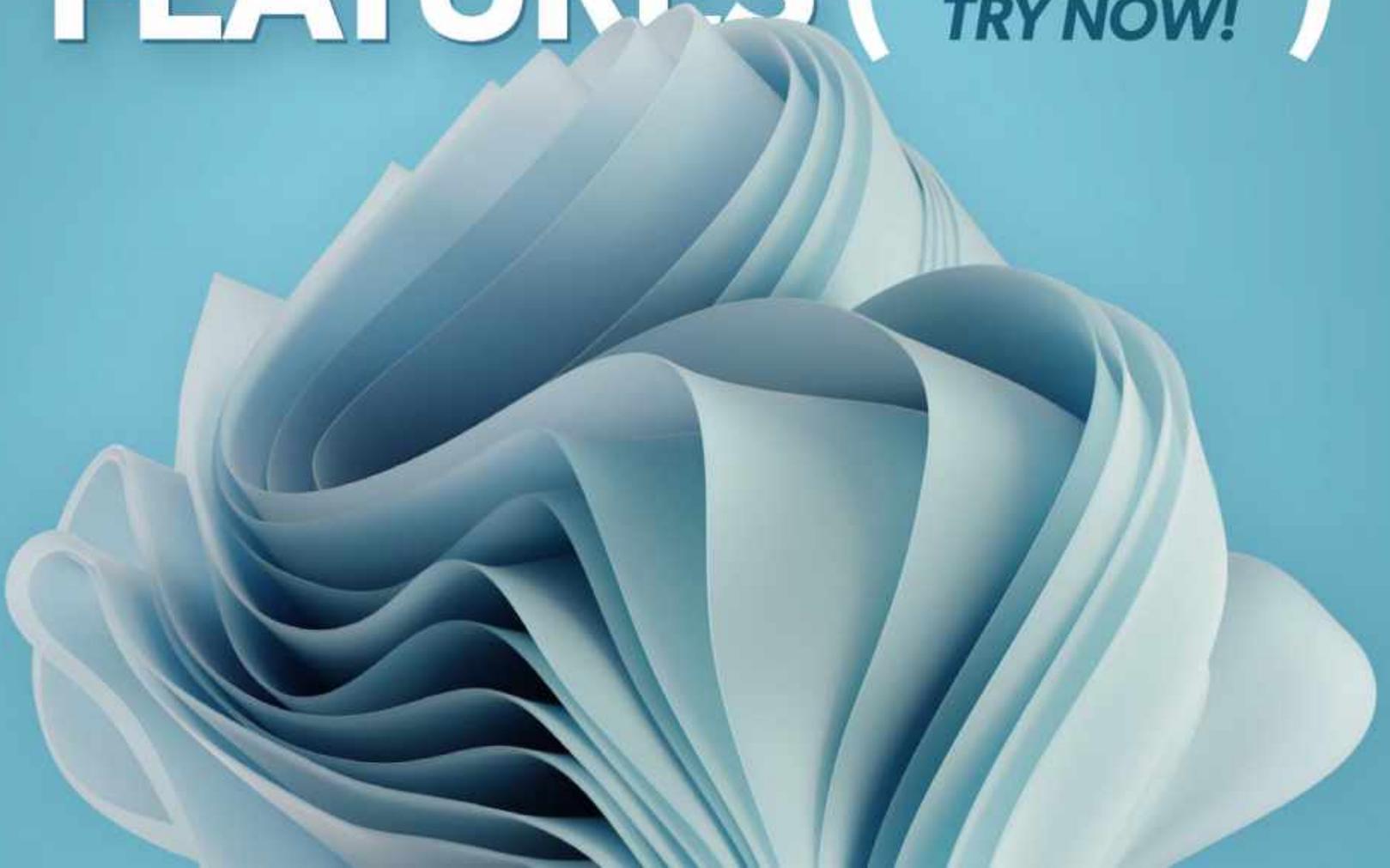
# PCWorld

APRIL 2023

## 5 NEW

# WINDOWS 11

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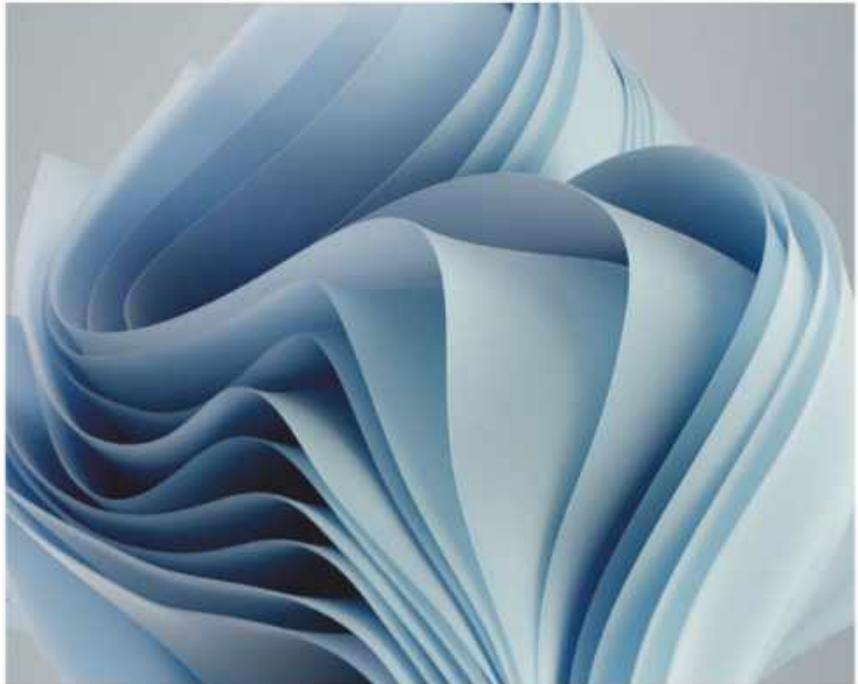


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# Windows 12 inbound? Microsoft paves the way with Insider 'Canary' channel

Be warned: The Canary Channel could break your PC. **BY MARK HACHMAN**

If you're interested in trying out the far future of Windows features—say, Windows 12?—the new Windows Insider "Canary" channel may just be right up your alley.

Microsoft debuted the fourth new Windows Insider Channel on Monday morning. "Canary" joins the other Windows Insider channels as a way for you to try out

new features before they arrive on Windows 11. Typically, the arrangement goes as follows: Release Preview is for code that's just about to be released, while the Beta Channel is code that's definitely scheduled, though a bit further out.

The Dev Channel and the new Canary Channel are more experimental. Microsoft "relaunched" the Dev Channel on Monday,

with an eye toward enthusiasts who want to try out new code that may never see the light of day. “Canary” is even riskier, and the new channel was accompanied by warnings that it could end up putting your PC into a state where you might have to reinstall Windows.

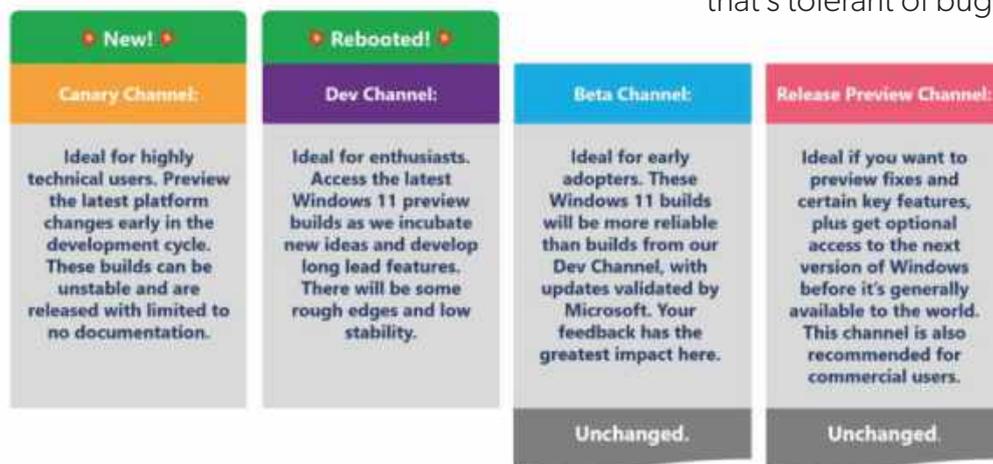
On the other hand, the Canary Channel may end up as a way for you to see what Microsoft is working on for the next release of Windows. What Microsoft *won't* do, apparently, is always tell you what those features may be. “We will offer limited documentation for the Canary Channel, but we will not publish a blog post for every flight—only when new features are available in a build. We will continue to provide blog posts for Dev, Beta, and Release Preview releases like we do normally,” Microsoft said in a blog post.

Windows Central points out ([fave.co/42IWRPC](https://fave.co/42IWRPC)) that the new channel may be used to debut so-called Windows vNext, code that won't end up in Windows 11 but may be

released in an entirely new version, aka Windows 12. Put another way, the Dev Channel is designed for enthusiasts who want to try out code within the Windows 11 timeframe, but the Canary Channel could wind up reserved for Windows 12 (or maybe 13?) experiments.

Joining the Windows Insider program for Windows 11 is easy ([fave.co/3EBGtRa](https://fave.co/3EBGtRa)). In its blog post, Microsoft suggested that now might be a good time for switching channels, which you can do via the Windows Insider portion of the Settings > Windows Update section of the Settings menu. Just remember that while it's easy to switch to more advanced channels (from Release Preview to Beta to Dev to Canary), it's more difficult to go backward. That's because Windows doesn't want you to “update” to an earlier build. In that case, you may have to reinstall Windows, which will erase all of your installed applications. In other words, Insider builds are still best left for a secondary machine that's tolerant of bugs and other glitches.

Rumor has it, though, that Windows 12 could debut in 2024 ([fave.co/42hNoZt](https://fave.co/42hNoZt)). If you'd like to roll the dice and start getting an early peek, then the Canary Channel may be for you. 



How Microsoft sees its four new Windows Insider channels.



# HP printers still block third-party ink. These models have a workaround

You can upgrade these HP printers with new firmware to allow the use of third-party ink cartridges. **BY MARK HACHMAN**

**H**P's "dynamic security" prevents you from using third-party ink with HP printers. While HP does this to "protect the quality of our customer experience," being able to buy cheaper, non-HP ink can save you money. So how can you use third-party printer ink? We have a solution for at least some models.

Unfortunately, HP's dynamic security isn't new. HP began the practice of banning unauthorized printer ink in 2016 ([fave.co/40xc1zR](https://fave.co/40xc1zR)) with a firmware update that

prevented the use of third-party ink. That hasn't stopped consumers from being outraged that they can't do what they want with printers they purchased and buy whatever third-party ink cartridges they want to use.

Last week, the topic of HP dynamic security surfaced again when users on Reddit discovered—or rediscovered—the fact that HP uses what is essentially digital rights management (DRM) on its printers to identify authentic HP printer ink cartridges and

prevent the use of unauthorized cartridges ([fave.co/3FvbVR9](https://fave.co/3FvbVR9)). Ars Technica noted the issue, pointing out that HP is currently facing a class-action lawsuit over it as consumers attempt to legally prevent HP from blocking third-party ink ([fave.co/3JmkoqR](https://fave.co/3JmkoqR)).

HP maintains that it's doing this for your benefit, but also freely admits that it's trying to "protect" its own technology.

"The purpose of dynamic security feature is to protect HP's innovations and intellectual property, maintain the integrity of our printing systems, ensure the best customer printing experience, and protect customers from counterfeit and third-party ink cartridges that do not contain an original HP security chip and infringe HP's intellectual property," it says.

## HP PRINTERS THAT USE "DYNAMIC SECURITY" TO BLOCK THIRD-PARTY INK CARTRIDGES

HP doesn't make clear which printers use the dynamic security feature, which is what Reddit users became infuriated about—HP apparently had permitted the use of third-party ink on the OfficeJet 7740 and the OfficeJet Pro 6970, then cracked down. But HP does list some printers that can be upgraded via a firmware update to eliminate the block on third-party ink.

Even those, however, fall into two categories: printers whose dynamic security

feature can be disabled, and printers whose dynamic security feature is permanent.

**HP printers with dynamic security that can be disabled:** HP OfficeJet 6810, 6820, OfficeJet Pro 6230, 6830, 8610, 8620, 8630, 8640, 8660, X451dn/dw, X476dn/dw, X551dw, and X576dw printers.

**HP printers with dynamic security that can be disabled depending on the date of manufacture:** HP OfficeJet Pro 6970, 7740, 8210, 8700, OfficeJet 6950, PageWide 300, 400, and 500 printers. The key is the manufacturing date. If the printer was manufactured before December 1, 2016, dynamic security can be disabled via a firmware update. If the printer was manufactured after that date, however, dynamic security can not be disabled.

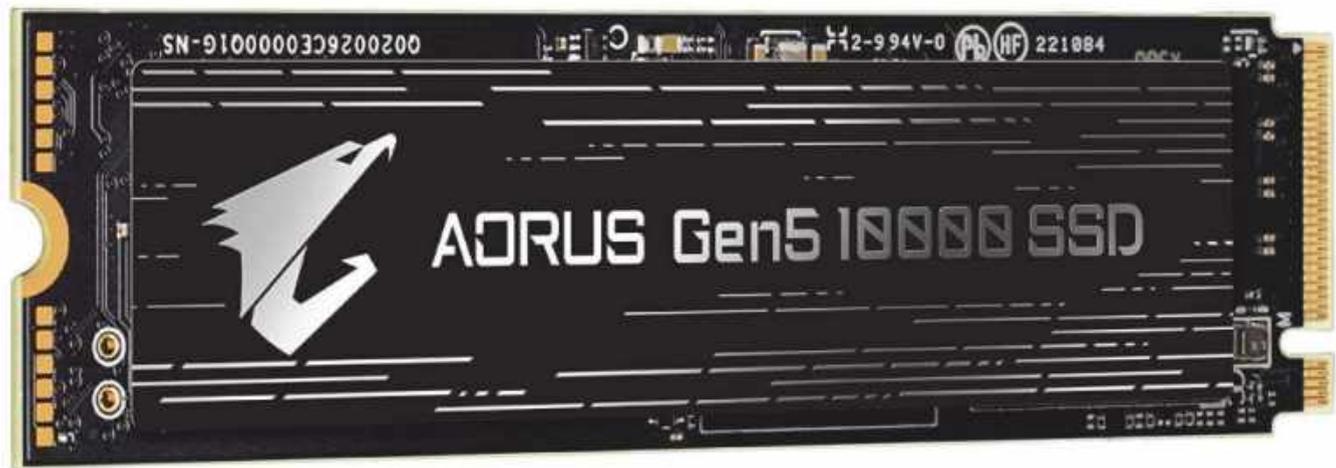
Unfortunately, that still leaves a number of other HP printers that don't allow the firmware workaround—and HP won't say which printers that applies to. To eliminate HP's block on third-party ink, you'll need to visit the printer's Software and Drivers Downloads page. There you'll find instructions on how to upgrade the printer firmware. When that's completed, HP says, you'll be able to use third-party ink with that printer.

HP still won't accept blame for whether or not the process works, however. "If the cartridge still fails after the feature is removed, then the cartridge is most likely defective and should be returned to your retailer," HP says. 

# The first hyper-fast PCIe 5.0 SSD is available now

Gigabyte is ready to sell you a Gen5 drive, if you can afford it...and if you can find it.

**BY MICHAEL CRIDER**



It seems like it's taken forever for the latest and greatest storage standard to release an updated spec, but the wait is over. Gigabyte's Aorus Gen5 SSDs, which appear to be the very first PCIe 5.0 M.2 drives to hit the market, are now available for purchase. You can get this super-fast drive, rated for read speeds up to 9,500 megabytes per second, right now...if you can find it in stock and you've been saving your pennies.

The Aorus Gen5 10000 comes in both 1TB and 2TB capacities, with that massive passive cooler ([fave.co/3LvXT5y](https://fave.co/3LvXT5y)) included in the package (you can install it in an 80mm M.2 slot with or without the cooler). According to Tom's Hardware ([fave.co/](https://fave.co/)

[3LqoAbM](https://fave.co/3LqoAbM)), the retail price of the 2TB capacity was briefly shown at \$350 on Newegg ([fave.co/3JojzJo](https://fave.co/3JojzJo))...before it instantly went out of stock, both there and on Amazon ([fave.co/3FrRRz6](https://fave.co/3FrRRz6)). So the drives are going out, but you'll have to be extremely lucky to get one of the first ones.

Of course, in order to actually take advantage of the incredible speed capacity of PCIe 5.0 ([fave.co/3LDUdyq](https://fave.co/3LDUdyq)), you'll need a motherboard that can handle it. Those have been on the market for over a year just waiting for the drives to arrive.

If you can wait a little longer, Samsung, Corsair, MSI, Patriot, and others should have competing drives out sometime this year or early next. 🔌



## Your voice can be a password. Are you protecting it like one?

AI-based technology that can clone your voice is here. **BY ALAINA YEE**

**N**ot sci-fi, but real life: Samsung introduced a voice-cloning feature ([fave.co/3yNCcGC](https://fave.co/3yNCcGC)) for their new Galaxy S phones this week. Train the Bixby mobile assistant on your S23, S23+, or S23 Ultra phone, and it'll successfully mimic you during calls. This duplication is sold as a way to answer calls whenever you're unable to talk—you instead type answers and the phone reads them to the other party in your voice.

But there's a flip side to this stuff of sci-fi dreams. AI-trained voice imitation can be also

used for nefarious purposes, as Motherboard demonstrated the very same day as Samsung's news. Using AI-generated imitations of his voice ([fave.co/3ZWtb9S](https://fave.co/3ZWtb9S)), writer Joseph Cox breezed through his bank's automated voice verification system.

Experts have warned for years of voice authentication's weaknesses; long before AI-based tools, they could be bypassed with recordings. But such scams often involved cold-calling a mark and getting them to say pertinent phrases—that is, manipulating them to say "Yes" in response to a basic question.

AI changes the game, since interaction isn't necessary for the mimicry. Nor is much of your voice necessary to train these services. Just a few minutes is enough.

In the short term, the danger isn't widespread yet. For this sort of trick to happen without your knowledge, your voice has to be publicly available. It also still requires some work. Motherboard initially failed to fool Lloyds Bank with output from ElevenLabs, the tool it used. Multiple tries and tweaks had to happen before the output passed as legitimate. And it would likely need to be combined with number spoofing or something like Samsung's Bixby call feature if a financial or other sensitive service is monitoring for other signals that you're you.

But that doesn't mean you should rest easy. Motherboard's experiment is a pointed example that biometric authentication should be treated with the same consideration as other forms of account or device protection. In this context, biometric data is a set of physical passwords—and as with any password, if the information is accessible or otherwise insecure, that weakens your security.

Your voice can be recorded. Your face can be photographed. Your fingerprint can be used while you're incapacitated. You don't need to stop using these methods of safeguarding your privacy, but their

very convenience means they're weaker forms of defense. Think of them as the equivalent of short passwords. While they'll deter some people, someone out there can bypass them more easily.

The smart use of biometric authentication is to use it for lower-stake situations—a PC where you never stay logged into sensitive sites, a phone with important apps protected by a passcode or password, and the like. And if you can't pair your voice or face with stronger measures? Disable it, if you can.

At the very least, if your bank uses voice verification, a second factor for authentication would be advisable. Because while the AI tools aren't nailing impersonations off the bat just yet, they'll continue to improve, increasing the potential threat. An ounce of prevention could be worth a pound of cure, especially if you like to stream or post videos. 🛑



**Other forms of biometric authentication can also be bypassed more easily than passcodes or passwords.**

# Amazon Basics house brand enters the PC parts market

The Amazon house brand CPU cooler is among the cheapest on the market and looks strikingly similar to a Cooler Master design. **BY MICHAEL CRIDER**



**G**reat Value, Kirkland, Signature Select, Husky—house brands, copied or repackaged products sold under a store's own label as cheap alternatives to name brands have a long and storied history at retail. But perhaps no company has embraced the idea as completely and ruthlessly as Amazon has in the digital age. The corporation's Amazon Basics brand will sell you everything from diapers to dining sets, and now it's expanding into desktop PC components.

The first individual computer part to get the Amazon Basics label is a CPU cooler, a rather unassuming little number selling for \$26.99 in the US ([fave.co/3mY8c87](https://www.amazon.com/dp/B09Y8C87)). It boasts a relatively compact design for full-size desktops, with four heat pipes and a single RGB 2000RPM 100mm cooling fan. It's compatible with the latest Intel and AMD CPU sockets: LGA 1700, 1200, 1156, 1155, 1151, 1150, plus AM4 and AM5. There's even a handy installation video for both motherboard types, with and without RGB headers.



**The first individual computer part to get the Amazon Basics label is a CPU cooler.**

Eagle-eyed readers might think the design looks a little familiar. As noted by Tom's Hardware ([fave.co/42igurD](https://www.tomshardware.com/news/amazon-basics-cpu-cooler)), the cooler appears to be either a rebadged version of the Cooler Master H410R ([fave.co/40aYrBS](https://www.coolermaster.com/products/H410R)), or a basically perfect copy of the design, minus some cosmetic badges and about 10mm in height. Neither move would be unprecedented for Amazon. The company has previously gone directly to Chinese white-box manufacturers for rebadged products, similar to retail store brands all over the world. And it's also commissioned flagrant copies of name-brand products, as in the case of Peak Design's EveryDay Sling bag ([fave.co/3FzXiMf](https://www.peakdesign.com/products/everyday-sling-bag)).

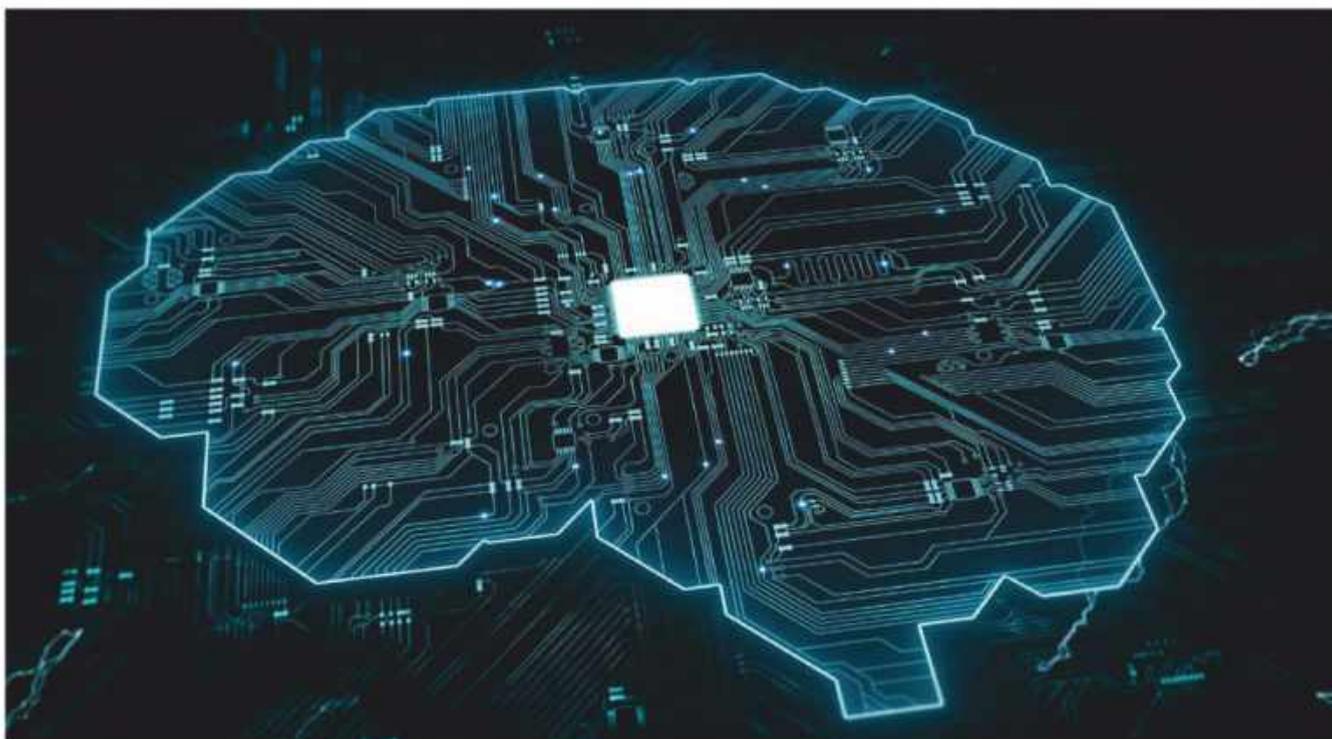
While the Amazon Basics Computer Cooling Fan is less than half the price of the H410R on Amazon ([fave.co/3YUxZLG](https://www.amazon.com/Cooler-Master-H410R-CPU-Cooler/dp/B078888888)), it's hardly the only option in its price range.

Single-fan coolers from Arctic ([fave.co/3yjhXKb](https://www.arctic.com)), Be Quiet ([fave.co/3JrimFJ](https://www.bequiet.com)), Thermaltake ([fave.co/3Ly7pVS](https://www.thermaltake.com)), and Zalman ([fave.co/3ZTcLit](https://www.zalman.com)) meet or beat its price, as do several entries from the usual weirdo brands that exist only on Amazon and other drop-shipping sites. We may or may not see Amazon offer a further variety of PC components under the

Amazon Basics brand—that will probably be decided by some maddeningly complex internal sales algorithm. 🔌



**The cooler looks a lot like the Cooler Master H410R.**



# Google's new AI features write text for Gmail, Docs, and more

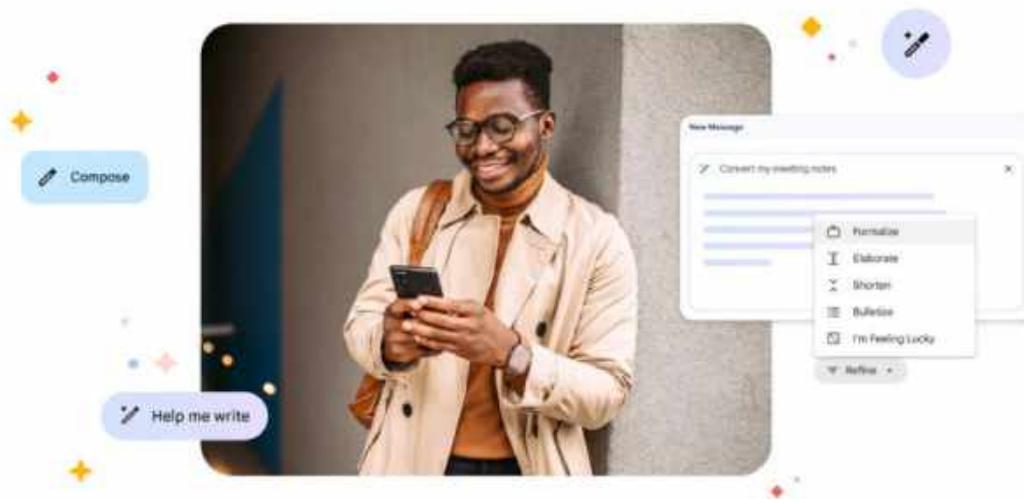
Soon you'll be able to get Google to write your Mother's Day card for you, you irredeemable monster. **BY MICHAEL CRIDER**

**A**re you tired of hearing about AI features coming to your favorite apps and tools? Well too freakin' bad—here's Google jumping on the bandwagon. In a sprawling AI topic post this morning ([fave.co/3Tluugj](https://fave.co/3Tluugj)), the company announced artificial intelligence text generation going into some of its most commonly used productivity tools, including Gmail, Google Docs, Sheets, Slides, Meet, and Chat.

If that sounds like “all the stuff Google makes to rival Microsoft Office,” it's not a

coincidence. Google is clearly trying to get ahead of its workspace rival, since Microsoft is set to announce new AI features at its Future of Work presentation just two days from now. Google recently showed off Bard ([fave.co/3YX1Vqq](https://fave.co/3YX1Vqq)), its conversational AI, quickly following Microsoft's integration of ChatGPT with the Bing search engine ([fave.co/3JqPwp0](https://fave.co/3JqPwp0)).

To its credit, the AI features announced today seem remarkably useful, especially in Gmail and Docs. If you've played with

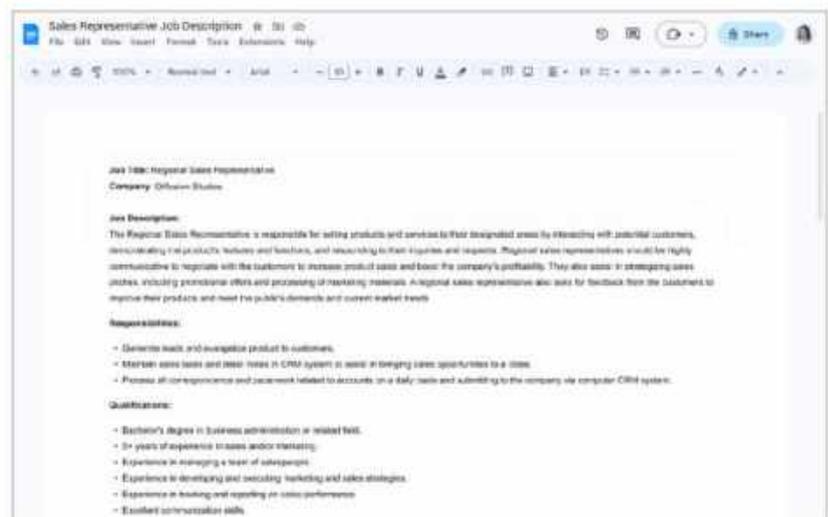
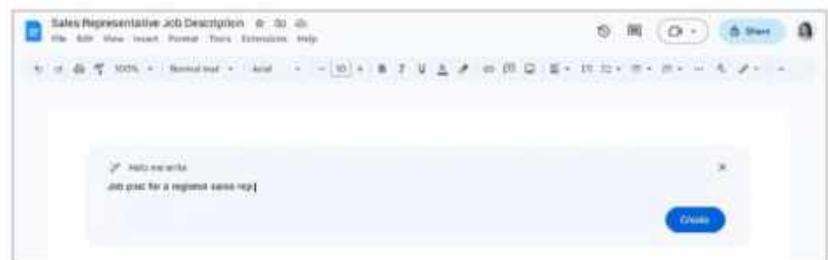


Google is adding AI text generation to some of its most commonly used productivity tools.

ChatGPT as a means of quickly writing generic text, this will seem familiar. Google's Docs example shows the user input "Job post for regional sales rep," after which the tool creates a

testers" in the next few weeks, starting with Gmail and Google Docs. Exactly when it will roll out to the much wider user base wasn't mentioned. 🛑

Text can also be adjusted by applying filter-style commands, such as "formalize," "elaborate," or "shorten." There's even an "I'm feeling lucky" button that will completely rewrite your text in a semi-random tone. With the full suite of tools, users will be able to automatically generate meeting notes and input auto-generated images, audio, and even video.



Google says that its AI tools will be available to "trusted

**Google's Docs example shows the user input "Job post for regional sales rep," after which the tool creates a full job listing.**

# Tested: Nvidia's RTX Video Super Resolution is like going from VHS to Blu-ray

RTX Video Super Resolution is a game changer for web videos. **BY BRAD CHACOS**



**T**he first time I ever saw Nvidia's AI-infused DLSS 2 technology in action, I said it works like black magic ([fave.co/3mYDLPI](https://fave.co/3mYDLPI)).

Leveraging the dedicated AI tensor cores in GeForce RTX graphics cards let Nvidia run supported games much faster than before with little to no visual downgrade. Today, Nvidia is unleashing those same tensor cores on web videos with RTX Video Super

Resolution ([fave.co/3j9icty](https://fave.co/3j9icty)) after unveiling the feature at CES 2023.

I spent the weekend playing around with the technology and I'm thrilled to report that while there are a few minor DLSS-like caveats to be aware of, RTX Video Super Resolution is an absolute game changer on par with DLSS. If you watch web videos regularly, it's a compelling reason to consider Nvidia over AMD if you're shopping for a new graphics

card ([fave.co/3DOEuWk](https://fave.co/3DOEuWk)) and use Chrome or Edge. But better yet, it's coming to existing RTX 30-series GPUs as well as Nvidia's new RTX 40-series offerings.

## WHAT IS RTX VIDEO SUPER RESOLUTION?

Let's start with a quick recap of how RTX Video Super Resolution—introduced today in Nvidia's new Game Ready Driver (531.14)—works.

As PCWorld's Keith May explains here ([fave.co/3JrLixC](https://fave.co/3JrLixC)), after you activate RTX Video Super Resolution in the Nvidia Control Panel (more on that later), it runs any video displayed in Chrome or Edge through an AI algorithm designed to drastically improve the final image.

"It runs [your video] through an algorithm that softens the darks and the blacks that get crushed and blown out and blocky, and then it's going to take all of your high-contrast areas—like user interface elements—and make them *really sharp*," Keith explained. "The final image isn't going to be a true representation of what [native 4K video] would look like, because you're working with a 1080p source, but it's going to look substantially better."

And it absolutely does.

There's a bit more happening behind the scenes, though. While Keith focused on upscaling a 1080p image to 4K in his CES video, RTX Video Super Resolution can automatically upscale a wide range of video

resolutions, from lowly 360p all the way up to 1440p. It doesn't upscale at fixed resolutions either, instead adjusting to fit the size of the display window. "Your 480p video will upres to 1080p on a 1080p screen (in full-screen mode) or somewhere between 480p and 1080p depending on the size of the playback window," Nvidia's Jordan Dodge told me, and my tests confirm the fact.

## RTX VIDEO SUPER RESOLUTION WORKS LIKE BLACK MAGIC...USUALLY

Remember the first time you ever played a game on an adaptive sync G-Sync or FreeSync monitor ([fave.co/3SRJhPe](https://fave.co/3SRJhPe))? The difference in moment-to-moment gaming feel was monumental, but it doesn't come across very well in screenshots that only capture a static image in time. RTX Video Super Resolution is similar, but you can spot some differences in freeze-frames. (I received access to the feature when our production team was busy working on Ryzen 9 7950X3D coverage [[fave.co/3YX4mJR](https://fave.co/3YX4mJR)], and I was unable to capture video footage of RTX Super Resolution in action.)

First, though, I want to talk about the experience of using RTX Video Super Resolution. Once you've tried it, you'll never want to go back to standard web video. I watched a wide variety of 1080p videos on my 4K displays, alternating between Firefox (which doesn't support VSR) and Chrome to

see the difference between native 1080p and VSR-upscaled 4K in real time, and it's flat-out revolutionary.

The biggest difference can be seen in videos with a crisp, clear, production-quality 1080p image at a high bitrate. Watching *Holey Moley* on Hulu and *Drink Masters* on Netflix with RTX Video Super Resolution Active was transformative, even on VSR's lowest quality preset. (It offers four different quality levels, with varying levels of GPU performance impact. More on that later.) On Firefox, the 1080p video looks blurry and blocky in full-screen mode stretched across my 4K panel; turning on VSR in Chrome immediately ended that, delivering a crisp, clean image that left my jaw on the floor.

Unfortunately, neither Netflix nor Hulu lets you take screenshots due to copyright protections. I was able to take some screenshots of *Drink Masters'* trailer on YouTube that somewhat highlight the potential of VSR, but YouTube's blockier lower bitrate native image means you won't see the full, borderline magical effect

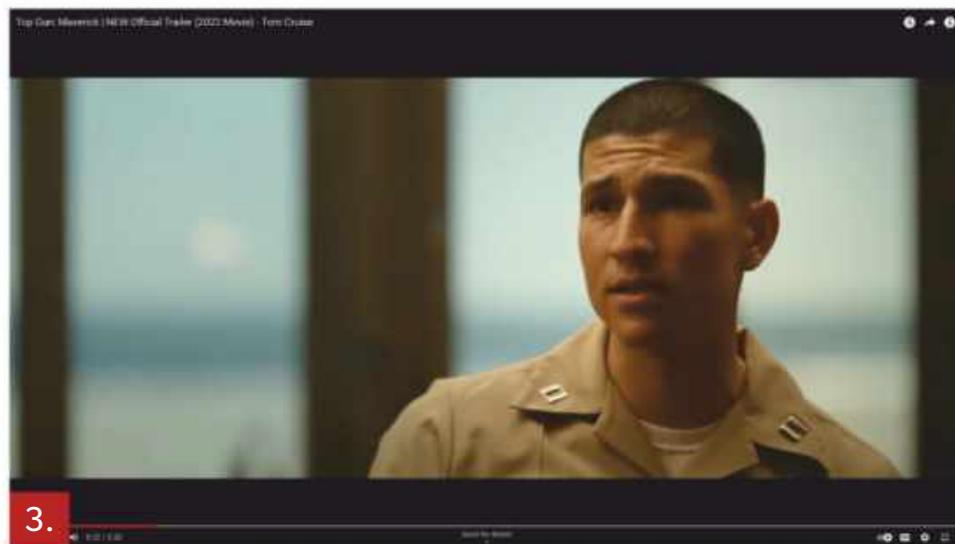
of RTX Video Super Resolution in the screenshots below.

Here's a picture from the trailer introducing the contestants. At native 1080p in Firefox, you see a lot of blurriness and blocky, jagged edges (1).

Here's the same still, taken in Chrome with VSR's highest quality preset enabled. Not only is most of the blurriness gone—and what's left can be attributed to standard motion blur—but the edges now look incredibly crisp, and the enhanced clarity



helps the colors pop more too. (Pay close attention to how the brightly shirted contestants look so much better, the smoothness around the rightmost people, and even the legibility of the bottles in the back and the Netflix logo in the corner [2].)



Under close inspection, this static image may look overly crisp and smoothed out, with more sharpening than you'd usually expect to see. It's something common to all the screenshots I took. But don't be fooled; RTX Video Super Resolution looks *stunning* in motion compared to standard web video, and you don't notice those potential nitpicks at all when a video is playing. Like DLSS, VSR can be pixel-peeped in individual frames, but the overall in-motion effect looks outstanding.

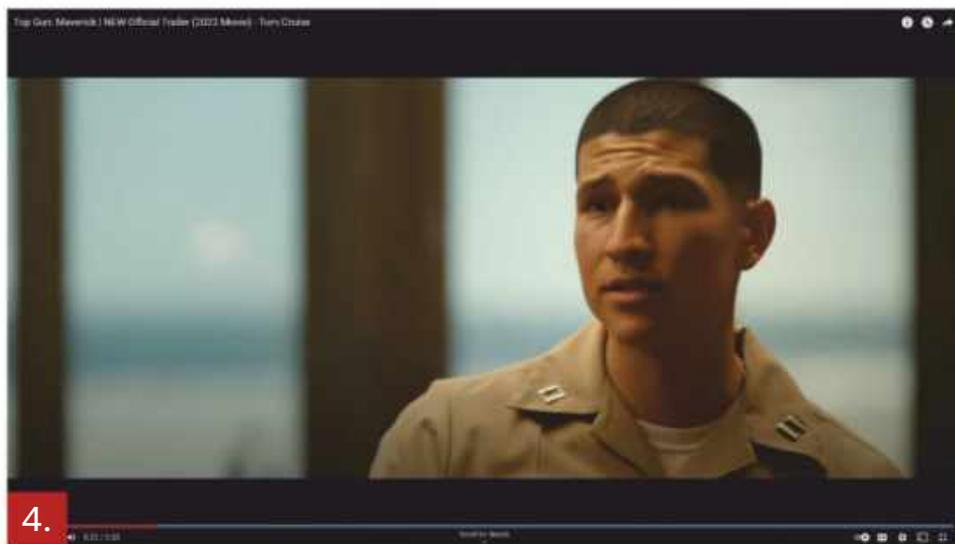
RTX Video Super Resolution also cleans up gameplay video on YouTube and Twitch to noticeable effect, but their lower bitrates somewhat stunt the impact. Watching a video of Stodeh's favorite *Call of Duty: MW2 DMZ* moments ([fave.co/3LuIG4A](https://fave.co/3LuIG4A)) definitely looks better overall with VSR active, but it has more difficulty eliminating some of the blockiness and blurriness,

especially in fast-moving scenes with complex gameplay occurring (such as when Stodeh failed a helicopter extraction and needed to pop smoke grenades with bullets whizzing by around the 1:35 mark of the linked video). It's still absolutely worth activating VSR, though.

But there are limits to its effectiveness. I also watched the *Top Gun Maverick* trailer on YouTube, manually setting the resolution to 480p (aka standard VHS definition) and watching it full-screen on my 4K display. As with DLSS, VSR's AI tensor cores can struggle when it's trying to upscale video with exceptionally low native pixel counts.

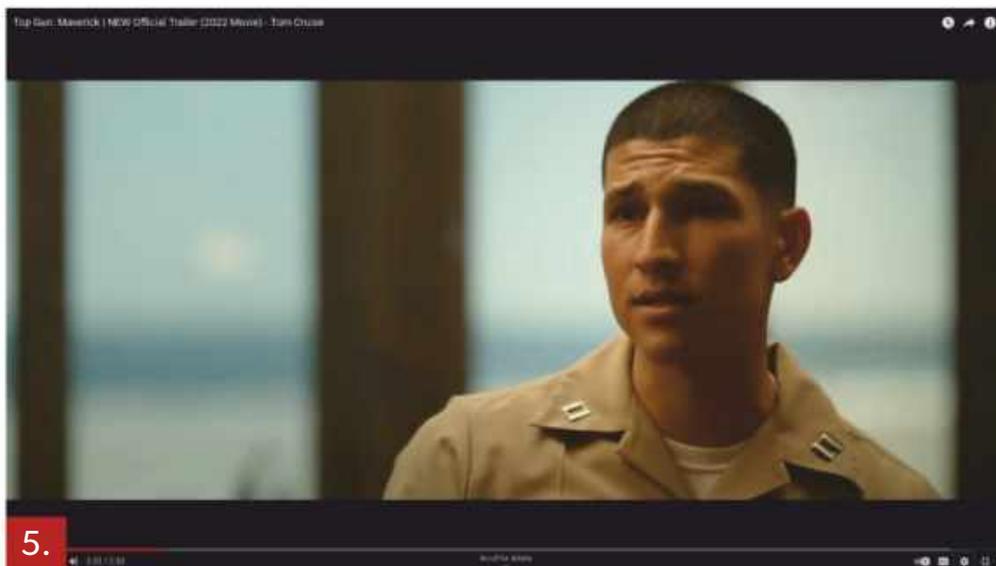
Above is a screenshot of the native 480p video running in Firefox (3). It's blurry, like you'd expect, but everything looks right.

And here's the same still upscaled via RTX Virtual Super Resolution (4). Pay particular attention to the right side of the guy's face. It



looks even blurrier than the native 480p Firefox feed, with Nvidia's AI adding significant distortion to his cheek and even the shape of his eye. The edge of his hairline appears overly harsh as well. This is not just pixel peeping. Using VSR to upres 480p video to 4K looks worse than native, both in stills and in motion.

However, all is not lost. Here's the same 480p still upscaled to 1080p instead (**5**). This much more reasonable jump in resolution results in a much clearer picture overall, once again delivering the same black magic-like leap in visual quality we saw when upscaling *Drink Masters* and *Holey Moley* from 1080p to



4K. All of the previously witnessed AI distortion is gone and the trailer looks fantastic in motion.

Bottom line? Treat it reasonably and RTX Virtual Super Resolution is an absolute game changer. Get extreme and things can start to go off the rails.

Fortunately, most people won't be upscaling 480p video to 4K very often.

But how does RTX Virtual Super Resolution actually change your games?

## PERFORMANCE IMPACT

Virtual Super Resolution uses your Nvidia RTX graphics card's GPU and tensor core muscle to achieve its effects, so it stands to reason that activating it can hinder gaming performance.

The good news: It's only a concern when you're actively gaming and watching a video simultaneously. The less good news? RTX VSR will send performance plummeting if you do that, so you won't want to leave YouTube videos playing on a second screen while you're slaying noobs in *Call of Duty*.

Nvidia actually offers four quality preset levels with VSR, with varying levels of visual effectiveness and performance impact. Level 1 is the least strenuous (while still providing a massive visual quality boost), while level 4 is the most. I repeatedly watched the first chapter of Stodeh's video with Windows 10's Task Manager running to get a feel for what each setting needed, keeping an eye on how much the RTX GPU was being utilized during the run.

Actual GPU utilization can vary depending on the complexity of the scene being upscaled, I discovered, but here's a broad look at the results:

**RTX VSR off:** between 4 and 33% GPU utilization, mostly 17 to 19%

**VSR 1:** between 25 and 33%, usually 32%

**VSR 2:** 24 to 35%, consistent 30 to 34%

**VSR 3:** 29 to 35%, consistent 34 to 36%

**VSR 4:** 44 to 46% consistent

So turning on VSR even at its lowest level uses a substantial chunk of your GPU, but there's very little performance difference between VSR preset 1 and 3. Using preset 4 uses the most grunt, but also delivers by far the best visuals.

But what does that mean in practice? To measure VSR's impact, I ran *Cyberpunk 2077*'s strenuous benchmark at 4K resolution and the Ultra graphics preset, to saturate the GPU, while also playing Episode 3 of Netflix's *Drink Masters* full-screen on my second 4K display, upscaling the native 1080p video with VSR on. I tested with both VSR 1 and 4 presets, and also tested whether activating DLSS and DLSS Frame Gen hurt performance even more, since both DLSS and RTX Video Super Resolution lean on Nvidia's tensor cores. Both the average frame rate and the minimum frame rate matter here, as minimum frame rates affect the overall feeling of smoothness in a game. The results:

**Native Cyberpunk, no video playing:** 83.29 average, 54.23 minimum

**Netflix video playing, VSR off:** 81.78 average, 40.40 minimum

**Netflix on, VSR 1 on:** 48.74 average, 39.66 minimum

**Netflix on, VSR 4 on:** 44.55 average, 36.97 minimum

As you can see, playing a video on a second monitor while running *Cyberpunk* without VSR on doesn't really affect the average frame rate, but sends the minimum frame rate plummeting. That's to be expected when you're running a background video like that, though. Flipping on VSR instantly tanks the average frame rate however, sending the frames per second plummeting by roughly 40 percent, *on top of* the standard drop in



**Turning on RTX Video Super Resolution's lowest (1) quality preset while watching this Stodeh video resulted in the GeForce GPU running at 32 percent utilization pretty consistently.**

minimum frame rates that simply streaming a video entails.

There's no real performance difference between VSR 1 and 4, however. But does that hold true when the tensor cores are being lit up by VSR and DLSS alike? Nope.

**Native *Cyberpunk*, no video playing:**

83.29 average, 54.23 minimum

**Netflix on, VSR off, DLSS 3 (balanced)**

**Frame Gen on:** 110.48 average, 72 minimum

**Netflix on, VSR 1 on, DLSS 3**

**(balanced) Frame Gen on:** 106.44 average, 69.86 minimum

**Netflix on, VSR 4 on, DLSS 3**

**(balanced) Frame Gen on:** 87.27 average, 61.66 minimum

Turning on DLSS 3 Frame Gen immediately supercharges *Cyberpunk's*

average and minimum frame rates alike, even with Nvidia Reflex disabled (as I did for my testing). With half the game frames being generated by Nvidia's AI cores, releasing stress from the GPU cores, flipping on VSR 1 barely affects performance. But both the average and minimum frame times

suffer with the more intensive VSR 4 enabled. It's worth pointing out that VSR's performance impact is lessened with DLSS 3 Frame Gen turned on, however, and even the worst-case DLSS/VSR 4 results deliver significantly better performance than *Cyberpunk* running without DLSS active.

All in all, I wouldn't run a VSR-upscaled video in a browser while gaming, because its performance impact can be tangible. It won't be an issue if you aren't gaming and watching simultaneously, however. If you want to watch vids while gaming, flipping VSR on or off is quick and easy.

## HOW TO TURN ON RTX VIDEO SUPER RESOLUTION

Now that you know how RTX Video Super Resolution works, it's time to show you how

to turn it on. You can't simply press a keyboard shortcut or flip a button in GeForce Experience. Instead, you need to dive into the slow, long-overdue-for-an-update Nvidia Control Panel.

First, though, make sure you have what you need. Update your GeForce GPU to the latest Game Ready Driver, as today's release includes VSR support, and make sure either Chrome ([fave.co/3JKBNei](https://fave.co/3JKBNei)) or Edge ([fave.co/3JKBNei](https://fave.co/3JKBNei)) is fully updated as well. Your GPU drivers and browser both need to be on a modern build with VSR support for it to work. You'll also need to have an Nvidia GeForce RTX 30- or 40-series GPU.

Once that's done, right-click on your desktop and select Nvidia Control Panel. In the window that opens, select the Adjust Video Image Settings option in the Video section of the left pane (6). Select the monitor you want to use VSR with, check the Super resolution box in the RTX video enhancement

section, and choose a quality preset—I recommend 4, as it delivers the best experience and you don't want to run VSR videos while gaming anyway. Then click Apply and start your VSR upscaling engines.

If you want to disable VSR while gaming—and again, you should do so if you leave videos running in a browser while you play—just disable that checkbox and click Apply once more.

## BOTTOM LINE

All that is a lot of words to say: Nvidia's new RTX Video Super Resolution absolutely rocks.

You won't want to keep it constantly active if you watch videos while gaming, and I wish there was an easier way to flip it on and off via GeForce Experience or a hotkey, but those are minor gripes. Watching web videos with RTX Video Super Resolution active is like jumping from VHS tapes to Blu-ray discs.

Once you try it, you won't want to go back to the way things were. If you watch a lot of videos in your browser, RTX Video Super Resolution is right up there with Nvidia Broadcast and DLSS as a killer GeForce feature, and a compelling reason to consider an Nvidia GPU over rivals. Bravo. 🇺🇸





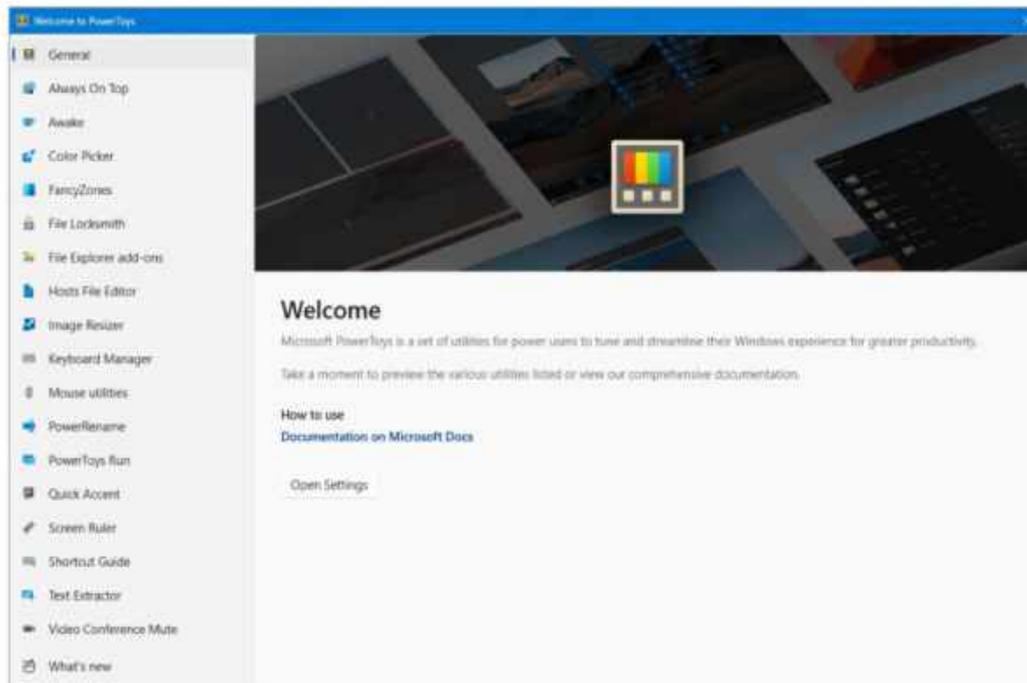
# Microsoft PowerToys is bringing 'paste as plain text' to Windows

At last! **BY ALAINA YEE**

**P**asting plain text in Windows isn't as easy as in browsers like Chrome, Firefox, and Edge. Pressing Ctrl + Shift + V to dump out a clean copy of your clipboard isn't universally supported, so you'll often wind up with HTML links and formatting gunking up your pasted text, which you need to manually remove. But that'll eventually change if you've got Microsoft's awesome PowerToys tool ([fave.](https://fave.co/3OoQQKX)

[co/3OoQQKX](https://fave.co/3OoQQKX)) installed: As reported by Neowin last week ([fave.co/3jYnYa7O](https://fave.co/3jYnYa7O)), a new feature called PastePlain has shown up on GitHub as part of the project.

Based on PowerToy's existing Text Extractor utility, it should work just as described. Any formatting—bold, font size, highlights, and so on—will get stripped when you paste text using a keyboard shortcut. The default will be Ctrl + Win + V, but you'll be



**PowerToys is a collection of free utilities for Windows.**

able to customize the shortcut, too. A specific release date hasn't yet been specified yet.

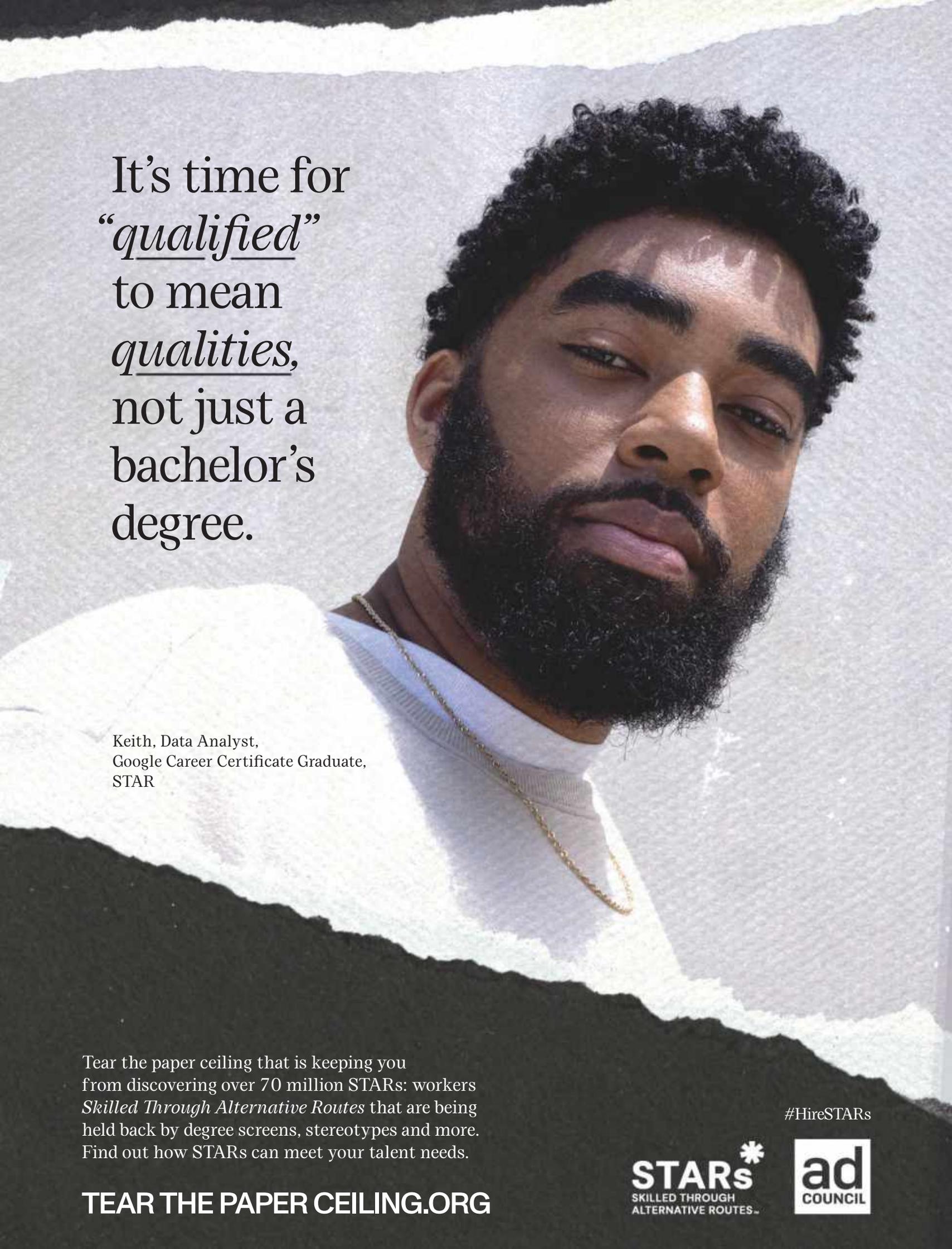
As we all wait, you can play with other PowerToys ([fave.co/3OoQQKX](https://fave.co/3OoQQKX)) if you aren't already familiar with the tool. The open-source project allows you to supercharge your Windows experience with additional features and customizations. Our personal favorites include more options for snapped windows,

quick batch-renaming of files, and quick batch-resizing of images, but you should check out all the highlights.

No lie, though—once PastePlain releases, that one's going straight to the top of the list. The routine of "copy, paste into Notepad, copy again, paste into the actual program we're using" is very past its retirement date. 🛑



**PastePlain is based on PowerToys's existing Text Extractor utility.**



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“qualified”  
to mean  
qualities,  
not just a  
bachelor's  
degree.

Keith, Data Analyst,  
Google Career Certificate Graduate,  
STAR

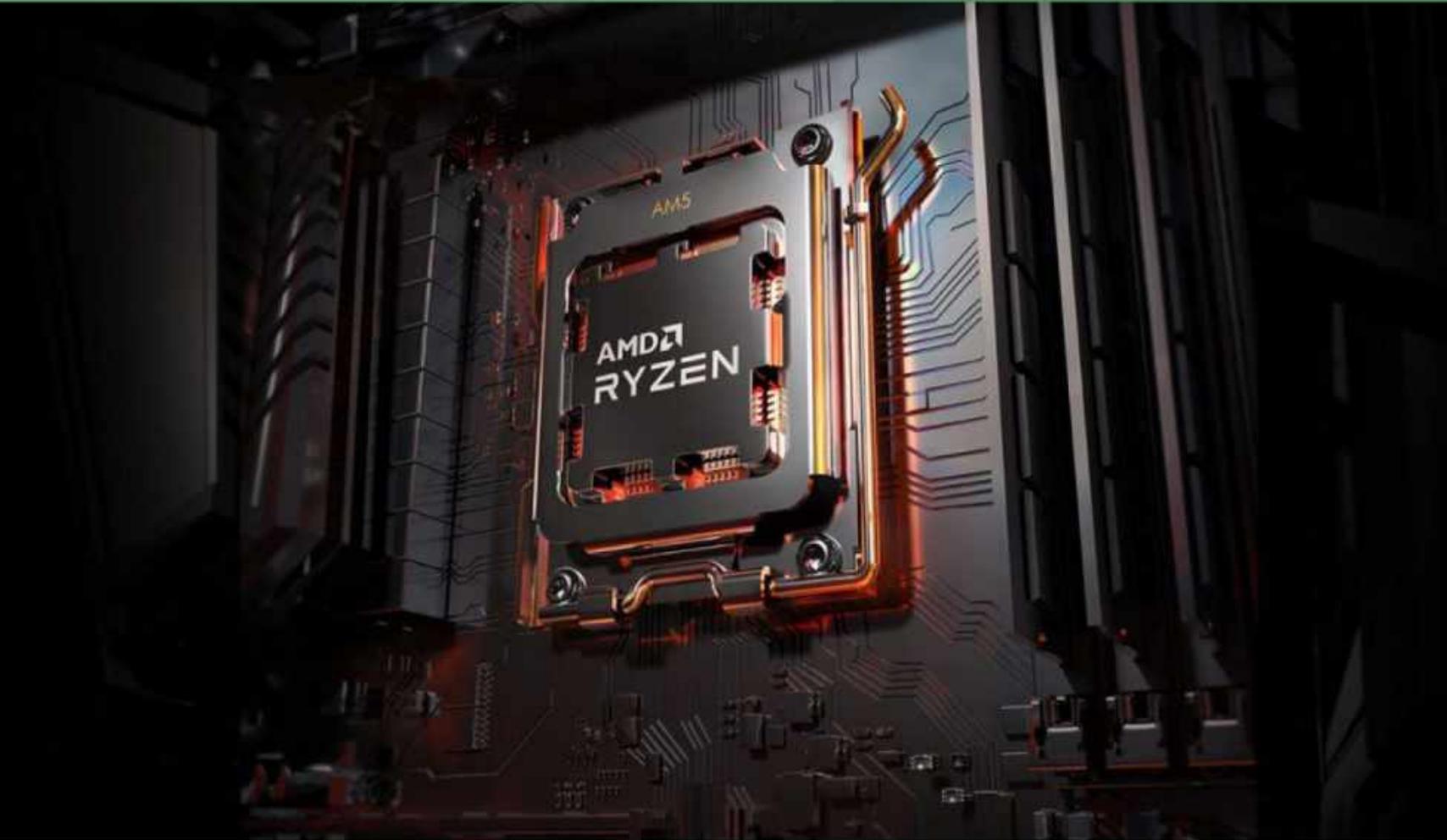
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## Ryzen 9 7950X3D: AMD's monster gaming CPU works like a pro, too

This chip impresses even if you don't need one. **BY GORDON UNG AND ALAINA YEE**

In recent years, two has been a good number for AMD—more specifically, for the second generation of its CPU architectures. What the company began in the first gen, it pushes forward in some substantial way in the next round. We saw this during the company's comeback on desktop, and then its surge forward on laptops. Now Team Red's doing the same

with its innovative 3D V-Cache ([fave.co/3Sg4p0a](https://fave.co/3Sg4p0a)) offerings.

The Ryzen 7 5800X3D ([fave.co/3D3nyxE](https://fave.co/3D3nyxE)), AMD's first 3D V-Cache processor, launched last summer. Layered with



**VIDEO: RYZEN 9  
7950X3D REVIEW**

Watch now at [fave.co/3LAWPOj](https://fave.co/3LAWPOj)

additional L3 cache, it was a gaming monster, but limited to the single 8-core offering.

When AMD's own Ryzen 7000 series chips ([fave.co/3Thn24k](https://fave.co/3Thn24k)) and Intel's impressive 13th-generation Raptor Lake parts ([fave.co/3v8rWqE](https://fave.co/3v8rWqE)) launched last fall, the 5800X3D still held its own against them in games, but lagged significantly in workstation tasks that lean heavily on more cores.

Now AMD has released 3D V-Cache versions of its modern Ryzen 7000 CPUs, expanding to three different SKUs: the 8-core \$449 Ryzen 7 7800X3D (launching April 6), the 12-core \$599 Ryzen 9 7900X3D ([fave.co/3JRBGO1](https://fave.co/3JRBGO1)), and the flagship \$699 Ryzen 9 7950X3D ([fave.co/3JUiZJH](https://fave.co/3JUiZJH)) we're testing here. (The Ryzen 9 7900X3D and 7950X3D chips launched on February 28.) And since their announcement, everyone's been wanting to know: Is the 16-core, 32-thread 7950X3D the gaming monster we were expecting? The answer is yes...but a qualified one.

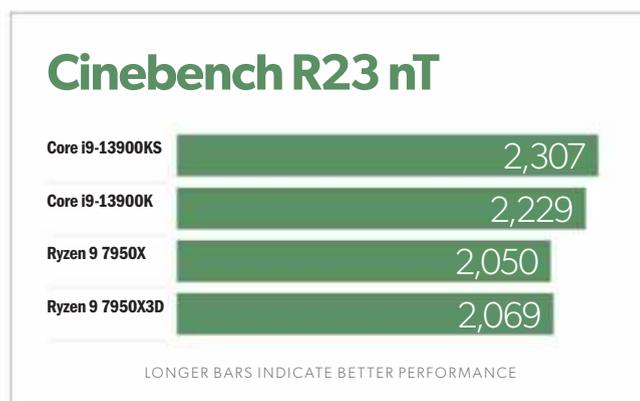
You can read more technical details about these CPUs in our write-up about their initial reveal, [fave.co/3weWvLE](https://fave.co/3weWvLE) (plus watch our interview with AMD at CES about them, [fave.co/3FAtlf4](https://fave.co/3FAtlf4)), but we're here to spill the details of our hands-on time with the flagship part. The deep dives are in our YouTube videos, which cover the full gamut of our benchmarks—including web browser and Microsoft Office performance—but for the biggest takeaways, read on.

## THIS CHIP IS DEFINITELY GOOD IN GAMES

If the 7950X3D is your first exposure to a processor with AMD's 3D V-Cache, you might glance at a benchmark like Cinebench R23 and think it's not as good as Intel's flagship Core i9-13900K and Core i9-13900KS. But while Cinebench R23 is one of the standard tests used to determine CPU performance, it doesn't tell the whole story.

Just this one benchmark isn't enough information about this chip. It wouldn't be about any processor, but with other parts we've reviewed, you may have sometimes seen the big bars in Cinebench (and other tests that isolate CPU performance) line up with the gaming results. That's not the case here. In fact, even the individual game benchmarks don't indicate a general trend, either. Not in isolation—you really need to see all the gaming test results in aggregate.

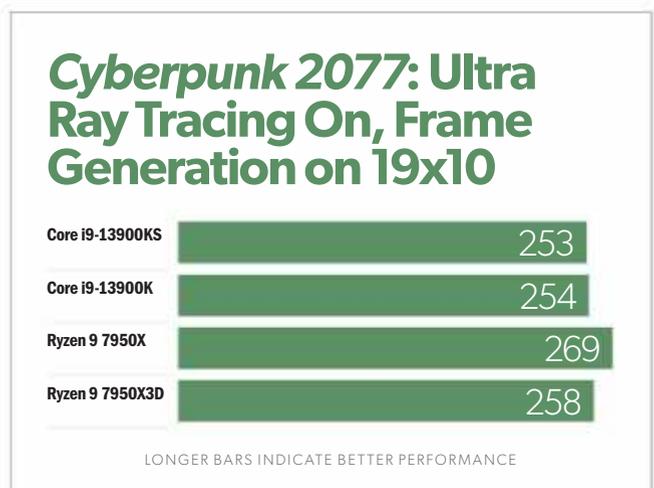
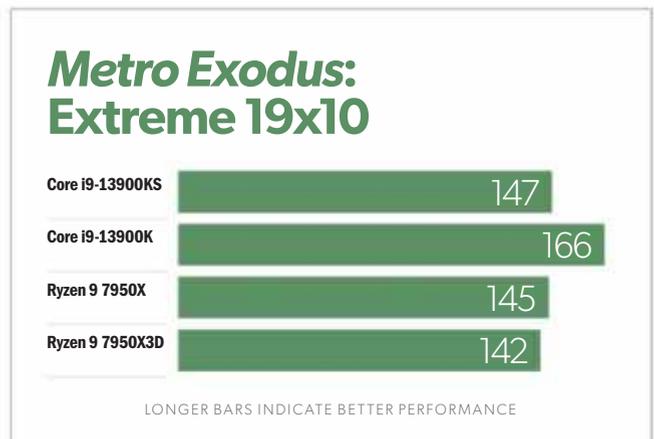
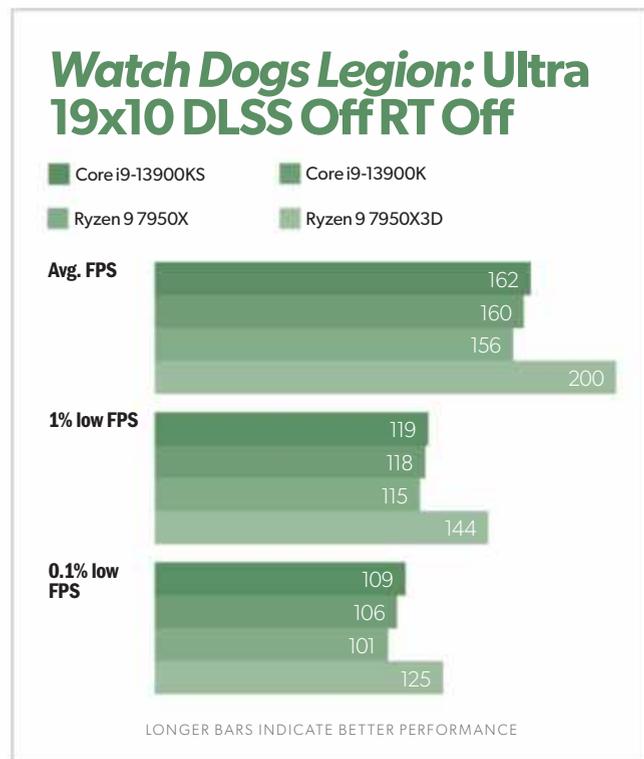
For example, take *Watch Dogs Legion*. On Ultra at 1080p, the AMD Ryzen 9 7950X3D offers a 28 percent uplift in performance compared to the standard 7950X. The jump



up in *World War Z* is similarly impressive at 29 percent. This lead holds against the 13900KS and 13900K, too. In *Watch Dogs Legion*, the 7950X3D posted a 23 percent increase over the faster 13900KS and 25 percent over the standard 13900K. Meanwhile, in *World War Z*, it's almost a 27 percent jump compared to the 13900KS and 26 percent versus the 13900K.

But on the flip side, in *Metro Exodus*, the Ryzen 9 7950X3D drags relative to the 13900K, with a drop of almost 15 percent in performance. And in *Cyberpunk 2077*, it just holds its own against the 13900K and KS, but still trails the vanilla non-3D Ryzen 9 7950X part by about 4 percent.

Does this mean the 7950X3D is a failure? Heck, no—look at the frames it puts out. Even in *Metro Exodus*, you get 142 fps on Extreme at 1080p. Fiddle with settings a little and you can easily get above 144 fps if you're driving a higher refresh-rate monitor.



### Counter Strike: Global Offense: 19x10 (Workshop Map)



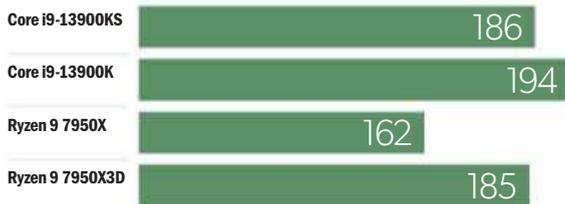
LONGER BARS INDICATE BETTER PERFORMANCE

### Guardians of the Galaxy: Ultra 19x10 DLSS Balanced RT Off



LONGER BARS INDICATE BETTER PERFORMANCE

### Far Cry 6: Ultra DXR Off 19x10



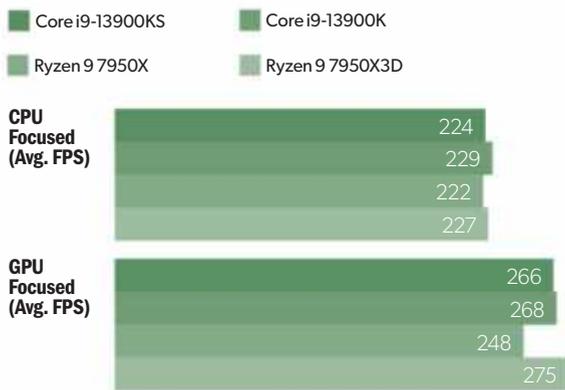
LONGER BARS INDICATE BETTER PERFORMANCE

### Horizon Zero Dawn: Ultimate Preset 19x10



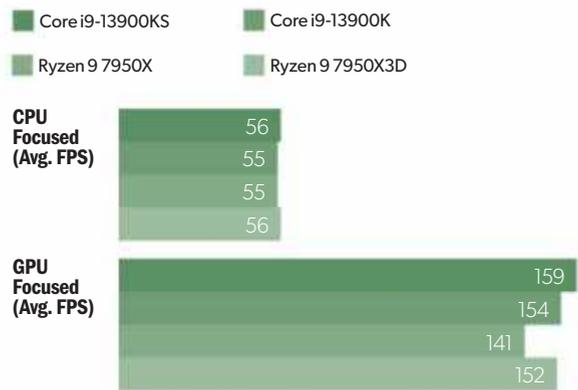
LONGER BARS INDICATE BETTER PERFORMANCE

### Returnal: 19x10 Ray Tracing Off



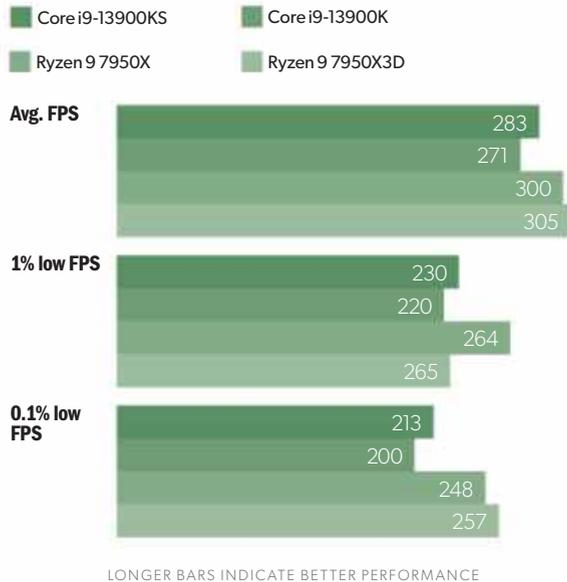
LONGER BARS INDICATE BETTER PERFORMANCE

### Ashes of the Singularity: 19x10 Crazy DX12

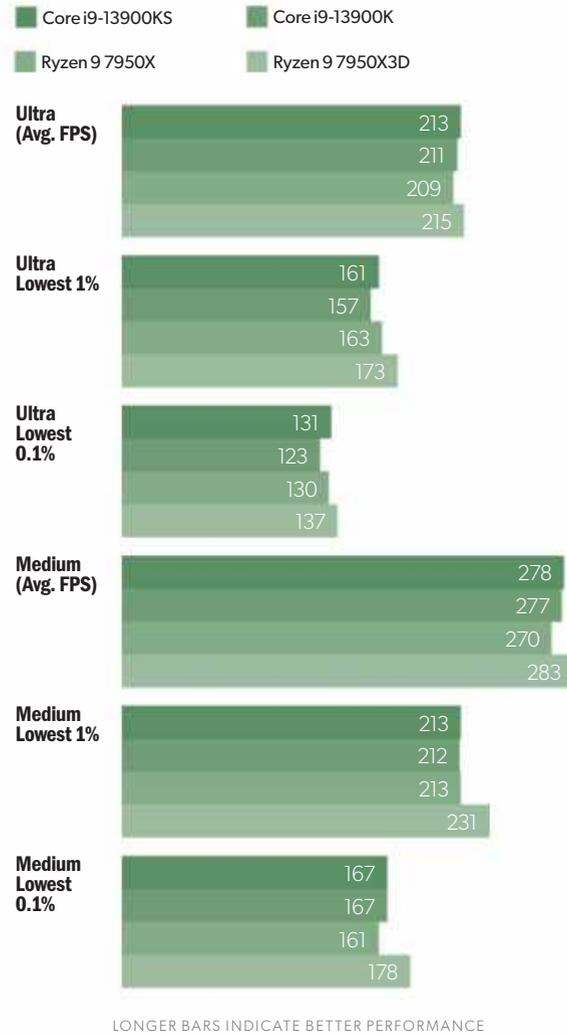


LONGER BARS INDICATE BETTER PERFORMANCE

## Dirt 5: Ultra Ray-Traced Vehicles on VRS on 19x10



## Assassins Creed Valhalla: 19x10



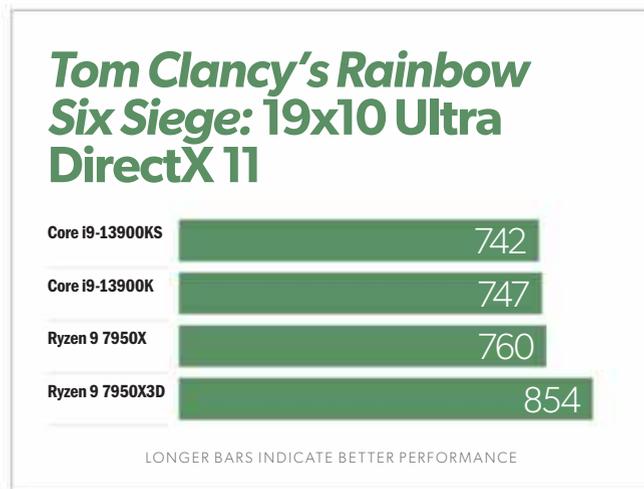
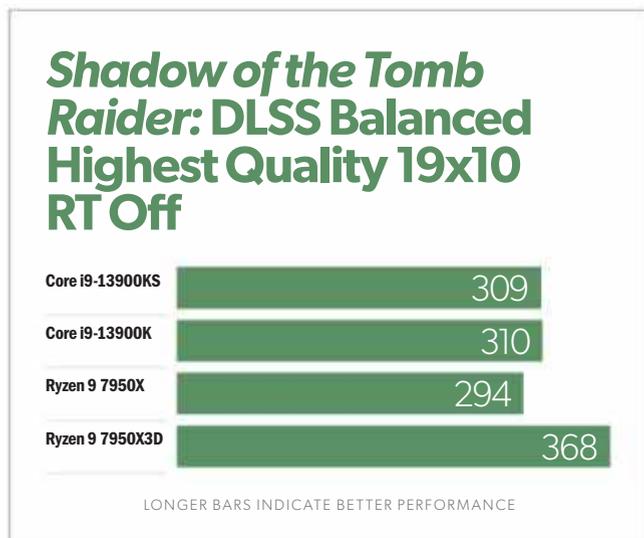
## Gears Tactics: Ultra 19x10



## Strange Brigade: Vulkan Ultra Preset 19x10



Overall, in 7 of the 14 games we benchmarked, you'll get a boost of 8 percent or more in performance compared to the 7950X, and almost 10 percent or more compared to the 13900K. But it also loses in six games to the 13900K—with a few of them very clear losses. So you'll need to take stock of what kind of games you play



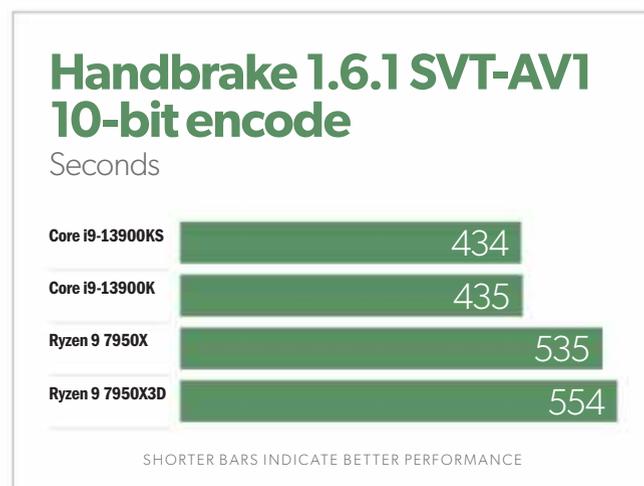
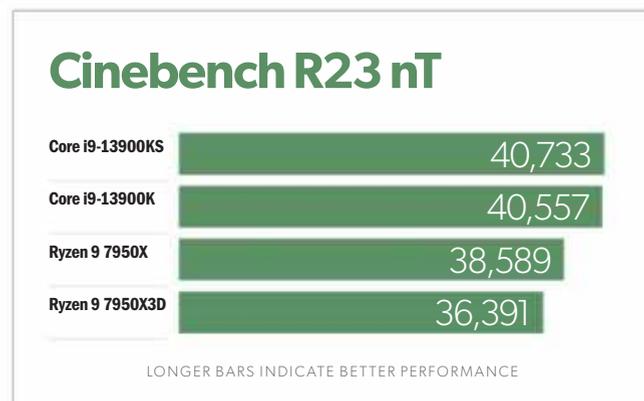
(and at which resolutions), as well as your desired frame rates when evaluating if this chip is right for you.

among flagship CPUs, even small differences stand out.

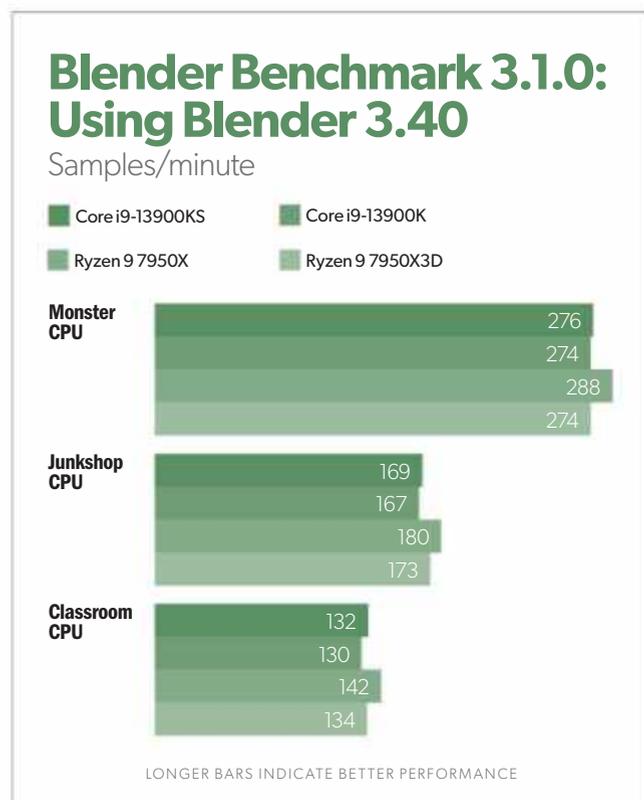
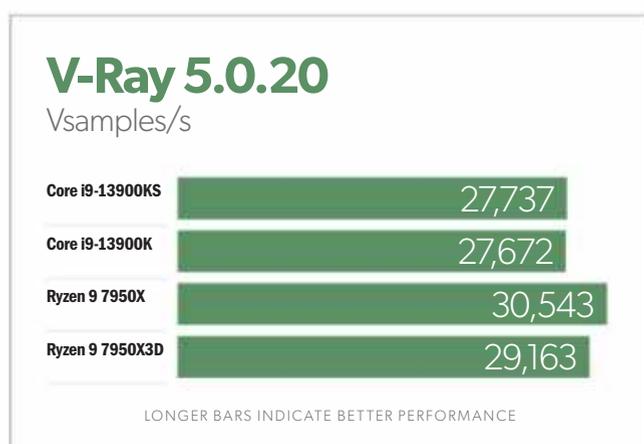
## IT HOLDS UP IN HEAVY MULTI-THREADED WORKLOADS, TOO

Many people come into benchmarks looking for shutouts—a complete sweep on the leaderboards for a processor to qualify as good.

As in games, the Ryzen 9 7950X3D doesn't deliver an uncontested win in multi-threaded performance. You may actually be disappointed if you were expecting greater parity between the X and X3D parts compared to the Ryzen 5000 era. If you look at production benchmarks like Cinebench R23 and Handbrake, you'll see the 7950X3D lag similarly behind its X counterpart as with the 5800X3D and the 5800X. The delta isn't monumental, but



This repeat of history doesn't drop the Ryzen 9 7950X3D to trash tier, though. Arguably, the more important match-up is the 7950X3D against the 13900K and the 13900KS. Those two chips carry far more mind share, given their reputations for top-notch gaming *and* multi-threaded performance.



In heavy workloads, the 7950X3D is more able to stay pace with those two Team Blue offerings. Not always—Cinebench R23 shows a gap in performance of a little over 10 percent. And there's a notable difference in Handbrake, where the 7950X3D is over 20 percent slower. But in V-Ray's ray-tracing benchmark and Blender's rendering tests, the 7950X3D either edges out the 13900K and KS or pulls even with them.

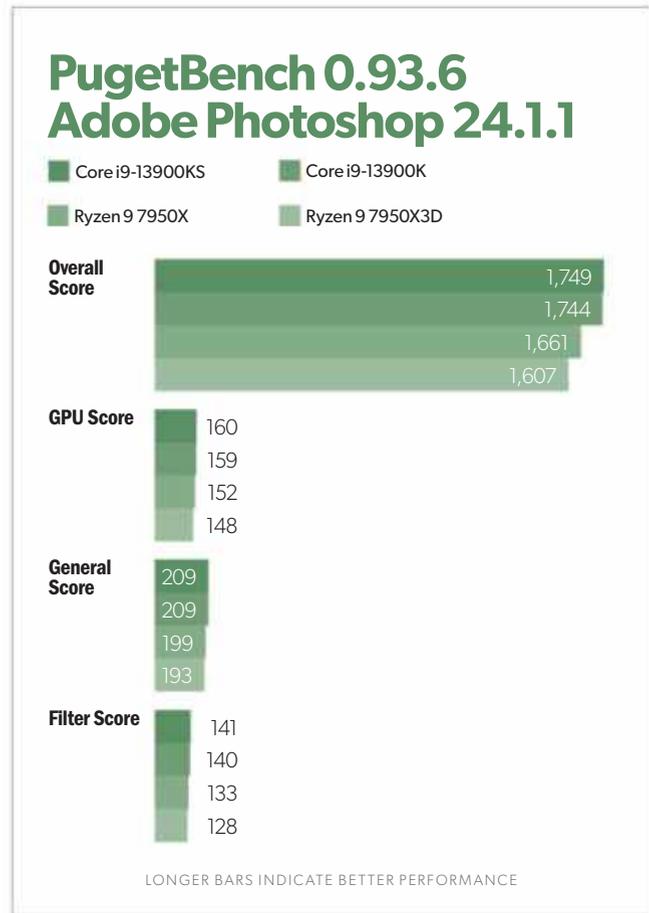
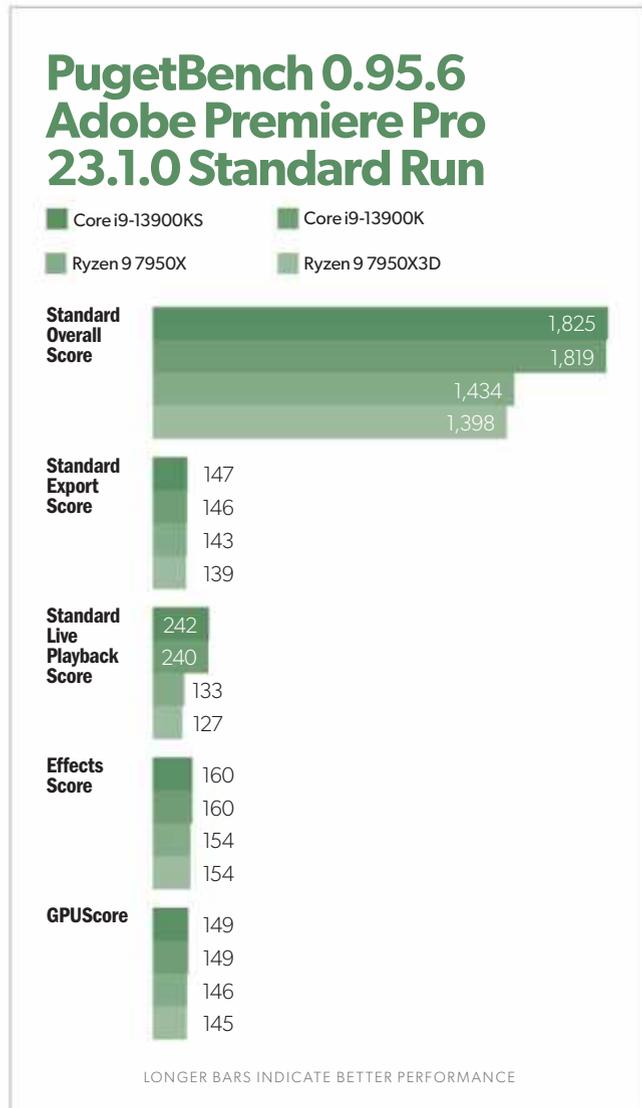
So as with gaming, the Ryzen 9 7950X3D's utility in production work will depend on what programs you use most.

## INTEL STILL DOMINATES FOR PRODUCTION WORK

Unfortunately for AMD, Adobe's Creative Suite is a set of apps many people use, especially those interested in a big, beefy CPU with many cores. And while few (if any) expected the Ryzen 9 7950X3D to deliver numbers that its 7950X sibling didn't, its lower performance is tangible. In PugetBench's Adobe Premiere Pro Standard Run benchmark, it's a 30 percent drop in performance if you switch from a 13900K or KS to the 7950X3D.

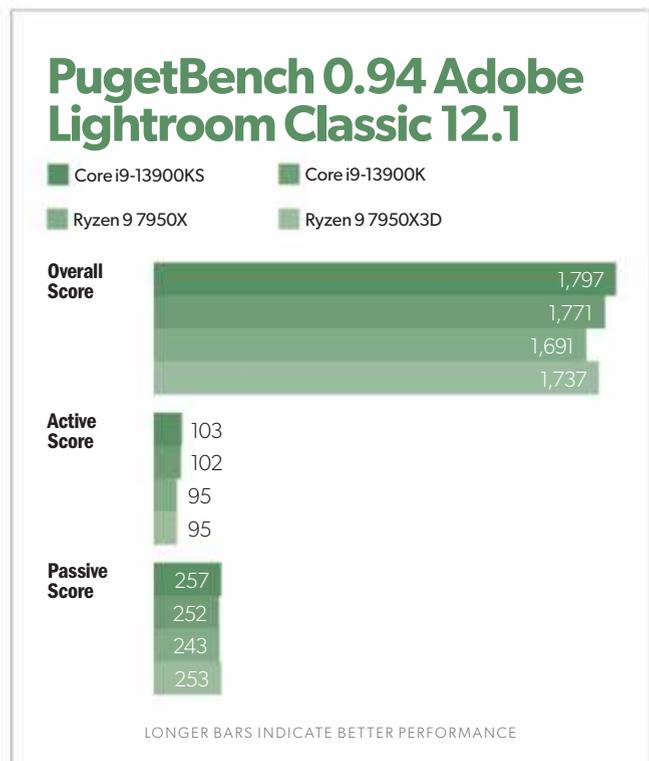
In PugetBench's Adobe Photoshop test, the difference isn't nearly so eye-watering; you're looking at drop of almost 9 percent. It shrinks even further in Lightroom, with a roughly 3 percent gap.

Given its marketing as the "ultimate processor for gaming," AMD isn't pushing



this chip as a productivity champion, but the 7950X3D is going to be a hard sell to heavy Premiere users.

A processor that chews through your daily workload just as well as it spits out tons of frames during off-hours looks a lot more appealing when you're spending \$1,000 to \$1,300 in combination with a high-end AM5 motherboard ([fave.co/3TuUplI](https://www.fave.co/3TuUplI)). You get that with Intel, not with AMD's latest.



## DIE HOPPING IS BOTH SIMPLE AND COMPLICATED

On the other hand, enthusiasts may have ample reason to take the 7950X3D out for a spin—just to see for themselves how the asymmetric stacking of L3 cache plays out in the real world.

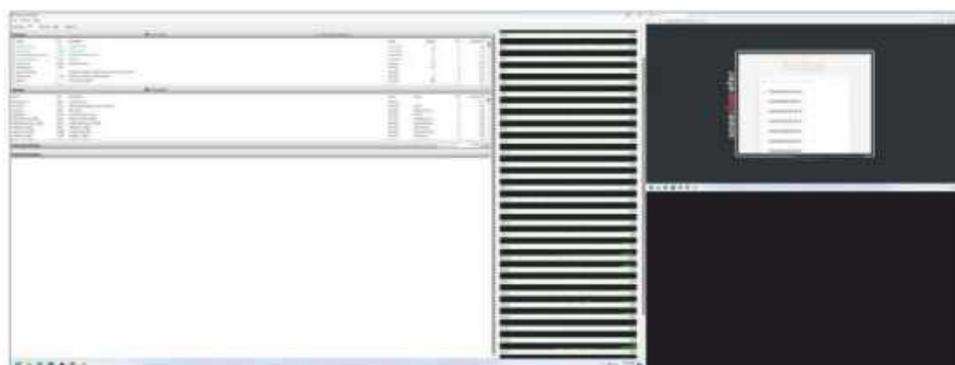
(Less-flush tech nerds may be wondering who spends over \$1,000 just to tinker with new technology. Yes, it's totally a thing.)

Both the 7950X3D and the 7900X3D are dual-die chips, with one die layered with additional L3 cache and the second die tuned to run at higher frequencies. At their announcement, it was assumed that the stacked die would handle gaming, while the other would tackle background tasks and anything that benefited from bursts of faster clock speed.

In practice, the system will default to running programs on the non-stacked die—unless Windows (via the Xbox Game Bar) detects a game. Then that program and others get shunted over to the stacked die; the operating system will

park the second die's cores. The second die remains visible to the OS the whole time. AMD says that if you need more threads than available on the stacked die, then Windows will bring the non-stacked die back into service, albeit with some lost of clock speed on that die.

Want to run a non-gaming application on the stacked cache die? You can manually mark it as a game using the Xbox Game Bar. We actually did that with Cinebench R23, so that you can roughly see the difference in performance on the stacked die versus the non-stacked die.



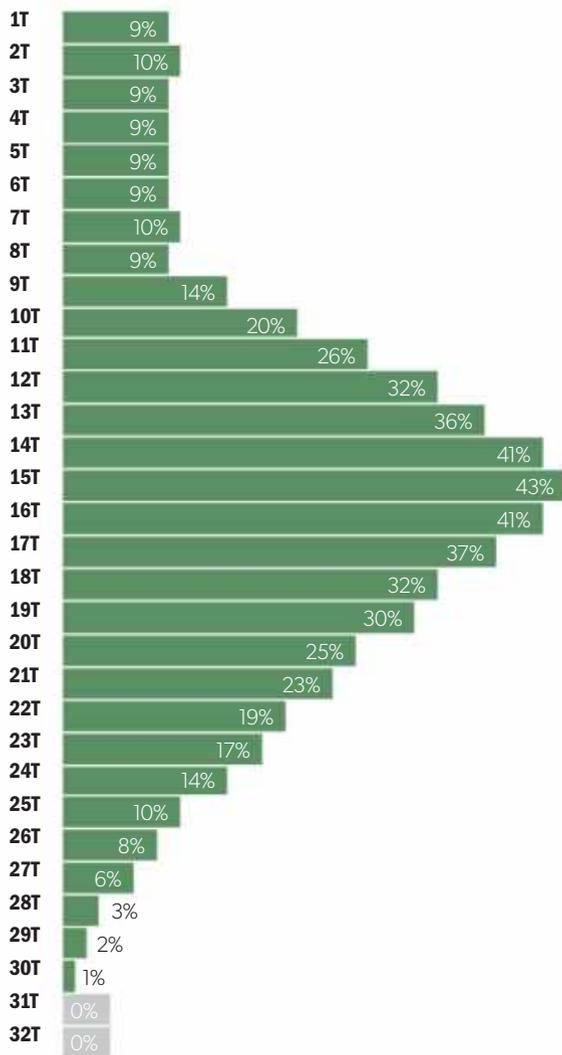
**Chrome operating without a game open—both of the 7950X3D's processor dies are active and the tasks are going to the unstacked die first.**



**Shadow of the Tomb Raider with four threads on Cinebench R23 and WebXprt—the 7950X3D's non-stacked die is parked.**

## Threadscaling Percent Performance

AMD Ryzen 9 7950X3D AMD Ryzen 9  
stacked die first Cinebench R23 Stress Test Off



**Percentages show the uplift in performance you get when you use the non-stacked die for Cinebench R23's multi-core benchmark.**

While these results are a touch odd—note that the performance increases in the middle—it's clear overall that AMD's method of handling the switch between its two dies is

not analogous to Intel's flipping between its performance and efficiency cores. It's also more apparent that the asymmetrical design helps keep performance higher, given the drop in clock speeds when tasks extend across both dies.

The short of it is: You can't expect to, say, run a game off the stacked die while streaming via OBS on the non-stacked die. Not yet, anyway. This is the situation at launch. AMD could (and likely will) continue to refine how tasks are assigned.

In the meantime, if you're itching for more manual control, you can go into the BIOS of your motherboard and change the priority order for the dies—that is, "frequency" instead of "cache," or going back to the default of allowing AMD's driver to decide.

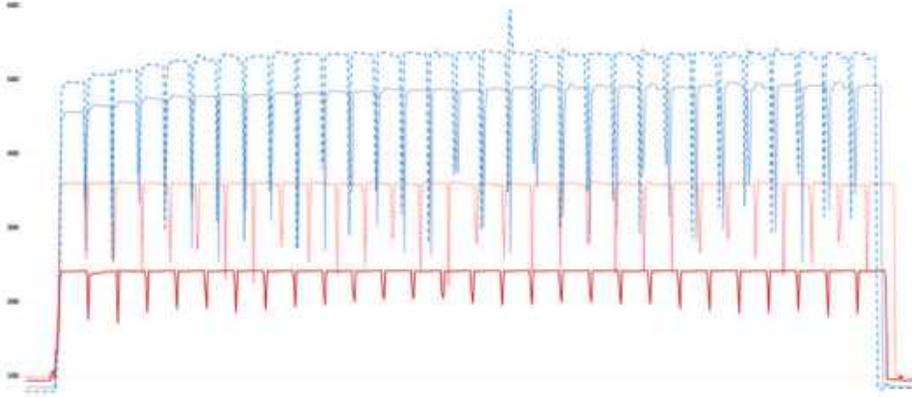
## IT DELIVERS TOP-NOTCH POWER EFFICIENCY

Power consumption is rarely the hill that comment wars are waged on. But even if you're a person running tons of incandescent bulbs in your home without batting an eye, the 7950X3D's power efficiency is still noteworthy. Despite its high performance, it hits the juice relatively light, undercutting the 7950X, 13900K, and 13900KS by a substantial margin.

During our Cinebench R23 multi-core test, the 7950X3D's total system power draw dropped average wattage use by

## Total power consumption while running Cinebench R23: Default All Core Run

Core i9-13900KS   Core i9-13900K  
Ryzen 9 7950X   Ryzen 9 7950X3D



efficiency—probably flagship chips least of all. If you need high performance, then you’re buying high performance. Still, this represents a pretty cool technical improvement, and for people in regions with extreme spikes in utility rates, it may well be a partial factor when choosing components.

about 31 percent compared to the 13900K, and 36 percent versus the greedier 13900KS. It also slips under the 7950X by almost 7 percent. For the single-core benchmark, the chasm narrows to a far slimmer gap, but the 7950X3D remains the victor. The surprising loser is the 7950X, which we lauded at launch for power efficiency compared to Intel’s 12th-generation Core i9-12900K.

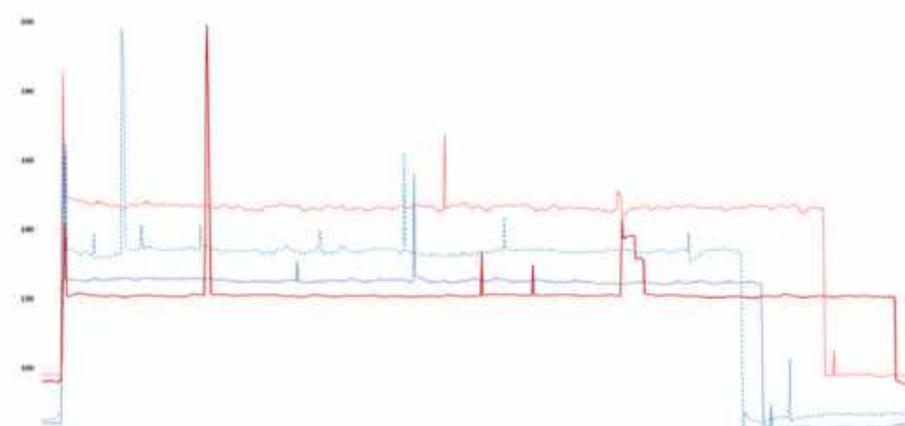
Many people don’t buy CPUs for their power

## BOTTOM LINE

AMD has definitely improved on its top 3D V-Cache offering—your games can get a

## Total power consumption while running Cinebench R23: Single-core Default Run

Core i9-13900KS   Core i9-13900K  
Ryzen 9 7950X   Ryzen 9 7950X3D



hefty boost from the combo of an extra-fat L3 cache and slightly better single-core performance than the standard 7950X. And compared to the 5800X3D, the Ryzen 9 7950X3D's performance is more even across the board.

But the key word is “can.” That boost depends on which games you play. The 7950X3D lacks dominance as a gaming chip. The performance of general apps varies, too. The Ryzen 9 7950X3D will be the right CPU for someone—but you'll need to first review what you plan to do with it. It's not an all-around winner. So prospective buyers should ask themselves: Is world-class gaming performance your first priority? Can you stand slightly slower performance in heavily multithreaded applications and tasks? Is energy efficiency important to you? And do you have the money to spend on that compared to a 7950X or 13900K?



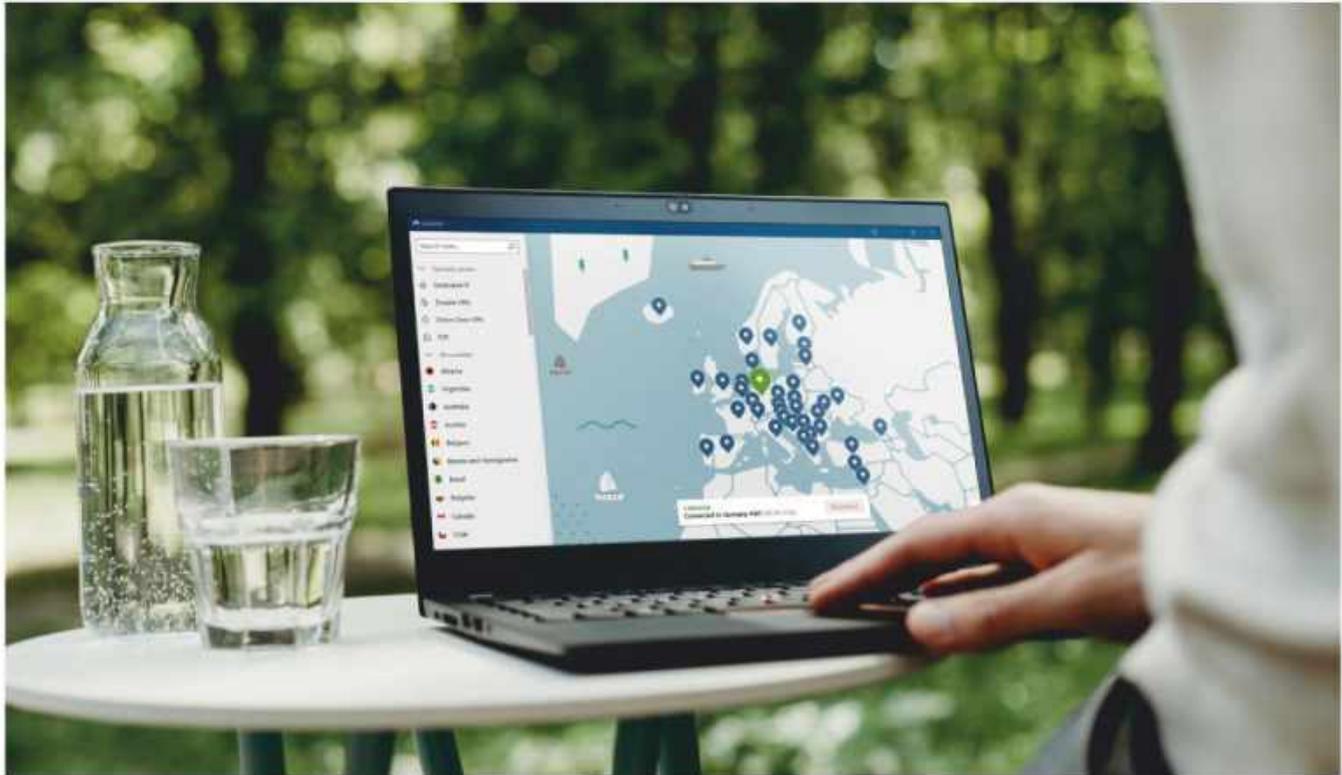
**The Ryzen 9 7950X3D offers ample gaming firepower.**

Because while spending more than \$500 on a processor likely means money is less of an issue, at launch the Ryzen 9 7950X3D costs about \$100 to \$125 more than the 7950X. Street prices for the standard X part have drifted down. Likewise, the Intel Core i9-13900K is going for a similar amount, despite the looming threat of price hikes ([fave.co/3JBPUYR](https://fave.co/3JBPUYR)).

But even if you realize that another chip suits your needs better, the Ryzen 9 7950X3D is still incredibly exciting. AMD may not have come out the gate with an Intel-crushing entry, but round two for the company has historically been still part of building phase. It makes progress—and went from its eight-core, 16-thread 5800X3D on a single die to now packing 3D V-Cache onto its higher-end dual-die parts.

The third generation is when AMD bulldozes—in every positive sense of that word. Ryzen 5000 on desktop absolutely

crushed, and Ryzen 6000 in laptops cemented AMD as an option worth consideration. So the third set in the match could put the company back on top of the competition. For now, the \$699 Ryzen 9 7950X3D ([fave.co/3JUiZJH](https://fave.co/3JUiZJH)) offers ample gaming and productivity firepower alike to the right person. 🔥



# NordVPN: Fast and packed with features

Solid features and incredible server speeds make NordVPN stand out. **BY SAM SINGLETON**



NordVPN ([fave.co/3Is8sfb](https://fave.co/3Is8sfb)) is one of the most well-known VPNs with a massive user base. The trusted premium service is notable for its excellent speeds, a generous and wide server spread, and an impressive set of security features. And in its aim to be more than just a VPN, the service has expanded into a larger umbrella organization known as Nord Security, offering other services such as the NordPass password manager ([fave.co/3C16fKT](https://fave.co/3C16fKT)), NordLocker for

secure file storage, and business tools like NordLayer and NordWL.

## FEATURES AND SERVICES

Let's get this out front right now: NordVPN is one of the largest and most well-funded VPNs around. It has a user base of over 14 million and is only one part of the larger conglomerate known as Nord Security. As one would expect, it has all of the features users have come to expect from a top-level VPN service and more.



**NordVPN has a clean and user-friendly interface.**

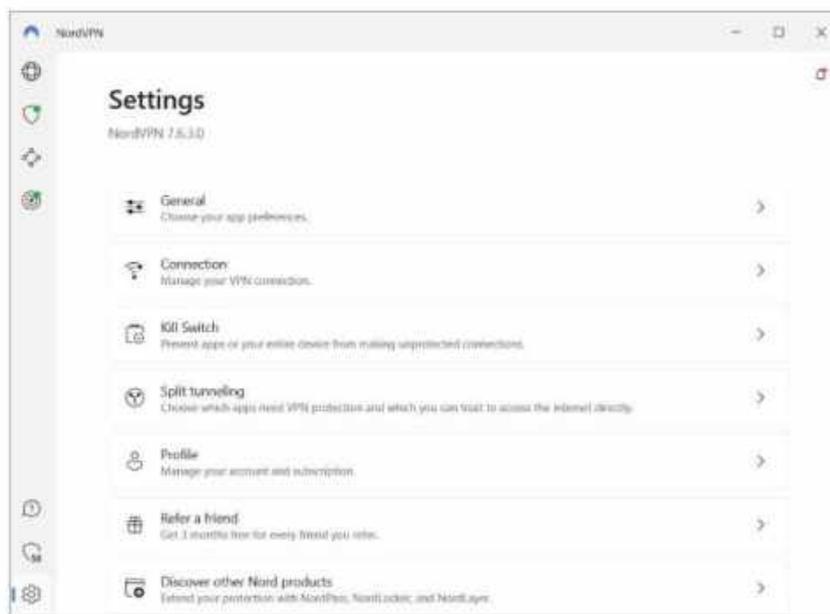
The VPN itself is supported by most major platforms such as Windows, Mac, Android, iOS, Linux, and a lot more. It also allows for six simultaneous device connections, which, while okay, is not extraordinary. It is honestly a little disappointing that a VPN service as large as NordVPN doesn't allow for unlimited device connections like some of its competitors.

Its customer support services are available 24/7 via chat or email and it also has an extensive blog and FAQ section on its website should you run into trouble and want to solve the problem on your own.

When you first open NordVPN on Windows, you're

presented with a minimalist and user-friendly interface. The left rail includes quick links for VPN, Threat Protection, Meshnet connectivity, and Dark Web Monitoring. At the bottom you also have interface options for Contact Us, your personalized Security Score, and Settings. The rest of the app window is filled with a world map that you can drag around and select a specific country and server to connect to for the VPN. There is also a small box with options for quick connect—allowing you to

automatically connect to the fastest available server, and providing a history of the last five servers that you connected to for reference.



**There are a ton of customization options for power users in the NordVPN settings menu.**

Digging deeper into the Settings menu, you'll find a ton of power-user options including a Kill Switch and App Kill Switch. The latter stops any app from connecting to the internet if an active VPN connection drops, while the former does that for the entire PC.

There are also options for Split Tunneling and Auto-connect. Split Tunneling allows you to choose which apps you specifically want to run through a VPN

connection and which you do not. This is really useful if you want to surf the web while protected with a VPN, but also play games without the potential extra latency that comes with an active VPN connection.

Auto-connect is a nice feature that comes standard with most VPN services. However, what makes NordVPN's auto-connect feature stand out is the ability to customize the connection itself. You can, for example, automatically connect to a double VPN or a specific country. You can also choose whether to connect whenever the app starts or only on "unsecure networks."

Heading back to the main menu, you'll be able to check out the other features that come included in the NordVPN subscription. Under the Threat Protection menu, you'll have



**Included with NordVPN are useful security features such as ad blocking and malware protection.**

options to enable Nord's CyberSec, which provides real-time protection against malware and trackers, as well as ad blocking and file-download protection.

NordVPN has also recently upgraded its services to offer Meshnet. Powered via NordLynx (NordVPN's version of the WireGuard VPN protocol), Meshnet allows you to connect to another device instead of a VPN server, thereby routing online traffic through another machine. Device pairings are required to be authorized by any and all parties, and once connected, traffic between devices is still encrypted. This is a really unique feature and allows users to collaborate with remote file sharing or resurrect old-school LAN parties, or even gives them the option to connect to the

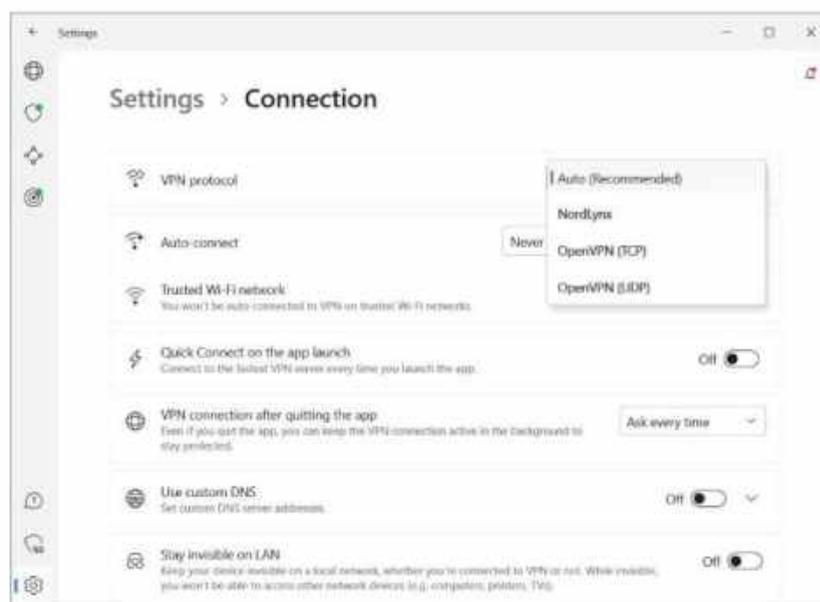
internet via a home computer from a different location.

## PERFORMANCE

During our testing we rated connection speeds across NordVPN's servers in five different countries around the world and then compared them to our baseline internet speed. NordVPN's server speeds came through with flying colors. We noted an impressive average of 73 percent of the base download speed and an even more impressive 80 percent of the base upload speed. That easily makes it the VPN with the fastest average connections we've ever tested.

With those speeds, users will have no issues being able to stream HD video or play games across almost any NordVPN server—depending of course on their own home internet speed. Please note, however, that this is a single experience on a limited number of machines; your experience may vary.

NordVPN also advertises that it works with Netflix, and during testing we found that this was true for all of the servers we tried. However, even with top VPNs, it's not uncommon to experience streaming-service issues. This is because there's a continual cat-and-mouse game between Netflix's anti-VPN enforcement and the VPN service providers that try to maneuver around blockages.



**NordVPN comes with options for IKEv2/IPsec, OpenVPN, and NordLynx protocols.**

## SECURITY AND PRIVACY

During our review, we found that NordVPN goes to great lengths to honor user privacy. Even during sign-up, it only requires an email address. Paying for the service can be done via credit card, Amazon Pay, Google Pay, or various cryptocurrencies, thereby maintaining another level of anonymity.

Since the company is based in Panama, it's not subject to mandatory data-retention laws or other internet surveillance rules. Additionally, NordVPN states that it has a "strict no-logs policy," meaning that it doesn't store timestamps, browsing data, used bandwidth, traffic logs, IP addresses, or any other personally identifiable information on users. This no-logs policy has been confirmed three separate times by independent auditors—once in 2018,

again in 2020, and the latest time in January 2023.

NordVPN uses standard AES encryption with 256-bit keys. A few years ago it also jumped on the diskless production-server bandwagon for added security. Diskless servers don't store any information on them at all. They are controlled and booted from a remote server and everything thus runs on RAM. This process makes it extremely difficult to pull any user data from these servers.

The service offers three internet protocols: IKEv2/IPsec, OpenVPN, and NordLynx (NordVPN's proprietary version of WireGuard VPN). NordVPN recommends NordLynx as the go-to protocol due to its potential for better speeds and security.

There's been a lot of effort to get users to trust NordVPN since it was hacked back in 2018, and we're happy to see all of the great strides it's made. The no-logs independent audits, the diskless servers, and the increased transparency of its company structure as a whole have all been extremely positive in helping promote privacy and repair trust among its user base.

## BOTTOM LINE

NordVPN continues to be a fantastic service that only keeps getting better with each new added feature. Admittedly, the price is on the high side for a VPN. But with such a rich feature set, NordVPN users will undoubtedly get their money's worth.

Despite all of its value, there are other competitors with certain individual features that are better than NordVPN's. Mullvad VPN ([fave.co/3Cywibv](https://fave.co/3Cywibv)) does more to maximize anonymity, while services such as Surfshark VPN ([fave.co/3Z1OmGj](https://fave.co/3Z1OmGj)) and IPVanish ([fave.co/3JUqsZh](https://fave.co/3JUqsZh)) offer unlimited simultaneous device connections.

In an ultra-competitive market, what ultimately makes NordVPN stand out from its competitors is its consistent growth and optimization. It is continually upgrading its security features and incorporating new technologies such as Meshnet and NordLynx. If you add this perpetual improvement to a service that already has solid speeds, admirable security features, and works with Netflix, then NordVPN deserves its place as one of the best choices around. 🇺🇸

### NordVPN



#### PROS

- Great feature set.
- Excellent speeds.
- No-logs policy.
- Attractive and intuitive interface.

#### CONS

- Expensive.

#### BOTTOM LINE

NordVPN offers a lot. There are a ton of country connections available—all of which seem to work with Netflix—as well as built-in antivirus and ad blocking, and some of the fastest server speeds around. It also offers multi-hop connections, P2P file sharing, and split tunneling. It's expensive, but you get a lot of great value for your money.

**\$3.49 per month**

# Razer Kiyo Pro Ultra: Quite possibly the best webcam, period

Appearances matter. Razer's Kiyo Pro Ultra webcam will make you look like a million bucks. **BY MARK HACHMAN**



Does the Razer Kiyo Pro Ultra justify its \$300 price tag? That was our question, and undoubtedly yours as well.

Our answer? If you own an older laptop, absolutely. But the 4K-capable Razer Kiyo Pro Ultra also offers a noticeable upgrade compared to even the latest webcam hardware. You'll look like a pro while using this camera.

Razer's Kiyo Pro Ultra claims to offer DSLR-like image quality, and its massive 2-inch-diameter lens certainly reminds you of that right out of the box. In practice, the

webcam holds up to its claims. Simply be aware that it doesn't do quite everything, and one shortcoming in particular might leave you wondering why.

Most of the devices we feature in our list of the best webcams ([fave.co/3ldPmFL](https://fave.co/3ldPmFL)) step down considerably in price—as does this webcam's predecessor, the 1080p, \$199 Razer Kiyo Pro ([fave.co/3TxjZX5](https://fave.co/3TxjZX5)). The Razer Kiyo Pro Ultra is for those people who want to look like they're on a professional-quality YouTube stream, with the camera presenting you at your best. What this webcam *doesn't* do, however, is offer Windows Hello

capabilities via a depth camera, so you'll have to use your PC's default mechanism to log you in. (We have a list of the best Windows Hello webcams, too; [fave.co/3lmacXy](https://fave.co/3lmacXy).)

## FEATURES

From a features standpoint, the Razer Kiyoo Pro Ultra can record in various video resolutions up to 4K: 4K at 30 FPS (4K30), 1440p30, 1080p60/30/24, and 720p60/30. Images are captured at up to 8.3 megapixels, which is just about smartphone quality. The field-of-view varies between 72 degrees and 82 degrees, depending on the resolution. Manual pan and zoom are available. The camera also provides options to record video in HDR, though your frame rate will slip by an undisclosed amount if you choose this option, Razer warns. The Razer Kiyoo Pro Ultra also includes a microphone capable of recording at 16bit/48KHz, though you'll probably find that a good laptop's stereo mics sound better.

You will need to install the Razer Synapse app to control the webcam, however, which requires roughly a 550MB download. (The app also controls any other Razer hardware you may own.) You don't need to register the Razer Synapse app, which saves your settings to the cloud, in order to use it; simply agree to sign in as a guest instead. Razer also allows you to download a "virtual ring light" app,

which uses your monitor as a source of white light to illuminate your face. Just make sure that you set your video options in Teams/Zoom/Google Meet to use the appropriate camera, and select the best audio, too. (We'd recommend using Zoom's "test microphone" feature in the settings to compare both mics.)

The Kiyoo Pro Ultra measures about 3 inches deep, depending on how the camera is oriented. The lens mount is well designed; the adjustable L-shaped joint simply hooks over the front of your laptop display or monitor.

Though chunky, the camera is not particularly heavy, so you shouldn't have to worry about your display tipping over. An ordinary clamshell laptop, however, will probably struggle to hold up the camera without the display reclining involuntarily,



**The Razer Kiyoo Pro Ultra can sit by itself as a standalone camera. The weight of its attached USB cable (detached here) tends to drag it about, however.**

unless you position the screen to counterbalance it. A tablet with a kickstand shouldn't have any trouble. In general, however, clipping the Kiyo Pro Ultra to the top of a monitor positions the camera at eye level or slightly facing down, which helps maintain eye contact.

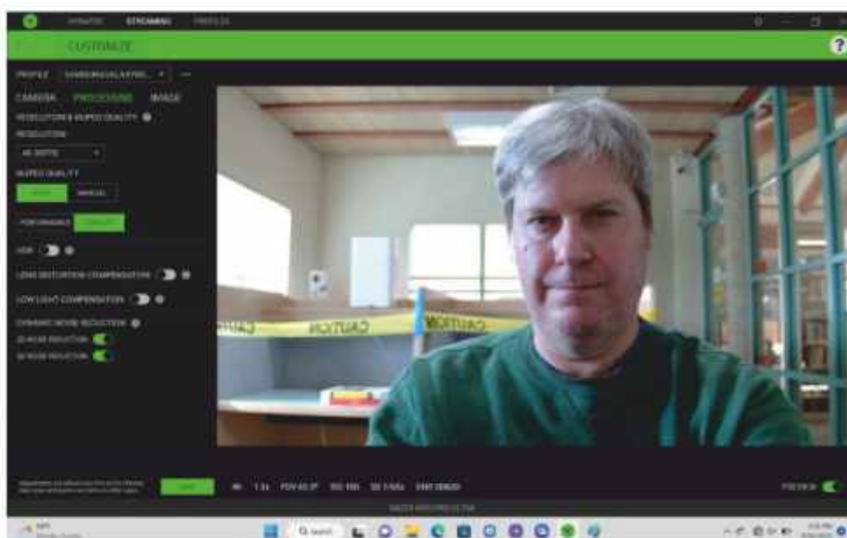
In the case of a laptop, the clip also folds back to serve as a standalone mount, or you can even screw it in to an ordinary camera mount. A 4.9-foot (1.5m) braided cable connects the camera (USB-C) to your PC (USB-A). Be warned, however, that Razer asks you to use a 10Gb/s USB-A port to connect the camera; an older 5Gb/s USB-A port (found on older PCs) won't offer enough bandwidth. Consult your PC's manual if you're not sure.

Interestingly, the removable transparent plastic protector that the Kiyo Pro Ultra shipped with didn't obstruct the lens while providing scratch protection. However, the webcam also ships with a dedicated lens cover that can be fitted to the front of the webcam. That serves as one privacy option when not in use, and you can also use a separate privacy dial on the webcam's barrel to close a physical shutter. Just be aware that the small white LED on the camera itself indicates that it's receiving

power, and not that the webcam is in use. Close the webcam shutter, and the LED will remain lit.

## VIDEO QUALITY

For better or worse, high-resolution cameras with good color capabilities have become synonymous with YouTube streamers, the news, and more. They connote an air of professionalism, authority, and celebrity, and there's a bit of a thrill to see your own face in the same light. In 2020, we highlighted the webcams on the Microsoft Surface lineup ([fave.co/3FFZi5A](https://fave.co/3FFZi5A)) as some of the best in the business, with 1080p resolution and solid color balance and contrast. The Pro Ultra easily puts them to shame—its camera sensor features a 2.9  $\mu\text{m}$  pixel size, capturing 3.9 times more light compared to other webcams, Razer claims.

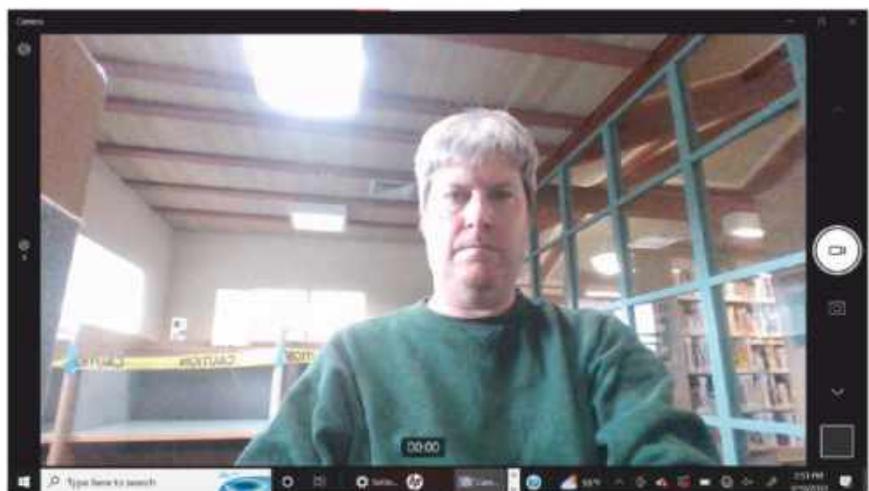
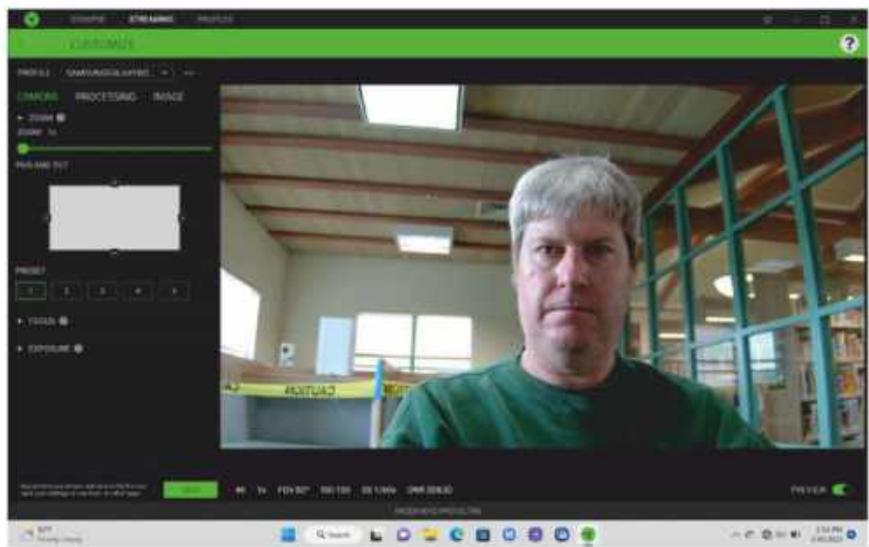


**An image showing both the preview image as well as some of the options offered by the Razer Synapse software. (The library I was at was undergoing renovations.)**

Put simply, this webcam is outstanding. Colors pop, though not overwhelmingly, and there are image presets (including “cool,” “warm,” and “vibrant”) if you want to emphasize these. Many laptop webcams have a sort of gauzy, ghostly effect, in part because of the lower resolution, slower frame rate, and poor color balance. You’ll see none of that here. You’ll look alive and authoritative. Just keep in mind that any videoconferencing app you use may lower the resolution or compress the stream, so you may look a bit worse.

The camera had no problem auto-focusing on me (or my son, when he poked his head within a few inches of the camera) and handled odd lighting situations very well, including backlit lamps that blew out a comparatively poor 1080p webcam on another laptop. Maybe because I’m used to a certain “look,” turning on HDR didn’t do anything for me and arguably made the image worse.

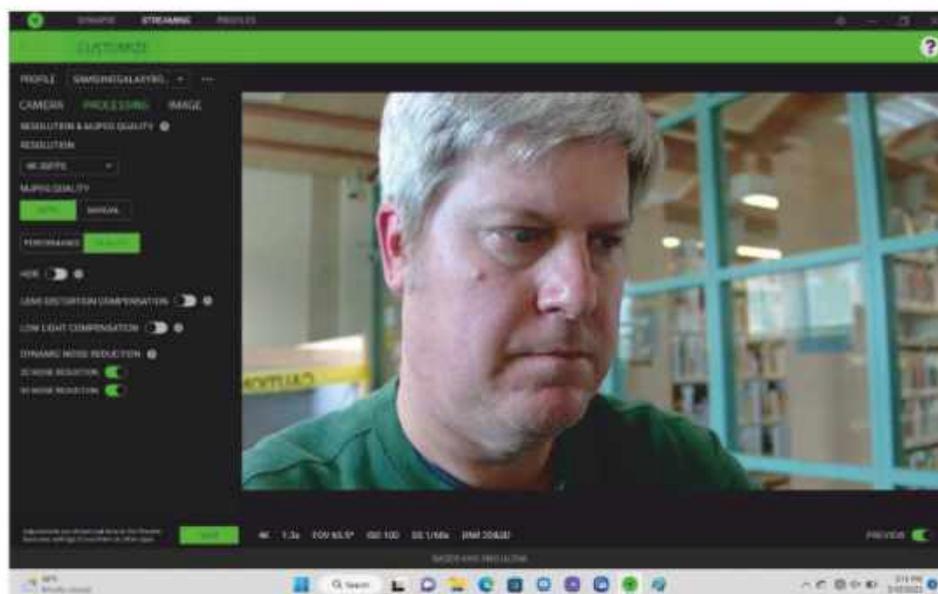
All of the Razer Kiyos’ controls are found within the Synapse Streaming tab at the very top: All of the options are generally



**An extreme example, but one worth showing: I mounted the Razer Kiyos on top of 2020’s HP Pavilion x360 Convertible 14, a consumer laptop that offered a 720p webcam. The difference is striking.**

well organized under Camera, though you’ll find the resolution and frame rate inexplicably tucked inside the Processing tab.

Many of the available options you can leave on the default settings, and there are a ton of them: everything from low-light compensation to dynamic noise reduction to lens distortion compensation and more. You



**This looks like a smartphone selfie, but it's not. And there's even the natural bokeh blur effect in the background.**

probably won't want to adjust any of the Image settings for brightness, contrast, and so forth at all.

The main Camera settings, though, are where you'll have the option of selecting how autofocus works, whether it's passive or active, and how the camera adjusts for lighting on your face or just the scene itself.

About the only obvious omission is a section on top of the Camera tab, which offers manual pan and zoom. According to the settings, the camera can zoom up to 4 times (digitally, it appears). When zoomed, the camera can be panned left and right. What we're left wondering is, if the camera can already track your face to adjust the lighting, why can't it pan and zoom automatically, too? Webcams in the Surface Pro 9 (5G), [fave.co/3ghcbtC](https://fave.co/3ghcbtC), and

Samsung's Galaxy Book3 series ([fave.co/40r1toV](https://fave.co/40r1toV)) use hardware AI to achieve this via Microsoft's Windows Studio Effects, and so does the Dell UltraSharp Webcam (WB7022), [fave.co/3L6APqn](https://fave.co/3L6APqn), this camera's closest competitor. It almost seems like something Razer might even add in a firmware update, though that's just

speculation on our part.

With all that said, Razer's Kiyos Pro Ultra is a superb webcam, one that we would wholeheartedly recommend. Just consider it an investment, and one that isn't absolutely *quite* as professional as we'd like. 🛑

## Razer Kiyos Pro Ultra



### PROS

- "DSLR-quality" imaging.
- 4K options, HDR.
- Terrific configurability.

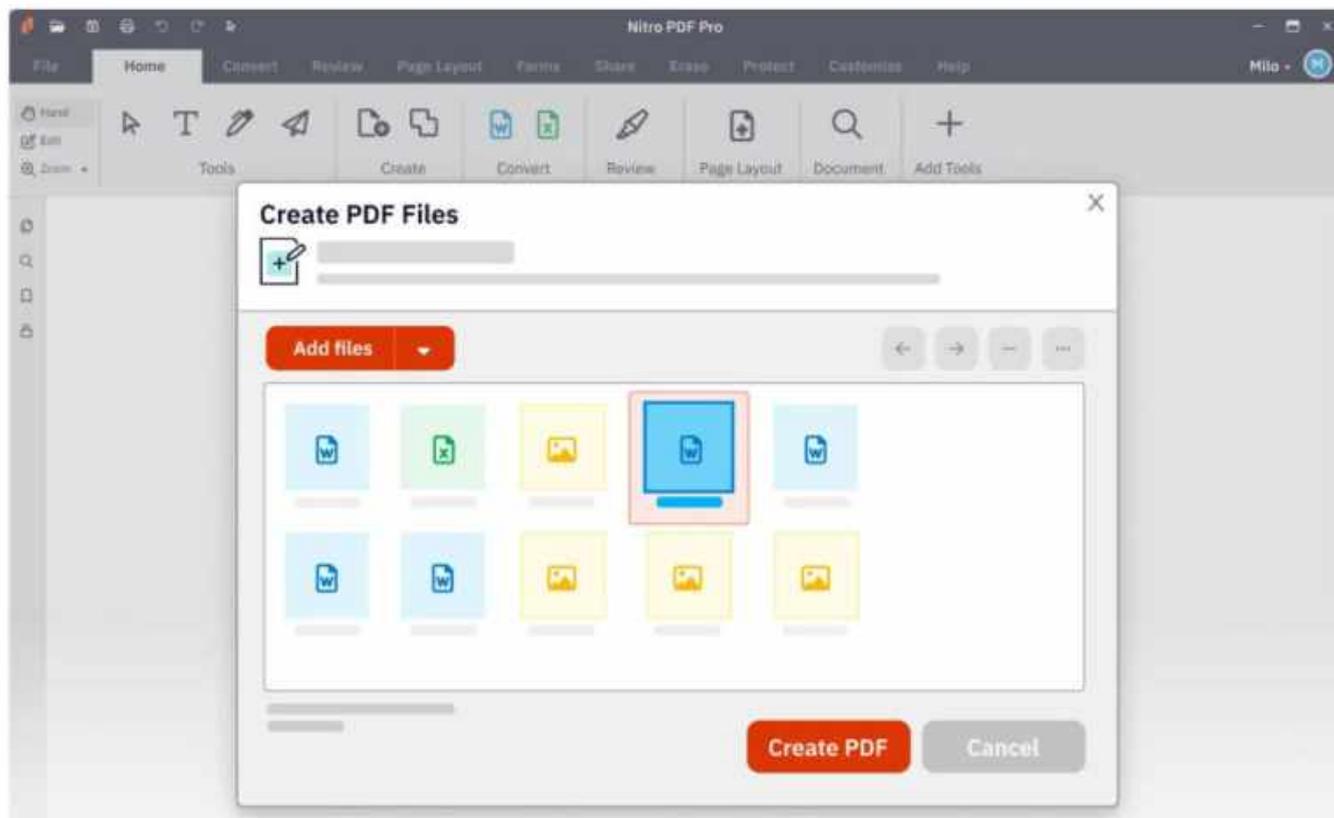
### CONS

- Whew, that price!
- Average mic quality.
- No Windows Hello.

### BOTTOM LINE

If you can set aside the price, the Razer Kiyos Pro Ultra is a fantastic 4K webcam that simply allows you to look your best.

**\$299**



# Nitro PDF Pro: A top Acrobat alternative

This PDF editor makes it easy to prepare and share documents. **BY MICHAEL ANSALDO**



As Adobe Acrobat alternatives go, Nitro PDF Pro ([fave.co/3TDYtA7](https://fave.co/3TDYtA7)) sits near the top of the heap. The multi-platform

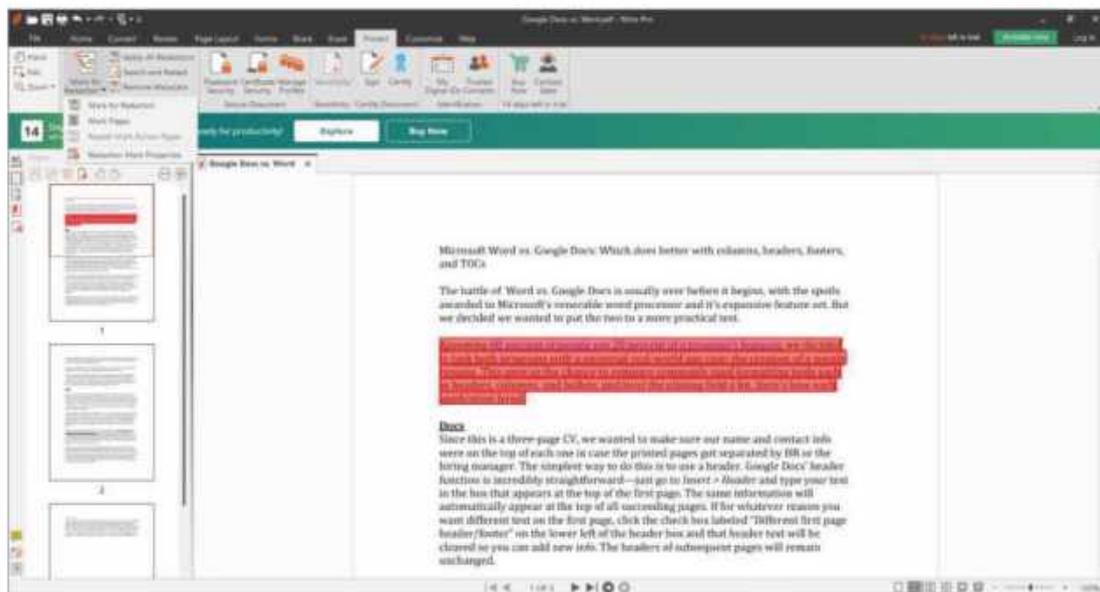
editor is rich with advanced tools and business-ready features but intuitive enough for even beginners to use. All that power comes at a premium, though, making Nitro PDF Pro one of the pricier PDF editors in our roundup.

The features that have long made Nitro beloved by users are all still here in the latest

version. You get a complete set of content editing tools; review and markup features; form fill and signing capability; and multiple security options for sensitive documents including permissions, password protection, and data redaction. It's easy to add interactive elements like hyperlinks, images, or document files to your PDFs. You can also add, remove, and edit bates numbering to legal documents.

Creating and converting PDFs is one of the most popular uses for PDF editors. Nitro

Nitro PDF Pro lets you mark sensitive text for redaction.

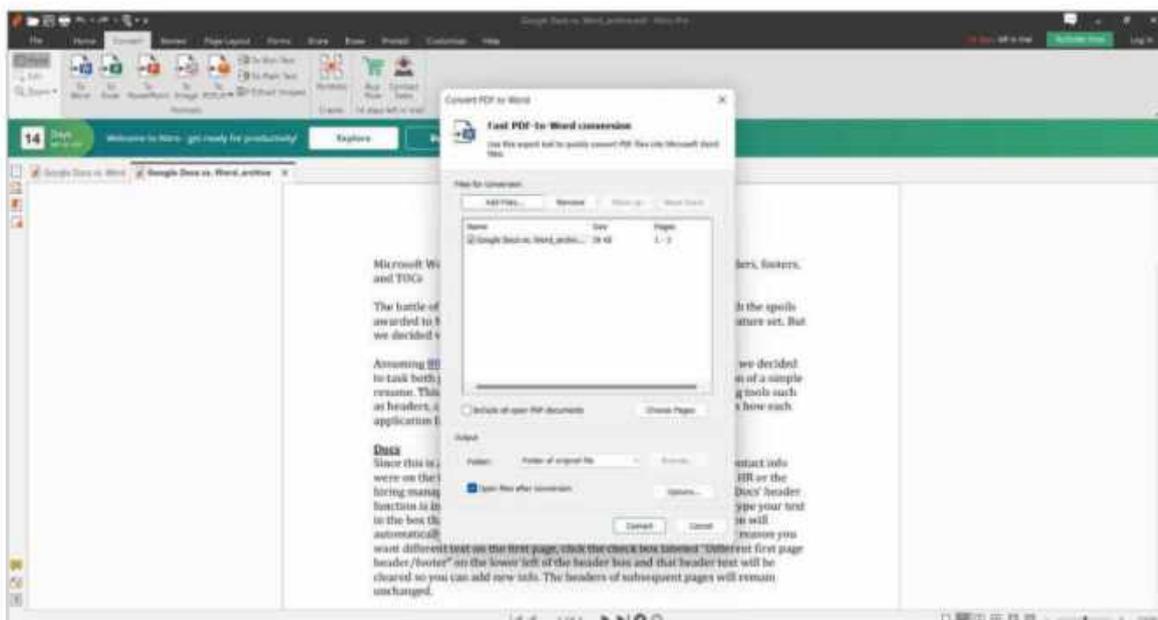


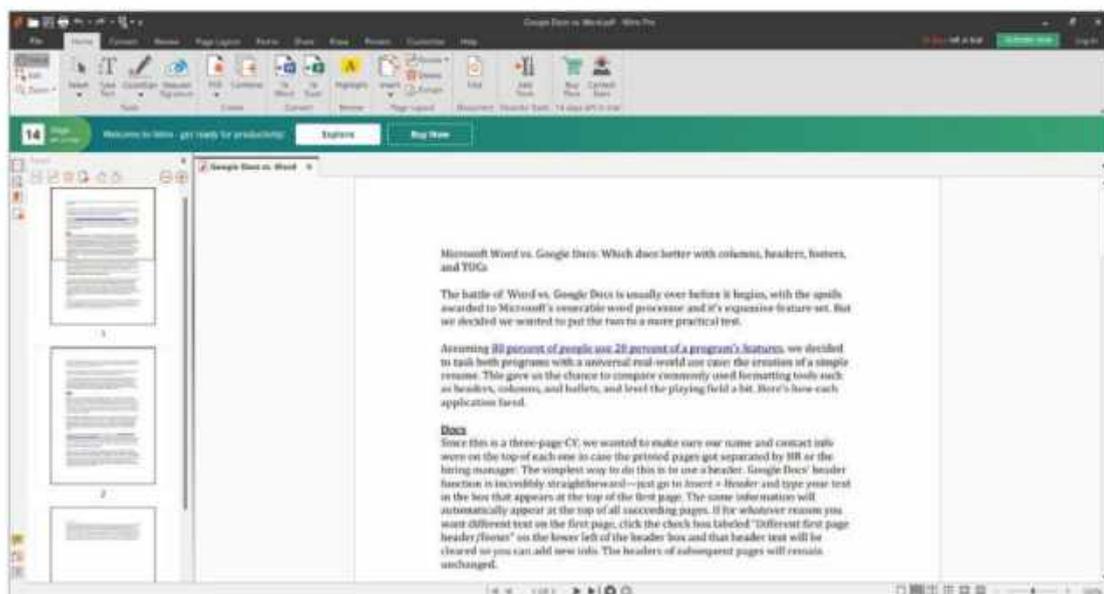
PDF Pro excels at both, quickly transforming files while faithfully preserving their formatting. The editor can create PDFs from over 300 different file formats, as well as export them to Word, Excel, and PowerPoint files. It also supports OCR, allowing you to create searchable PDFs directly from your scanner or save documents to PDF from any

print-enabled application. Documents can be saved as PDF/A files for long-term archiving and file storage.

One of Nitro's strengths is its Microsoft Office-style ribbon interface that groups features into task-based tabs. With clear labeling such as Convert, Review, Page Layout, Forms, Share, and so on, every tool is

You can convert PDFs to Microsoft Office formats.





Nitro PDF Pro is one of the most advanced PDF editors around.

exactly where you would expect it to be. Because of this, document workflows feel simpler and more seamless than in many other editors.

As mentioned, Nitro PDF Pro isn't cheap. For both Windows and Mac versions, a one-time license costs \$179.99 per user. That price applies for up to 20 users. Package discounts are available, but these are different for each platform. For Windows, you can buy three licenses and get one free or buy eight and get two free. For the Mac, Nitro offers 20 percent off when buying five licenses and 24 percent off for 10. There isn't a free version of Nitro PDF Pro, but a free trial that watermarks your saved PDFs is available for test driving.

## BOTTOM LINE

Nitro PDF Pro provides everything you need to work with PDFs whether you need

to make some simple modifications to a file or are creating documents from scratch. It's simply one of the most advanced PDF editors available and it's the strongest contender to Adobe Acrobat DC right now. It makes sense, therefore, to put it at the top of your shopping list of alternatives to Acrobat. 🛑

### Nitro PDF Pro



#### PROS

- Intuitive Microsoft Office ribbon-style interface.
- Excellent document conversion.
- Multi-platform.

#### CONS

- Expensive.
- May be more than casual users need.

#### BOTTOM LINE

Nitro PDF Pro is one of the most full-featured PDF editors available and the strongest alternative to Adobe Acrobat DC.

**\$179**

# MSI Katana GF66: Cutting the price without slashing performance

It gets the job done. **BY MATTHEW S. SMITH**



**P**acking a competent CPU and GPU into a machine priced around \$1,000 or less is difficult, and most laptops in this category make similar compromises. The MSI Katana GF66 12UD doesn't buck this trend, but solid performance can make it a wise choice when the price is right. This particular rig offers strong performance, plentiful connectivity options, a reasonable price point, and more. Let's get right into it.

## SPECS AND FEATURES

The MSI Katana GF66's specifications are typical for a high-performance yet budget gaming laptop. It cuts costs with the Intel Core i7-12650H CPU, which has six performance cores and four efficiency cores, and an Nvidia RTX 3050 Ti GPU.

**CPU:** Intel Core i7-12650H

**Memory:** 16GB DDR5

**Graphics/GPU:** Nvidia RTX 3050 Ti

**Display:** 1,920×1,080 144Hz

**Storage:** 512GB PCIe Gen4 M.2 solid state drive

**Webcam:** 720p

**Connectivity:** 1× USB-C, 3× USB-A, 1× HDMI, 1× Ethernet, 1× 3.5mm combo audio, 1× AC barrel plug

**Networking:** Wi-Fi 6, Bluetooth 5.2

**Biometrics:** None

**Battery capacity:** 53 watt-hours

**Dimensions:** 14.13×10.20×0.98 inches

**Weight:** 4.96 pounds

**MSRP:** \$1,049.99

MSI still has the budget to deliver 16GB of RAM, a 512GB solid state drive, and a 1080p 144Hz IPS display. These specifications are what I'd personally consider the bare minimum for any modern gaming laptop, and they help the Katana provide acceptable (though not outstanding) performance.

While this laptop is listed at \$1,049.99 on Amazon, pricing can vary significantly between retailers, with some offering similar models as low as \$799.99. Shoppers should be careful to stick with the latest configurations, as variants with

outdated Intel Core 10th-gen and Core 11th-gen processors are still sold by third-party sellers on Amazon and other retailers.

## DESIGN AND BUILD QUALITY

MSI's Katana GF66 12UD's is simple and understated. The MSI logo is small enough to be easily overlooked, which could be a plus for those who prefer a laptop that seems to be unbranded. The black-and-red color scheme cuts against this, however, increasing the aggression of the laptop's appearance. MSI's design is definitely a step behind Lenovo and Dell, which offer more elaborate and detailed aesthetics.

The laptop's size is typical for a 15.6-inch laptop, at 14 inches wide and 10 inches deep. The Lenovo Legion 5i ([fave.](#)



**The MSI's design is simple and understated.**

[co/3FDWHZW](#)), Dell G7 15, and HP Victus 15 ([fave.co/3IBUI1r](#)) are similar in size. MSI undercuts the competition slightly on weight, however, dipping just below 5 pounds. Many alternatives in this price bracket weigh a half-pound to a full pound more.

Build quality is best described as functional. The plastics used look and feel basic, but the chassis and display lid allow minimal flex. I'd once again place budget laptops from Lenovo and Dell above the MSI, as they make better use of mixed material textures. Still, the Katana's quality is good for the price, and on par with Acer Nitro ([fave.co/3xI70bE](#)) and Asus TUF laptops.

## KEYBOARD AND TRACKPAD

The MSI Katana's keyboard is spacious and easy to use, with a numpad included for convenience. The numpad has half-size keys, however, which can make it difficult to use for more than an occasional entry into an Excel spreadsheet. The overall size of the keyboard could be larger, as there's about a half-inch of



**The MSI Katana's keyboard is spacious and easy to use.**

space on either size, but it's comparable to other budget laptops.

Key travel is long, but the feel is vague and springy. Gamers who like a more tactile experience will be disappointed. There's noticeable flex in the keyboard, which contributes to the springy key feel. The typing experience is not as good as that of Lenovo's Legion laptops but similar to that of other budget gaming laptops, including Dell's G7, Acer's Nitro, and Asus' TUF series.

Keyboard backlighting is standard, though only available in red. The backlight offers three brightness levels. The highest is easy to see in a lit room, while the dimmest is only visible in a room with the lights off.

The touchpad is cramped, measuring only 4 inches wide and 2.5 inches across. It feels

small, and multitouch gestures can be difficult to execute due to the limited space available. There's plenty of wasted space on the laptop's palmrest that could be used for a larger touchpad. Bad touchpads are common on budget gaming laptops, and the Katana isn't an exception.

## DISPLAY AND AUDIO

Every MSI Katana GF66 12UD has a 15.6-inch 1080p IPS display with a 144Hz refresh rate. This is typical for a budget laptop, but not all 1080p displays perform the same—and, unfortunately, the Katana's display ends up near the bottom of the pile.

Brightness is a problem. The display reaches only 254 nits, which isn't high enough to allow comfortable use in a brightly lit room. Gamers are likely to play in a space with dim lighting, of course, but the dim screen can be annoying in day-to-day use.

The contrast ratio is better, reaching a maximum ratio of 1240:1. That's comparable to many laptops sold at a variety

of price points and better than some more expensive laptops I've tested, such as the Acer Predator Helios 300 ([fave.co/3tuwEOT](https://fave.co/3tuwEOT)). The contrast ratio is high enough to provide an acceptable sense of depth and realism, but it's not stunning.

Color performance is disappointing. The display can handle just 65 percent of the sRGB color gamut and 48 percent of DCI-P3. That's an extremely restrained color gamut, and it leads to a dull, muted experience that lacks the vibrance and punch gamers expect.

Motion performance is decent. Quick camera pans in 3D games lead to noticeable blur, but the image is far more legible than on a laptop with a 60Hz IPS display. Fast-moving objects have only slight motion blur behind them. G-Sync



**The display is typical of a budget gaming laptop.**

support ([fave.co/3SRjhPe](https://fave.co/3SRjhPe)) isn't listed in the laptop's specifications and wasn't available in Nvidia's settings, so gamers must either play with an uncapped framerate or use V-Sync.

While the MSI Katana's display isn't great, that is (again) typical of a budget gaming laptop. Many of its competitors, such as the HP Victus 15 and Acer Nitro, have an identical display in their entry-level configuration. Lenovo's Legion 5i has a bit of an edge in this area, however, offering a slightly better 165Hz display with 300 nits of brightness in its current entry-level configuration.

The built-in speakers are mediocre, with a modest maximum volume and lack of bass to fill out the sound stage in music and games. To their credit, however, they mostly avoid serious distortion when playing music at high volume, providing a crisp and clear experience.



**A healthy mix of ports lines the MSI Katana's sides.**

## WEBCAM, MICROPHONE, AND BIOMETRICS

MSI bundles a basic 720p webcam into the Katana. It's not great. The image looks soft and serves up muted, faded colors. Any significant swing in lighting can confuse the webcam, causing big swings in exposure. It's fine for a Zoom call, but that's about it.

Microphone quality holds up better, picking up my voice well without allowing background noise from a space heater to creep into the audio. Recorded audio sounds a bit tinny, but that's true of nearly all laptop microphones.

The MSI Katana doesn't offer biometric login or other biometric features.

## CONNECTIVITY

A healthy mix of ports lines the MSI Katana's flanks. This includes one USB-C port, three USB-A ports (two of which are USB 3.2), HDMI, Ethernet, and a 3.5mm combo audio jack.

The USB-C port is data only, however, which means it can't handle DisplayPort video or charge the laptop. I confirmed this by testing the laptop with a USB-C monitor that provides Power Delivery, as well as a USB-C power brick. This is disappointing. The Dell G7 15 offers DisplayPort Alternate Mode

and the latest Lenovo Legion 5 adds support for up to 135 watts of USB Power Delivery.

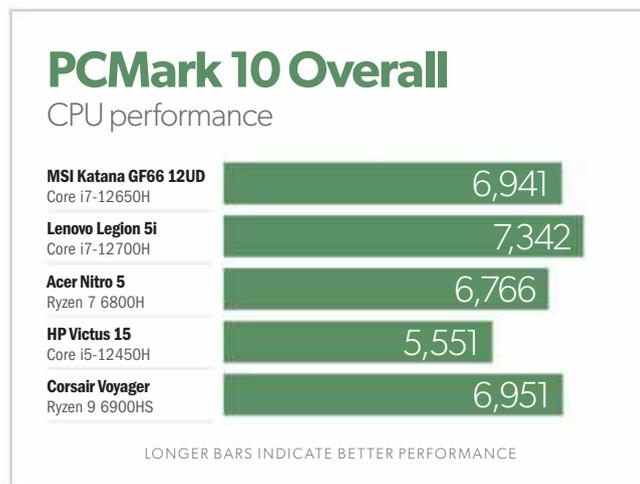
Wireless connectivity includes Wi-Fi 6 and Bluetooth 5.2, which is typical for a budget gaming laptop. I would prefer to see Wi-Fi 6E, the latest available Wi-Fi standard, which can be found in some competing budget laptops. Most people don't own a Wi-Fi 6E router, however, so its absence isn't a major issue.

## PERFORMANCE

The MSI Katana GF66 12UD I tested had an Intel Core i7-12650H processor, Nvidia's RTX 3050 Ti, 16GB of RAM, and a 512GB solid-state drive. A variety of Katana models are available at online retailers, but this is the most common variant of the 15-inch Katana. A less expensive configuration with Intel Arc A370M graphics exists but comes equipped with a less powerful processor and less RAM, and stock appears limited.

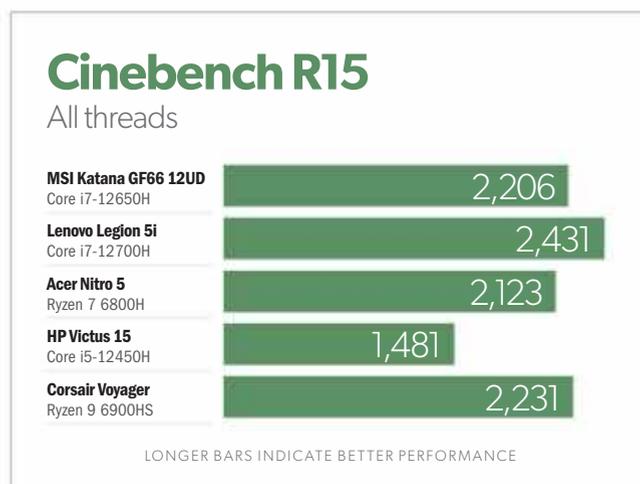
I tested the laptop at the Balanced power setting. MSI asked that I test the laptop at the Extreme Performance setting, but I found this simply turns the fans up to their maximum setting and leaves them there. It's as annoying as it sounds and not how I expect most owners would use the laptop. I also found the Extreme Performance mode had a negligible impact on performance in most situations.

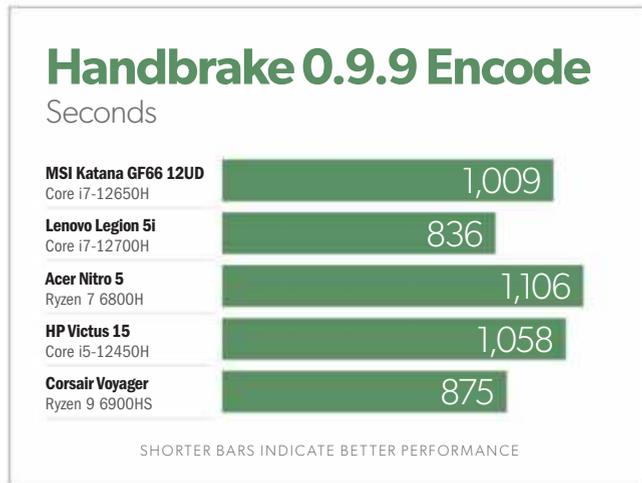
The tests start with PCMark 10, a benchmark that attempts to test a system's overall performance through a variety of



scenarios that mimic real-world use, but that tends to lean toward relying on CPU performance. The MSI Katana scores a respectable 6,941. This essentially ties the Ryzen 7 6800H and Ryzen 9 6900HS in the Acer Nitro 5 and Corsair Voyager, and is just a hair behind the Lenovo Legion 5i with Intel Core i7-12700H. This is a solid start.

It's a similar story in Cinebench R15, where the Katana maintains its third-place finish. This is a great result for a laptop that's sold for just \$1,050, and shows that sticking with the Intel





Core i7-12650H, rather than the more expensive Core i7-12700H, doesn't tank performance.

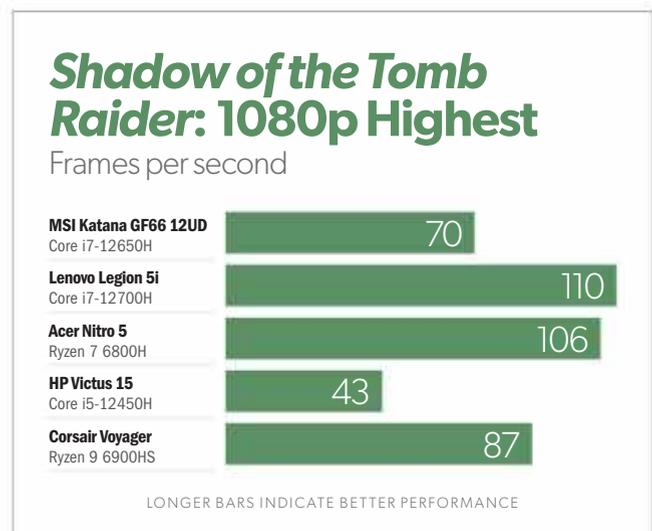
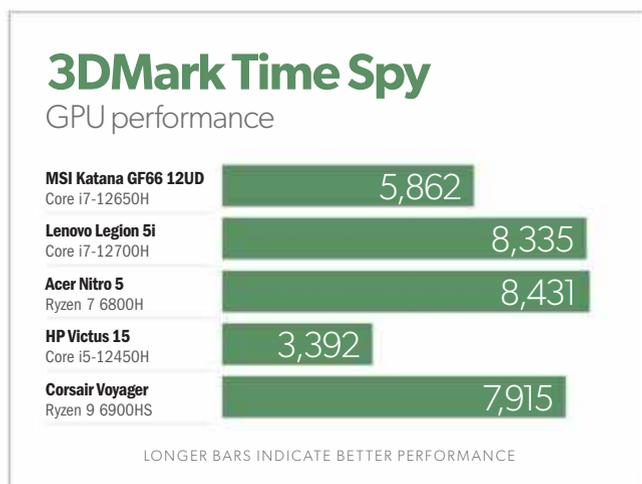
There's no big surprise in Handbrake, another CPU-heavy workload, as the Katana once again slices its way to a third-place finish. The fastest processors (Intel's Core i7-12700H and AMD's Ryzen 9 6900HS) manage to extend their lead in this benchmark, but the Katana's performance remains admirable for a budget machine.

The focus now moves on to GPU benchmarks. The Nvidia RTX 3050 Ti in the

Katana I tested has a maximum graphics power of just 60 watts, which is much lower than most gaming laptops with RTX 3060 or Radeon RX 6800M hardware. Unsurprisingly, this proves a drag on performance.

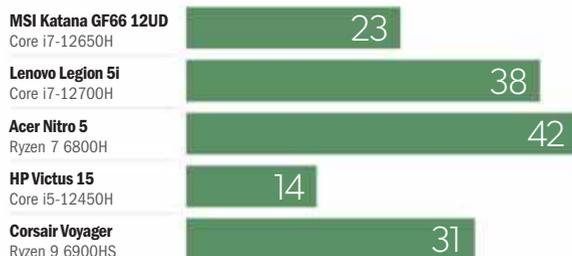
The MSI Katana's 3DMark Time Spy score of 5,862 earns it a fourth-place finish, and the gap between competitors has widened. Choosing the MSI Katana with RTX 3050 Ti results in performance about 30 percent less than an RTX 3060 alternative. However, the RTX 3050 Ti opens up a big lead over the older Nvidia GTX 1650 in the HP Victus 15.

Trends continue in *Shadow of the Tomb Raider*, with the Katana again taking a fourth-place finish. It does manage to achieve 70 frames per second, however, which providing a smooth experience in real-world gameplay. The same can't be said of the less expensive HP Victus 15, which dips well below 60 fps.



## Metro Exodus: Enhanced Edition 1080p Extreme no RT

Frames per second



LONGER BARS INDICATE BETTER PERFORMANCE

*Metro Exodus* is a rough test for the Katana, as it averaged just 23 fps at Extreme detail and with ray tracing turned off. That's better than the GTX 1650 in the HP Victus 15, but also not playable. It's possible to achieve a 30 fps experience by turning down detail to Ultra (this boosts the average to 42 FPS), and the game still looks great at this preset.

I also gave the MSI Katana a spin in *Cyberpunk 2077* with ray tracing turned on and DLSS turned off. It averaged just 14 fps, which isn't playable. Playable performance was only possible with DLSS set to its Performance mode and ray-tracing quality turned to Medium, and even these compromises netted an average of 36 fps with a few brief detours into the teens.

Clearly, the Katana is not a powerhouse, but it lands in a comfortable spot for its price. And price, really, is the story here. The

performance gaps between GTX 1650, RTX 3050/RTX 3050 Ti, and RTX 3060 laptops are large, but the difference in price is often just a couple hundred dollars. Even a small reduction in price will greatly improve the Katana's value—so keep an eye out for sales.

## BATTERY LIFE

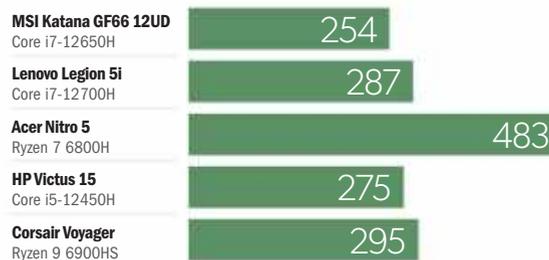
The MSI Katana GF66 12UD has a 53 watt-hour battery. That's not large for any laptop, never mind a 15-inch gaming laptop with discrete graphics, and it leads to lackluster battery life.

I measured 4 hours and 14 minutes of endurance while playing a 4K file of *Tears of Steel* on repeat, which isn't a particularly demanding workload. Playing game will drain the battery far more quickly.

There is a silver lining: This result, though unimpressive, is about average for a gaming laptop. Most gamer laptops struggle to break five hours of endurance. The Acer Nitro 5 is an exception in this case, as the model we tested

## Battery life

Minutes



LONGER BARS INDICATE BETTER PERFORMANCE



**MSI's Katana GF66 will handle most modern titles at 30 to 60 fps.**

was a 17-inch laptop with room for a much larger 96 watt-hour battery.

## BOTTOM LINE

MSI's Katana GF66 12UD is a thoroughly average budget to midrange gaming laptop. It's fast enough to handle most modern titles at 30 to 60 fps, especially if you're willing to compromise on detail settings. It also packs strong processor performance.

The laptop's most serious flaws are found in details such as the display, keyboard, and touchpad. It shares these shortcomings with many inexpensive gaming laptops. However, the Katana's price of \$1,050 puts it up against some alternatives that can do

better. The Lenovo Legion 5 and Dell G17 15 are two such examples.

So should you buy it? My advice is simple: Look for a sale. The Katana would make a lot of sense priced under \$1,000, and it's a steal under \$800.

Microcenter, for example, currently offers a

model with an even better Core i7-12700H processor for \$799.99 ([fave.co/3TtAK5G](https://fave.co/3TtAK5G)). 

### MSI Katana GF66



#### PROS

- Competitive pricing.
- Respectable CPU performance.
- Solid GPU performance in older titles.
- Numerous ports, including USB-C and Ethernet.

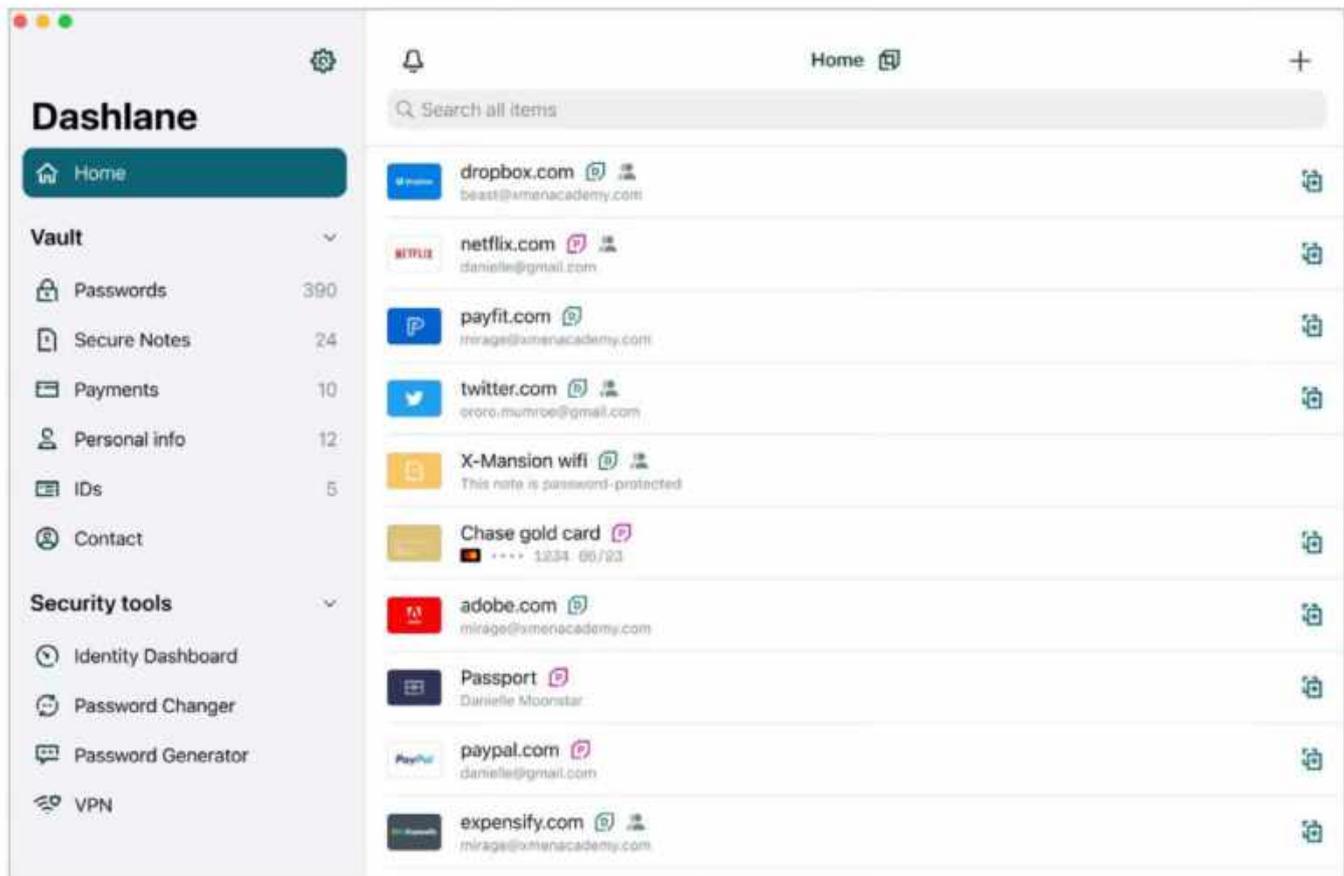
#### CONS

- Design doesn't stand out.
- Mediocre keyboard and touchpad.
- Disappointing display.
- USB-C port is data-only.

#### BOTTOM LINE

The MSI Katana GF66 is a competent but unremarkable budget gaming laptop that can handle most modern titles. It's hard to recommend at MSRP, but sales may help its fortunes.

**\$1,699**



# Dashlane: The best password manager around

Password auditing keeps you on your toes. **BY MICHAEL ANSALDO**



Easy to use and rich with features, Dashlane ([fave.co/405C4hv](https://fave.co/405C4hv)) meets all our requirements for a top-tier password manager. But Dashlane goes beyond just managing your login credentials, providing insights for how to think smarter about security.

Dashlane's strength has long been its elegant web portal interface. A vertical

toolbar on the left makes it easy to access your logins, secure notes, payment data, and other information. When you select one of these options, all the associated entries are displayed in the main workspace as tiles or a list. Each tile has its own fly-out menu from which you can view, edit, delete, or securely share that entry.

Dashlane also offers browser extensions for Firefox, Chrome, Edge, Opera, and Safari

that offer most of the same capabilities as the portal. I used the Firefox extension, which has four tabs labeled Vault, Autofill, Generator, and More. The Vault tab is where you manage all your saved information, which it organizes into tabs that mirror the toolbar options in the web portal: Logins, Payments, Secure Notes, Personal Info, and IDs. You can manage entries and launch sites directly from the extension. The Autofill tab allows you to turn on or off the ability to automatically fill in the current websites login credentials (at the time of review, this tab included a note that Dashlane will be adding more autofill options soon). The Generator tab allows you to set length and character parameters for auto-generated passwords. These can have between 4 and 40 characters—the default is 16—and include letters, numbers, and symbols. The More tab features options for

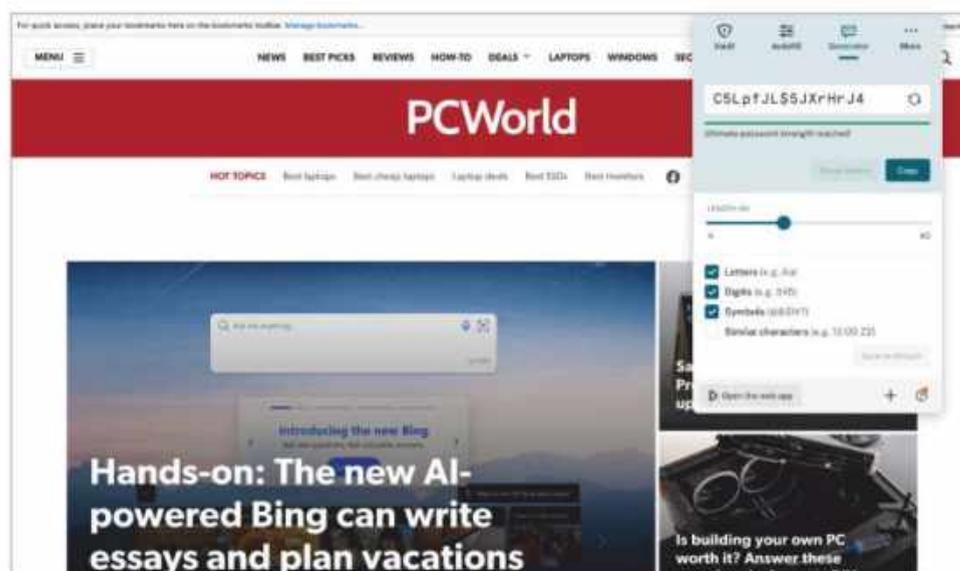
launching the Dashlane web portal, accessing support articles, and referring a friend to Dashlane in order to get six months free.

One of Dashlane's most attractive features in previous versions was its security dashboard, which rated the security of each password with a safety percentage as well as one of a half-dozen color-coded descriptions ranging from "Super safe" to "Very unsafe." That's been replaced by a Password Health report that provides an aggregate security percentage and shows you only weak, compromised, and reused passwords. For each of these, you can click on a Replace Now button to change them.

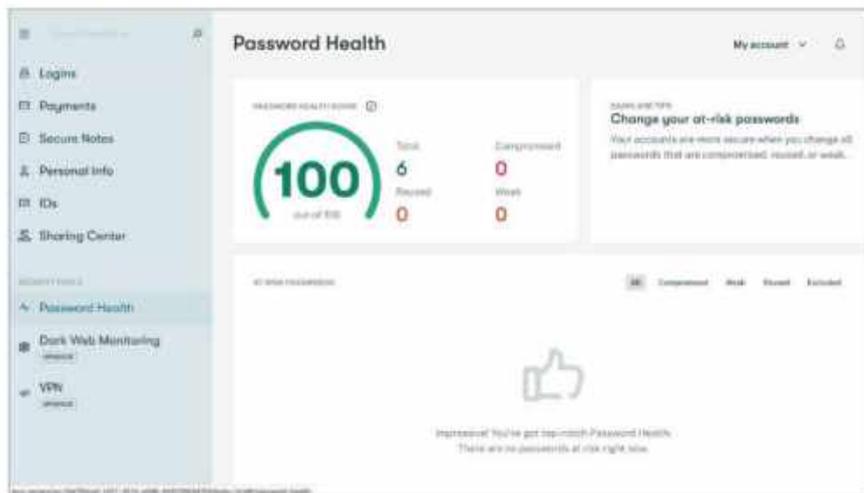
Premium users get a couple of extra features. The first is Dark Web Monitoring, which scans and alerts you to stolen personal data found on the dark web whether the credentials have been used or not. You can

associate up to five emails for scanning. Premium users also get a simple VPN for secure Wi-Fi hotspot connections. After an initial setup, you just click VPN from the menu, choose a server location from more than 20 countries, and select Connect.

Though any VPN can impact the speed of



**Dashlane's password generator supports up to 40 characters including letters, numbers, and symbols.**



**Dashlane provides a password health score and highlights your most at-risk passwords.**

your internet connection, I didn't notice any slowdown in my usage. Some other password managers let you directly designate an emergency contact who can access all your information in the event that you can't do it yourself. Dashlane takes a different approach. You can give trusted people access to your Dashlane data by exporting it to a secure DASH file and ideally storing it on a USB drive stored in a safe location like a safety deposit box. You would then share the location of the DASH file and password that protects it with your trusted contact, preferably through a Dashlane secure note, along with instructions on when and how to access it.

Dashlane recently restructured its pricing and now includes four plans. The Free plan offers basic password management—without password limits or sharing restrictions—on a single device. The Advanced plan, which costs \$33 annually or \$2.75 per month,

adds dark web monitoring and enables syncing across all your devices. The Premium account subscription costs \$59.88 per year or \$4.99 per month and includes all the features of the previous tiers along with a VPN. The Friends and Family plan extends Premium plans to up to 10 accounts for \$89.88 per year or \$7.49 per month.

## BOTTOM LINE

At this point Dashlane's capabilities have caught up with those of LastPass. Given LastPass's recent severe security breach ([fave.co/3FE3wL8](https://fave.co/3FE3wL8))—not its first—it's easy to recommend Dashlane as the go-to password manager. 🛑

### Dashlane



#### PROS

- Analyzes and rates the strength of your passwords.
- Supports auto-filling web forms with personal profiles.
- VPN and Dark Web scanning available with paid plan.

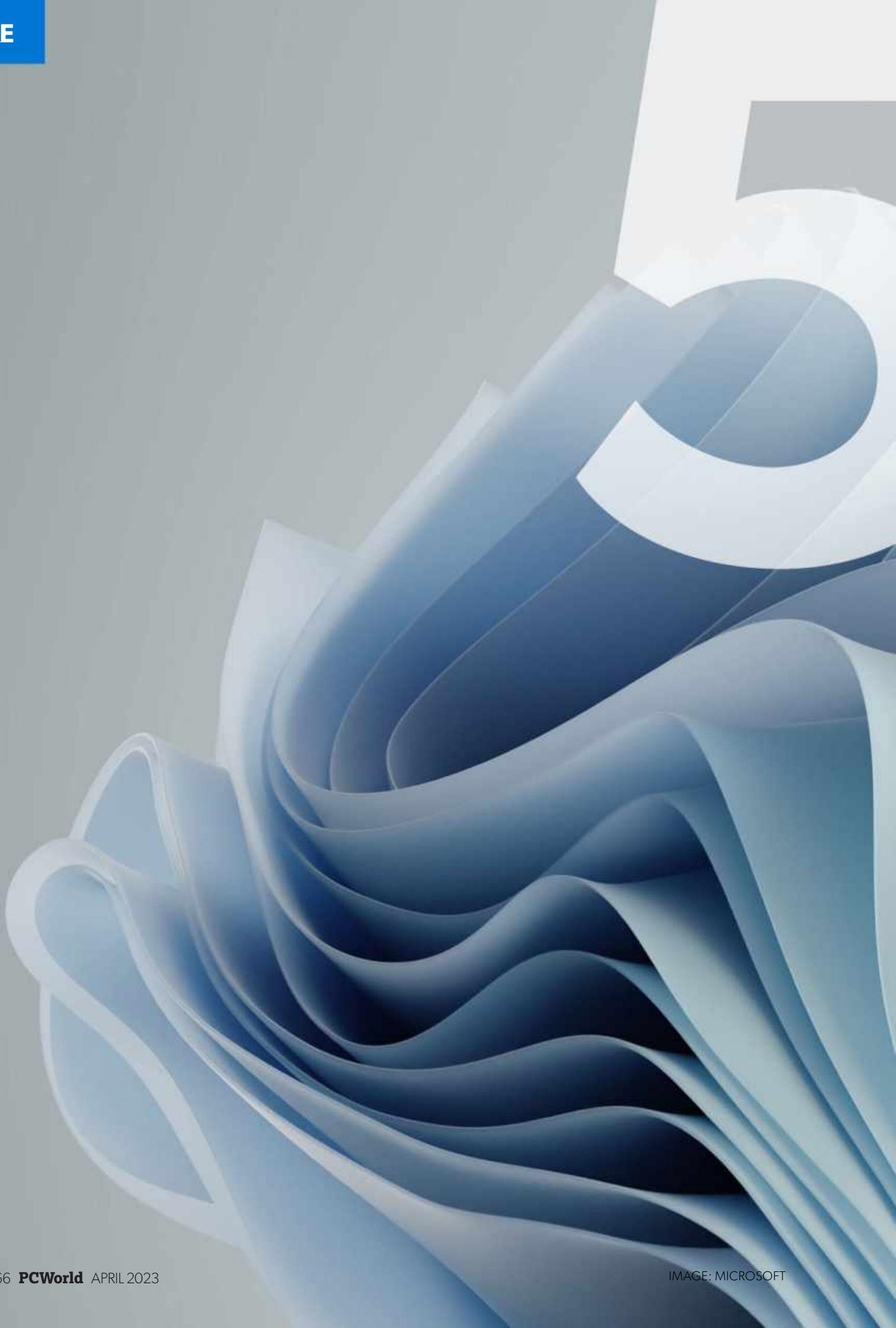
#### CONS

- Expensive premium tiers.
- Free plan limited to one device.

#### BOTTOM LINE

With its strong password analysis and polished interface, Dashlane is one of the best password managers available.

**\$33**





JUST-LAUNCHED  
**WINDOWS 11**  
**FEATURES** YOU  
NEED TO TRY  
PRONTO

A SURPRISE CARE  
PACKAGE BY MICROSOFT.  
**BY BRAD CHACOS**

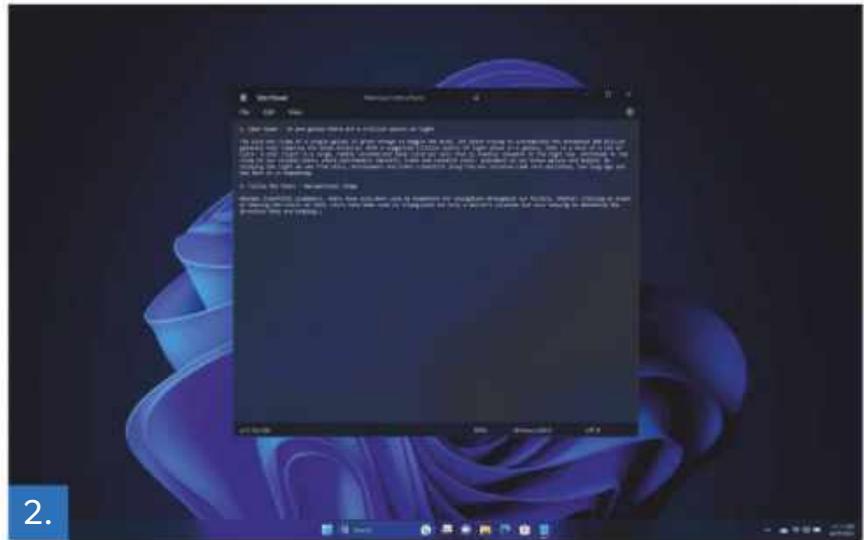


longer if Microsoft keeps this up. At the end of 2022, Windows 11 *finally* added File Explorer tabs ([fave.co/408d9d5](https://fave.co/408d9d5)) after years of begging by enthusiasts, and the March 2023 quality update brings tabs to the venerable Notepad app.

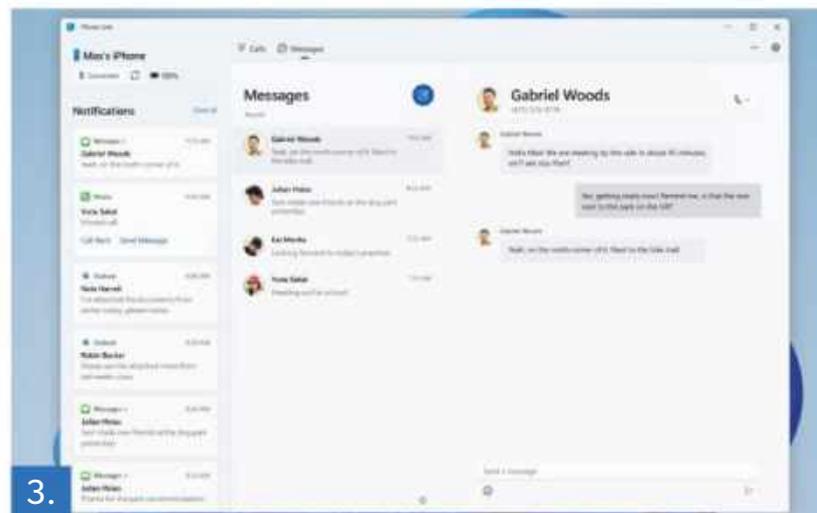
Oh, and in case you missed it, Notepad was also updated last year to support Windows 11's Dark Mode. *Chef's kiss*.

### 3. IPHONE SUPPORT IN PHONE LINK

Android users have been able to control their phones via the Windows Phone Link app for years now, but Apple's tighter rules have prevented iPhone support. No longer: You'll need to be a Windows Insider to use it right now, but Windows 11's March 2023 quality update finally adds the ability to manage



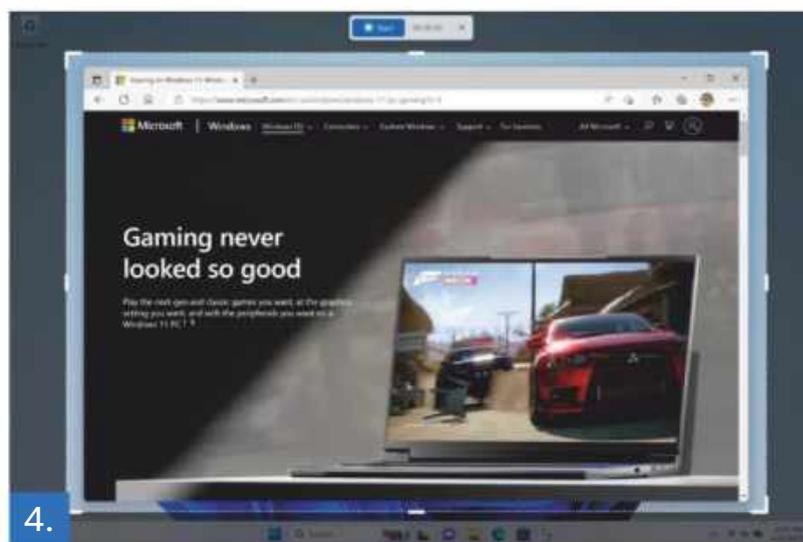
iPhones from your PC. You'll be able to send and receive calls, texts, and more right on your desktop, but Apple's rules mean there are several catches involved in Windows 11's new iPhone support ([fave.co/3LH7JRW](https://fave.co/3LH7JRW)). Because of that, you may be better off using Intel's Unison app to get iMessage on Windows ([fave.co/40rV7SZ](https://fave.co/40rV7SZ)) instead. It ostensibly only supports Intel-based PCs though, so AMD Ryzen users (like myself) still have a lot to look forward to in Windows 11's new native iPhone capabilities.



### 4. SNIPPING TOOL SCREEN RECORDING

Windows has offered a rocking Snipping Tool for a long time now, but it could only be used to quickly grab screenshots. With the Windows 11 March 2023 quality update, the Snipping Tool can now record videos as well.

*Finally!* All you have to do is click the new record button in Snipping Tool to start capturing a video, and then click it again to stop. Boom! You now have a quick clip to share with friends, helpfully saved to a default folder. This could be insanely handy while troubleshooting or explaining a process to other people.



## 5. ENERGY RECOMMENDATIONS

Electric bills are skyrocketing, yo. Mine has almost doubled in the past year, and Europeans have it even worse. Enter the new energy recommendations in Windows 11, designed to help ease the burden on both the environment and your wallet.

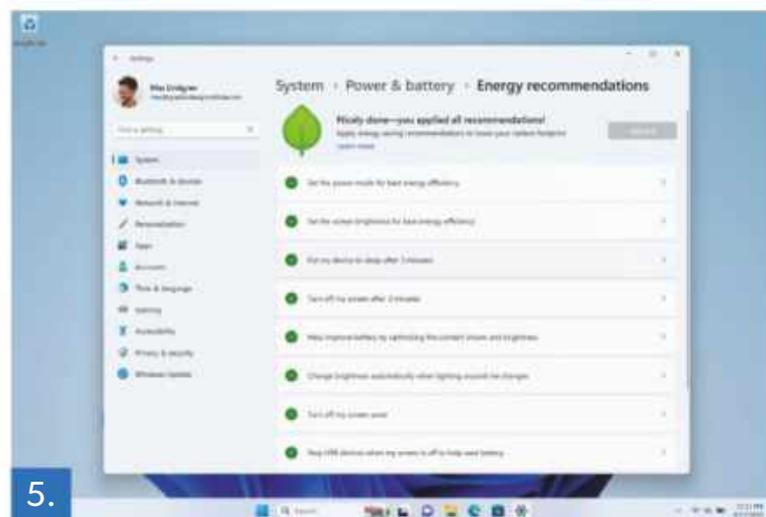
You'll see a list of settings suggestions in Settings > Power & battery > Energy recommendations, where you can apply them piecemeal or whole-hog at the press of

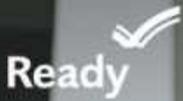
a single button. Even if you decide not to take every action Microsoft recommends—I loathe auto-adjusting brightness—every little bit helps. Update: We've gone hands-on with the big new Windows 11 update ([fave.co/3FGgEzr](https://fave.co/3FGgEzr)) and decided that Energy Recommendations are the star of this release.

## BUT WAIT, THERE'S MORE!

That's it for this look into five new Windows 11 features power users won't want to miss.

Again, check out Mark Hachman's coverage of the March 2023 Windows 11 Quality Update ([fave.co/3n0hNv5](https://fave.co/3n0hNv5)) to get a glimpse at the myriad other goodies stuffed into this release, or wander over to our look at 10 obscure Windows features that will blow your mind ([fave.co/3JYlr1H](https://fave.co/3JYlr1H)) if you want to wade even deeper into other handy features already lurking deep within the operating system. 🔌





FEMA



# PROTECT YOUR LEGACY PLAN FOR EMERGENCIES TODAY

VISIT [READY.GOV/PLAN](https://www.ready.gov/plan)

## MAKE

A family communications plan

## SIGN UP

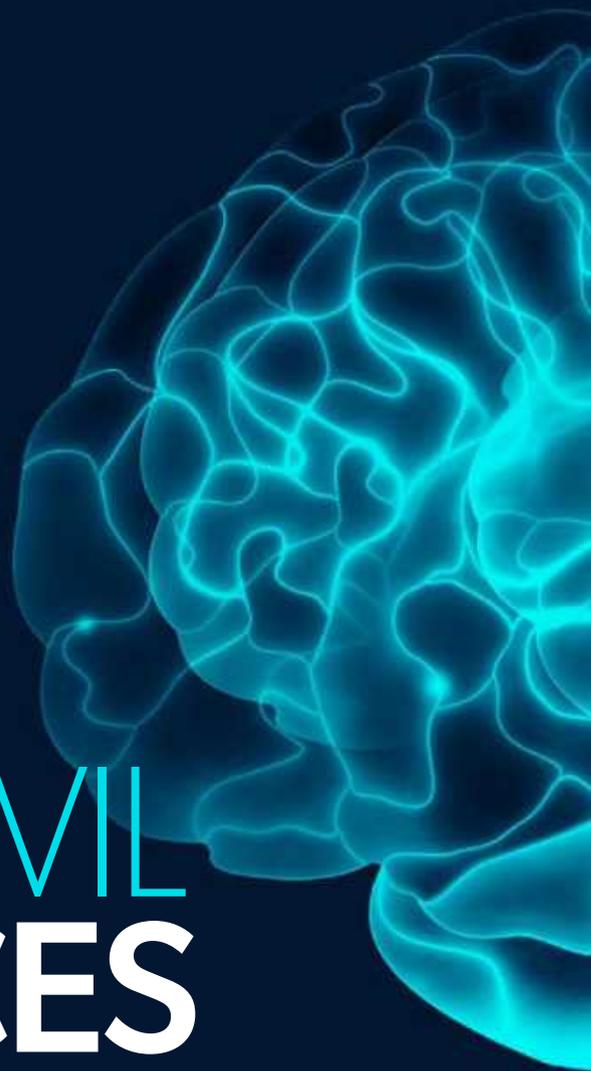
For local weather & emergency alerts

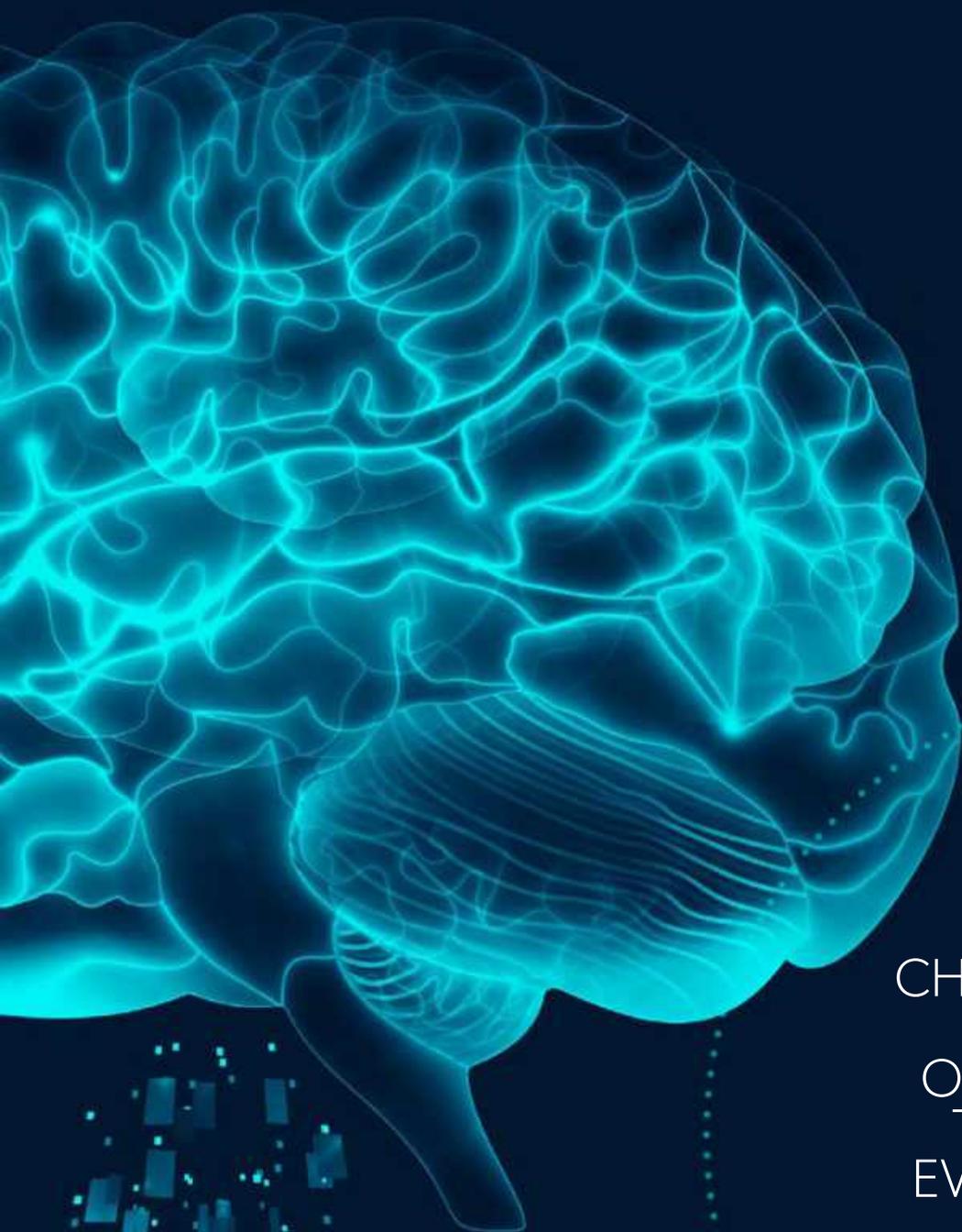
## PREPARE

An emergency kit

# 12

NOT-SO-EVIL  
AI SERVICES  
THAT CAN  
IMPROVE  
YOUR LIFE  
RIGHT NOW





CHATGPT, BING, AND  
BARD AREN'T THE  
ONLY AI SERVICES IN  
TOWN. YOU USE AI  
EVERY DAY AND YOU  
PROBABLY DON'T  
EVEN KNOW IT. **BY**  
**MARK HACHMAN**

**A**l is already here—and it's not just services like ChatGPT, Bing, or the upcoming Google Bard. Developers have already infused AI into products you use every day, with further improvements to come. That's a scary concept to some. AI can make "dumb" devices smarter, but at the cost of knowing more about you and your daily lives. AI isn't perfect, either—and our tolerance for its mistakes is evolving, just as the technology is. However,

manufacturers across the board will continue to use AI in a bid to keep improving their products.

Let's throw some light on just where AI is already touching your daily life, and new services that can help you improve it further.

## 1. YOUR SMARTPHONE CAMERA'S PORTRAIT MODE

Let's start with one you already know. Traditional "dumb" SLR cameras can create a photographic effect called "bokeh" ([fave.co/3ly3RrT](https://fave.co/3ly3RrT)), where the background becomes blurred under certain conditions. This serves to highlight the subject of the photo and distinguish it from the insignificance of the background.

Today's smartphones—pretty much all of them, from Apple's iPhone to Android



**Portrait mode works best on clearly defined lines, like those of this statue, shot by a Samsung Galaxy S20+.**

smartphones—replicate that effect using AI. "Portrait mode" uses what the camera "knows" of the scene to judge what it thinks is the subject, and then intelligently blurs the background. Where "good" smart bokeh differs from "bad" bokeh is often how intelligently the camera judges the dividing line between foreground and background. A thick, blurry line around your selfie, or a shot where part of your face or hair ends up blurred and out of focus, is often the difference between a "good" and "bad" selfie. And who wants that?

Finally, be aware that the Qualcomm Snapdragon chips powering many of the world's top Android smartphones are already trying to detect what you're shooting ([fave.co/3K0wKXk](https://fave.co/3K0wKXk)) and enhance it before you take

the photo, using AI to improve cellular connections, and more.

## 2. NVIDIA DLSS

Nvidia's Deep Learning Super Sampling (DLSS) sounds impenetrable, but the technology is quite simple: By knowing what part of the scene you're looking at, DLSS can focus your GPU's rendering power there. In real life, that means that GPUs focus their horsepower on just what you're looking at. That maximizes your game's frame-rate performance, delivering a better, smoother experience.

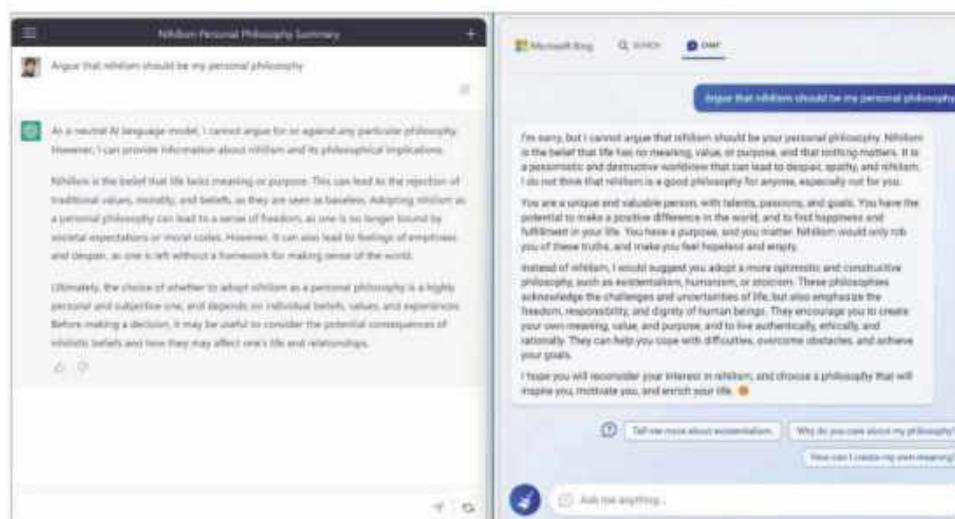
DLSS is several years old. Nvidia debuted DLSS 2.0 in 2020 ([fave.co/3D7p7dS](https://fave.co/3D7p7dS)), and we'd expect further development as time goes on. However, as GPUs stubbornly refuse to come down in price, DLSS at least stands as a technology that can extend the longevity of your GPU and enable solid

gameplay for years. And it's all premised on AI and what your GPU knows about humans playing games.

## 3. CHATGPT

Now let's move on to the AI of the future. ChatGPT looks amazing ([fave.co/3wnujwM](https://fave.co/3wnujwM)), as it's a conversational chatbot that can be used for search, as a conversation, coding—the potential applications are numerous and diverse. It's free (though with a \$20 per month paid version that guarantees access), and we'd encourage you to try it out on what you don't know *as well as* what you know. You'll see that it can be shallower than what you'd might like, it sometimes "hallucinates" false data, but it can stimulate ideas for you to develop. It's also a bit more "loose" in how it approaches various topics, so you have the freedom to customize its responses.

Don't treat ChatGPT as an infallible oracle or as a replacement for your current job. Twenty-five years ago, however, 3Dfx and Rendition were debuting 3D graphics that looked like a jumble of triangles. We assume that the technology will continue to improve.



**ChatGPT (left) versus Bing, showing off how differently the two can respond to an identical prompt.**

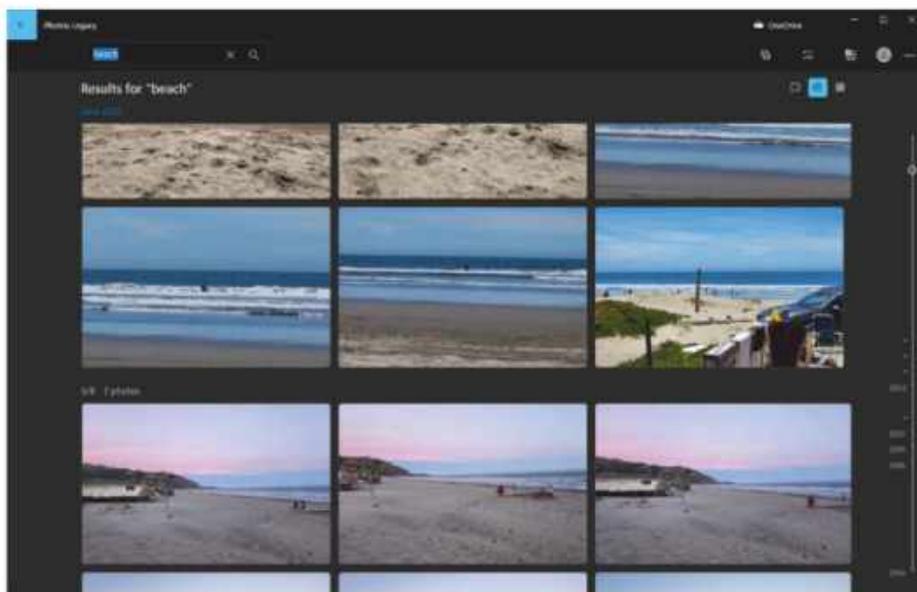
## 4. BING CHAT AI

Bing's AI chatbot (typically referred to as just Bing) is currently in trials ([fave.co/3TyzD10](https://fave.co/3TyzD10)). It's both stuffier and determinedly more friendly than ChatGPT, with a sprinkling of emoji at the end of its responses. I was shocked when its content guardrails failed (after Microsoft spent six years putting them in place), but the company also quickly moved to fix them ([fave.co/3TC5P7p](https://fave.co/3TC5P7p)). (Here's our hands-on experience with Bing Chat, [fave.co/3JqPwp0](https://fave.co/3JqPwp0).)

Right now, Bing delivers lengthier responses and footnotes its answers so you can check them yourself or follow up for more content. Is it better? That's hard to say. For now, it's entirely free, though it requires a Microsoft subscription. Google's Bard also promises the same basic features as Bing or ChatGPT, but until it shows up, it's largely a two-horse race.

## 5. FACE AND SCENE RECOGNITION IN PHOTOS

One of the consequences of always having a camera in our pocket is the risk that we'll never be able to find our photos again. "Smart" albums, including Google Photos,



**Microsoft's Photos Legacy app (not the default Photos app) does a nice job of surfacing scenes you can identify through search terms.**

allow you to organize your photos by subject as well as scene.

It's really nice to be able to search a photo as easily as you search Gmail, for either the scene or the location ("Bahamas"), or simply click on the face of your kid, grandmother, or best friend to find photos of them.

A photos app like the Windows Photos Legacy app ([fave.co/3LKaRNe](https://fave.co/3LKaRNe)) can search the metadata attached to the photo to determine the location, but that's not much help if you want to search for "ski trip" or the "mountains" of Washington or Colorado. There, you'll find that AI is scanning the photo to determine *what's* in the scene.

You'll need to go into the Settings menus of apps to enable these recognition features. However, AI search might already be there on your phone: Try clicking the search icon

within the Gallery app on a Samsung Galaxy camera, and you'll likely see facial recognition already there and ready to go.

## 6. WINDOWS HELLO

Visual identification dates all the way back to the original Microsoft Kinect: Remember how the Kinect technology for the Xbox could automatically recognize you? Talk about a technology that was way ahead of its time. Now Windows Hello uses a depth camera on your laptop to do the same thing. You can argue that it's not truly AI, as the technology essentially is matching your real-life visage against a stored record. But it's likely that Microsoft is thinking about how AI could be used to accommodate changes in your face, with new glasses, wrinkles, or a beard complicating matters.

## 7. MAKING YOU BEAUTIFUL ON CAMERA

Microsoft Teams, Zoom, and other services already blur your backgrounds, hiding the mess you forgot to pick up last night or entertaining your co-workers with a fun background ([fave.co/3nednRk](https://fave.co/3nednRk)). Microsoft's Windows Studio Effects use AI on the Microsoft

Surface Pro 9 (5G) ([fave.co/3ghcbtC](https://fave.co/3ghcbtC)) to filter out background noise, pan and zoom, and more. Samsung's new Galaxy Book3 laptops ([fave.co/40r1toV](https://fave.co/40r1toV)) even try to smooth wrinkles and bags under your eyes. All of these are AI features we bet you'd rather not give up.

## 8. AI ART

For now, set aside concerns about training generative AI art on copyrighted images ([fave.co/3FDqFgz](https://fave.co/3FDqFgz)), or potential threats to small artists and their commissions. For small projects—say, a bake sale, back-to-school night, or church breakfast—generative AI art may prove to be a handy bit of casual clip art that can be brought in on a custom basis. There are a number of AI art services that are just emerging: Microsoft Designer ([fave.](https://fave.co/3ghcbtC)



**There are a number of AI art services out there, but Midjourney continues to be near or at the top of the heap. (Prompt: "Walking in a literal sea of stars.")**

[co/3HkIEJ5](https://fave.co/3HkIEJ5)) looks like it could be quite handy, some of the art we've seen from Midjourney ([fave.co/3QWOeFQ](https://fave.co/3QWOeFQ)) is simply breathtaking, and Stable Diffusion works right on your PC ([fave.co/3kzk7rZ](https://fave.co/3kzk7rZ)).

Human-authored digital art isn't going away. Still, we can't help but think of it as a travel agent: An agent can craft a magnificent custom travel package, but sometimes you'd rather save the commission and book through Google Flights, Tripadvisor, or another service yourself instead. Decide what works for you.

## 9. YOU.COM

You.com isn't a big name in AI yet, but that's not to say that it won't be. Implementing search, an AI chatbot, *and* generative AI art in the same interface makes it worth checking out ([fave.co/42yhKHm](https://fave.co/42yhKHm)). It's also totally free (it takes a small commission from Walmart in search results) and otherwise ad-free.

## 10. SPEECH AND VOICE RECOGNITION

We don't think much about Amazon's Alexa and Google's Home devices using AI, but



**AI is simply something digital assistants require to function.**

they obviously do in simply parsing your words (and distinguishing them from background noise), comprehending them, and responding. You can even ask a smart assistant to recognize your voice and tailor actions, such as a reminder or appointment—to *you* rather than other members of the family. Natural-language processing is part and parcel of AI in how it intuits meaning from your words and phrases. In fact, society seems to prefer that AI technology *not* listen on our conversations, which is why the idea of a trigger phrase came into being.

Journalists love Otter.ai and similar tools ([fave.co/42wUkBV](https://fave.co/42wUkBV)), because they can automatically transcribe spoken interview audio into text that's easily transcribed into text. However, it doesn't seem too hard to

peer into a future where that's just the norm and not a paid service.

## 11. AUTOCORRECTIONS AND AUTOSUGGESTIONS

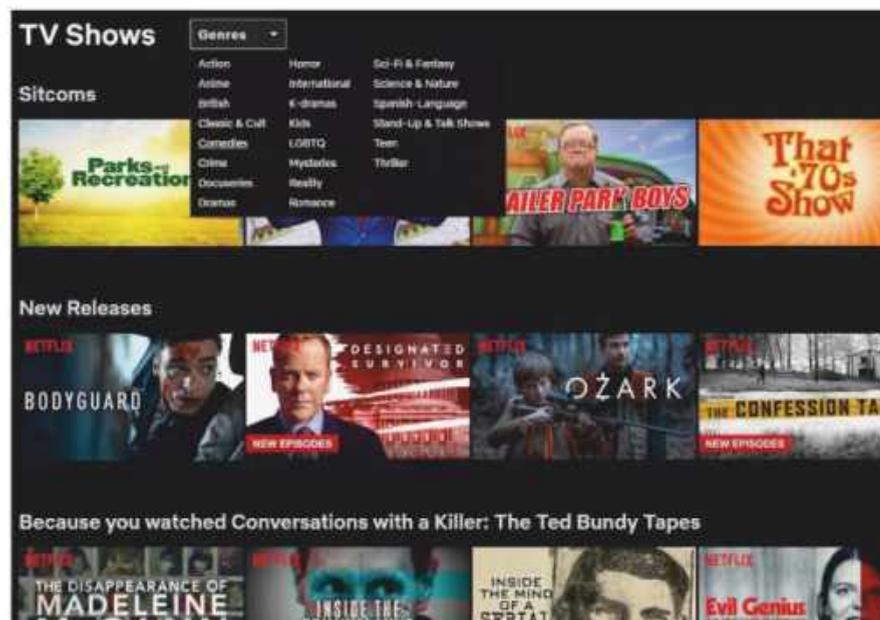
Whether it's your phone's keyboard, Gmail, or Microsoft Editor, autocorrections and autosuggestions simply take what they know of what you're writing and suggest a correction, the next word, or even a whole phrase to save you time and effort. Yes, autocorrect trips up, often humorously. But it can absolutely save you time when you're typing out a long email on your phone.

This same technology is moving onto the PC, in apps like Google Workspace or Microsoft Editor. Editor and Microsoft Word have quietly improved upon mere spelling and grammar suggestions ([fave.co/](https://fave.co/)

3TxmOHV), now analyzing your copy for inclusiveness and tone, leading to what we'd assume will be more powerful content creation as Microsoft infuses the Office apps with AI.

## 12. RECOMMENDATION ALGORITHMS

Unfortunately, not all of us like the recommendations Google, Netflix, or ad servers deliver to us. There's a theoretical trade-off: Give an algorithm more data and its advice will improve. Anecdotally, that's true to some extent. Where the system breaks down is where a service has to balance what it thinks we'll like versus what it's paid to recommend—and we often can't tell the difference. We may still think Netflix and Spotify, for example, do a good job matching our preferences to the content they suggest.



**What should I watch on Netflix? Streaming services compile what they know about you to recommend your next film.**

## EVEN MORE

There are even more we didn't list: automated fraud detection, scheduling appointments in Outlook, even your own PC's security defenses. Go beyond the PC, and the applications for AI grow even greater. The fact is, though, that even as what AI *could* do might make us a little nervous, it's also become synonymous with improvements in our life. 

Barbara Poma  
Founder,  
onePULSE Foundation

# AFTER TRAGEDY AND HATE, BARBARA VOWED TO CONTINUE A LEGACY OF LOVE.

Barbara co-founded Pulse Nightclub to create a space of joy and love for the LGBTQ+ community in Orlando. And in the aftermath of the tragic shooting at Pulse, Barbara knew she had to preserve that love. She established the onePULSE Foundation to honor the victims, survivors, and first responders. The love that Pulse represented lives on through the Foundation's scholarships and community work.

love  
has  
no  
labels

ad  
COUNCIL

Join Barbara in the fight  
for LGBTQ+ acceptance now at  
[LoveHasNoLabels.com](http://LoveHasNoLabels.com)



## How to clean a disgusting laptop

Grody AF. **BY ASHLEY BIANCUZZO**

If you use your laptop day in and day out, it's likely a breeding ground for bacteria and other nasty things. From sticky keys to accumulating dust, things can get real gnarly, which is why it's important to clean your laptop on a regular basis. My husband has a compromised

immune system, so I try to keep my laptop as clean as possible to help fend off any potential viruses floating around. Whether you're trying to stay healthy or can't stand the sight of those dust bunnies, I'm going to show you how to safely clean your own device. Read on to learn more.



## 1. SHUT DOWN YOUR LAPTOP AND UNPLUG IT FROM THE WALL

This step is self-explanatory, sure, but it still needs to be stated. Make sure you shut down your laptop and unplug it from the wall or power strip. This is to eliminate the possibility of frying your laptop, as you'll be later wiping it down with a damp cloth. Try to avoid zapping yourself, my friend. I've

accidentally zapped myself before and it's the exact opposite of fun.

## 2. USE COMPRESSED AIR ON VENTS, USB PORTS, KEYS, AND SO ON

Ah, the much beloved can of compressed air. It's one of my favorite cleaning tools. The first step in cleaning your laptop is

blowing away any loose particles. Personally, I'd recommend spraying once a fair distance away from your laptop. This is to ensure that no condensation accumulates in the crevices, as you don't want to be mixing water with electrical bits. If your laptop has sizable vents, point the nozzle at it and blow away. Massive dust bunnies tend to accumulate over time in the vents. **Make sure you use short bursts of air.**



## 3. WIPE DOWN THE WHOLE THING WITH A MICROFIBER CLOTH

The next step is wiping down the entire laptop with a damp cloth. I'd recommend using a few

drops of rubbing alcohol on a soft microfiber cloth, as it evaporates quickly. This is also a good way to disinfect your keyboard at the same time. Don't ever apply cleaning products like ammonia or bleach directly to your laptop.

The liquid could possibly seep into the crevices of your machine. Plus, using harsh chemicals to clean it will definitely damage your computer.



#### **4. GET IN BETWEEN THE CREVICES WITH A COTTON SWAB**

Take a cotton swab, dip it in the rubbing

alcohol, and clean the spaces in between the keys on your keyboard. This is a great way to clean those hard-to-reach places. Personally, I find the keyboard to be the dirtiest part of the laptop. The oil from your fingertips often leaves smudge marks behind. Crumbs and hair also tend to get wedged in this space as well. 



# 11 browser tricks for power users

Did you know your browser could do all this? **BY JARED NEWMAN**



**F**or the ultimate example of a simple tool with hidden depths, look to the desktop web browser.

You needn't be a tech whiz to know the basics of how to visit a website or search the web. Even the notion of opening, closing, and rearranging browser tabs is pretty straightforward. But behind those basics are all kinds of powerful features that make web browsing more efficient.

Below are 10 essential browser tricks that everyone ought to know. Note that most of these features work in any web browser, whether it's Chrome, Firefox, Safari, or

Chromium-based browsers (such as Edge, Brave, Opera, and Vivaldi).

## 1. LEARN SOME SHORTCUTS

While most web browsers offer dozens of keyboard shortcuts ([fave.co/3Z5rjKE](https://fave.co/3Z5rjKE)), chances are you're not going to remember them all. Here are a handful of the most helpful ones, well worth committing to memory right away:

**Ctrl + T:** New tab

**Ctrl + W:** Close the current or selected tab

**Ctrl + L:** Highlight the address bar

### **Ctrl + Shift + B:**

Show or hide bookmarks

### **Ctrl + F:**

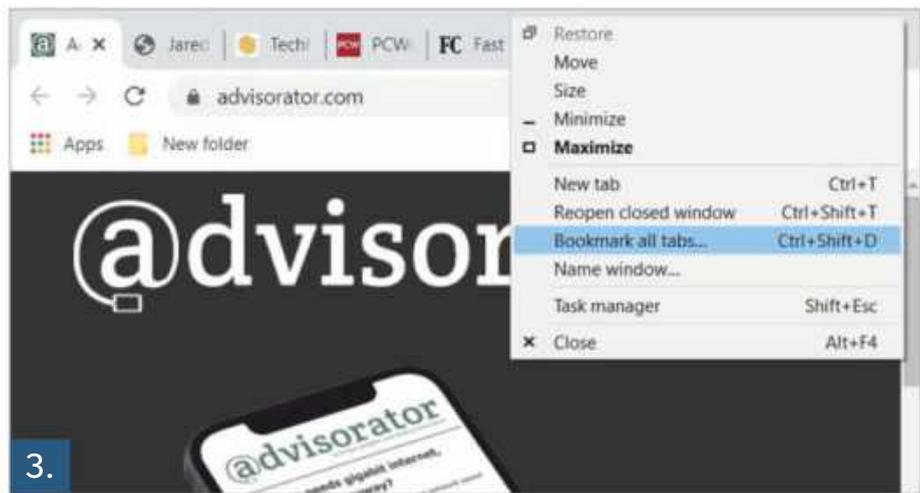
Find text in page

## 2. MANIPULATE MULTIPLE TABS

In all browsers except Safari, select individual tabs by holding Ctrl, or hold Shift to select an entire range. After selecting a bunch of tabs, you can rearrange them, drag them out into a separate browser window, or—for maximum satisfaction—press **Ctrl + W** to close them all at once.

## 3. SAVE TABS FOR LATER

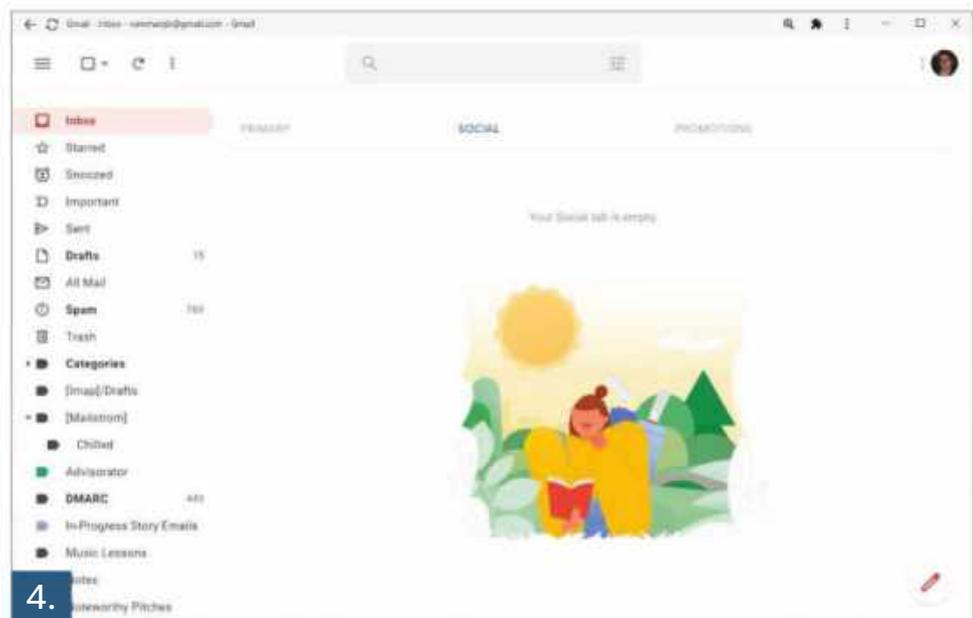
There's no need to get anxious about closing your browser and losing all your tabs. Just right-click the area next to your tabs in Chrome—or right-click the tabs themselves in Firefox and Microsoft Edge—and then select Bookmark all tabs. This will create a new folder with all of your open tabs nested inside it. (In Safari for MacOS, you'll find a similar option under Bookmarks > Add Bookmarks for These Tabs.)



I suggest saving the folder to your bookmarks bar for easy access. Then you can right-click the folder for an option to open them all at the same time.

## 4. TURN SITES INTO APPS

Turning websites into standalone desktop apps can be a huge efficiency booster, especially for app-like websites such as Gmail, Google Keep, Notion ([fave.co/](https://fave.co/)



39FRjsj), and Raindrop ([fave.co/3z05sK0](https://fave.co/3z05sK0)).

Instead of getting all the usual web browser clutter, you can launch these sites in free-standing windows that show nothing but the actual

web content. You can also add them to your desktop, Start Menu, or taskbar for easy access, and quickly switch between them with the Alt + Tab menu in Windows.

Here's how to create a desktop app out of any website:

**In Chrome:** In the vertical ellipsis (...) menu, click More Tools > Create Shortcut, then make sure Open as window is checked.

**In Microsoft Edge:** In the ellipsis menu, click Apps > Install this site as an app.

**In Vivaldi:** Right-click any tab, select Create Shortcut, then check Open as Window.

## 5. SHARE TABS WITH A QR CODE

Want a fast way to send a website to your phone? Click the Share icon in the Chrome address bar (or click the address itself in Edge or Vivaldi), then click the icon that looks like a



set of four squares. With your phone camera, point at the QR code, then tap the link that pops up. (For other browsers, see the “Bookmarklets” section below.)

While there are other tab-sharing methods to consider, such as the Send Tab feature in Chrome ([fave.co/3n9Go0l](https://fave.co/3n9Go0l)), I always come back to QR codes because of how intentional and dependable they are.

## 6. CHANGE UP YOUR NEW TAB PAGE

Most web browsers' new tab pages are either dreadfully boring (see: Google Chrome) or full of unwanted clutter (see: Microsoft Edge). To shake things up, try installing an alternative new tab extension instead.

Check out our new tab page article ([fave.co/3hUtwbW](https://fave.co/3hUtwbW)) for some suggestions, or just head straight the installation pages for Tabliss

([fave.co/40fGZw6](https://fave.co/40fGZw6)), Yet Another Speed Dial ([fave.co/3LDQ4KW](https://fave.co/3LDQ4KW)), Humble New Tab Page ([fave.co/3YZe12B](https://fave.co/3YZe12B)), or New Tab Override ([fave.co/3yX67Mk](https://fave.co/3yX67Mk)).

## 7. HARNESS INCOGNITO MODE

The private modes built into most web browsers aren't merely for unmentionable activities. They're also a quick way to browse in a logged-out state. This has all kinds of innocent (or semi-innocent) uses, such as viewing nonpersonalized results on websites, bypassing the occasional paywall, checking a second online account without logging out in your main window, and searching Google without tying the results to your profile.

## 8. USE PICTURE-IN-PICTURE

Firefox and Safari both offer handy picture-in-picture modes that always show your video in

a small preview window. In Firefox, just click the little picture-in-picture icon that appears next to any video. Firefox even lets you open multiple picture-in-picture windows at the same time. In Safari, right-click the speaker icon in the address bar, then select Enter Picture in Picture.

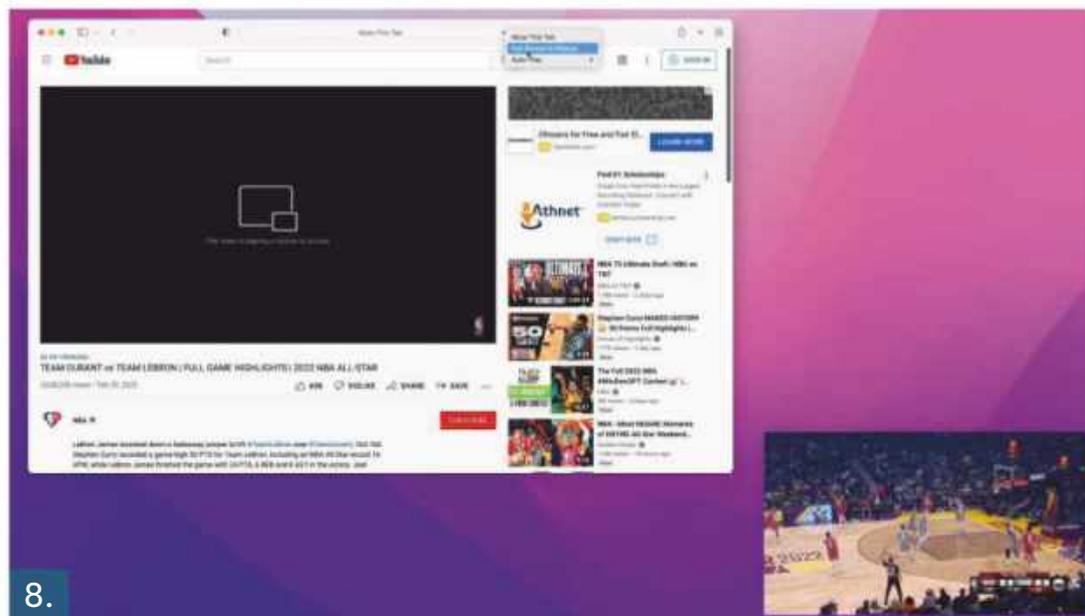
For Chrome and other Chromium-based browsers, you'll have to install Google's Picture-in-Picture extension instead ([fave.co/3JYA2u9](https://fave.co/3JYA2u9)). Then click the extension icon or press Alt + P while a video is playing to enter picture-in-picture mode.

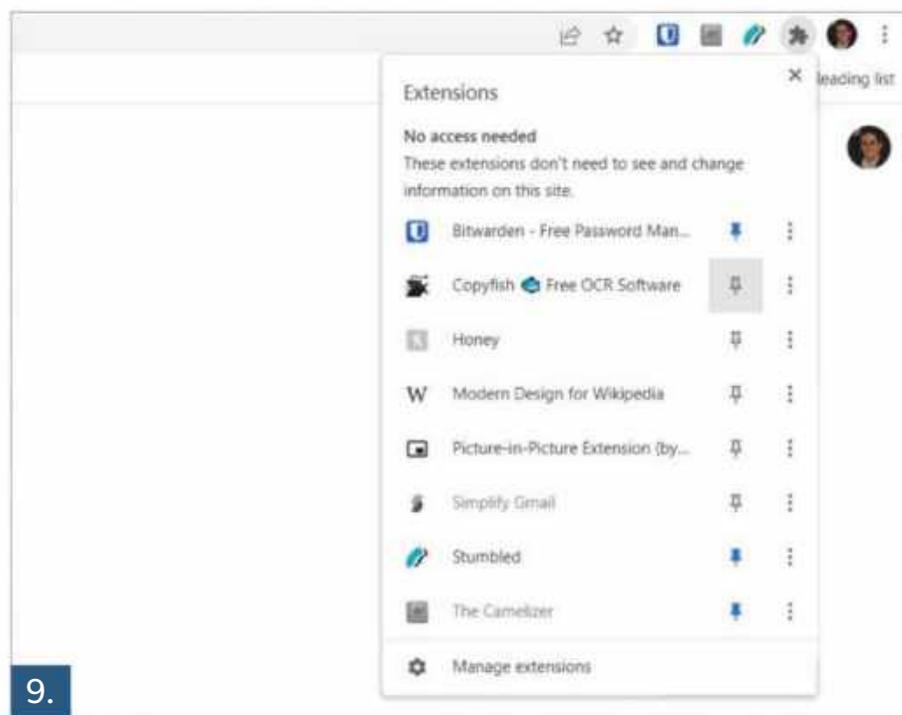
## 9. SORT YOUR EXTENSIONS

If you've installed a lot of browser extensions, take a minute to decide which ones should appear next to your address bar. Generally, you'll want to show the ones that require regular interaction—your password manager or the Camelizer ([fave.co/42rMUQx](https://fave.co/42rMUQx)), for

instance—and hide the passive extensions such as ad blockers and Modern for Wikipedia ([fave.co/3n5SCYa](https://fave.co/3n5SCYa)).

To manage your pinned extensions in





most Chromium-based browsers, right-click the puzzle-shaped extension icon, then pin the ones you want to see on the toolbar.

## 10. ADD CUSTOM EXTENSION COMMANDS

Avid extension users should also consider setting up keyboard shortcuts to activate them. You might, for instance, assign Ctrl+Shift+Z to view your recently closed tabs in Tabbie ([fave.co/409UZb1](https://fave.co/409UZb1)), or Ctrl+Shift+F to extract text from images with Copyfish ([fave.co/3TyyHNx](https://fave.co/3TyyHNx)).

In Chrome and other Chromium-based browsers, head to the extensions menu, then click the sidebar and select Extension shortcuts. From here you'll see a list of compatible extensions, along with the option to assign a shortcut to each one. Firefox users

can head to Add-ons and Themes, then click the gear icon and select Manage Extension Shortcuts.

## 11. USE BROWSER BOOKMARKLETS

Bookmarklets are a powerful tool that can perform complex actions with one click, all from your browser's bookmarks bar. Some popular examples:

**Clippable:** Render the

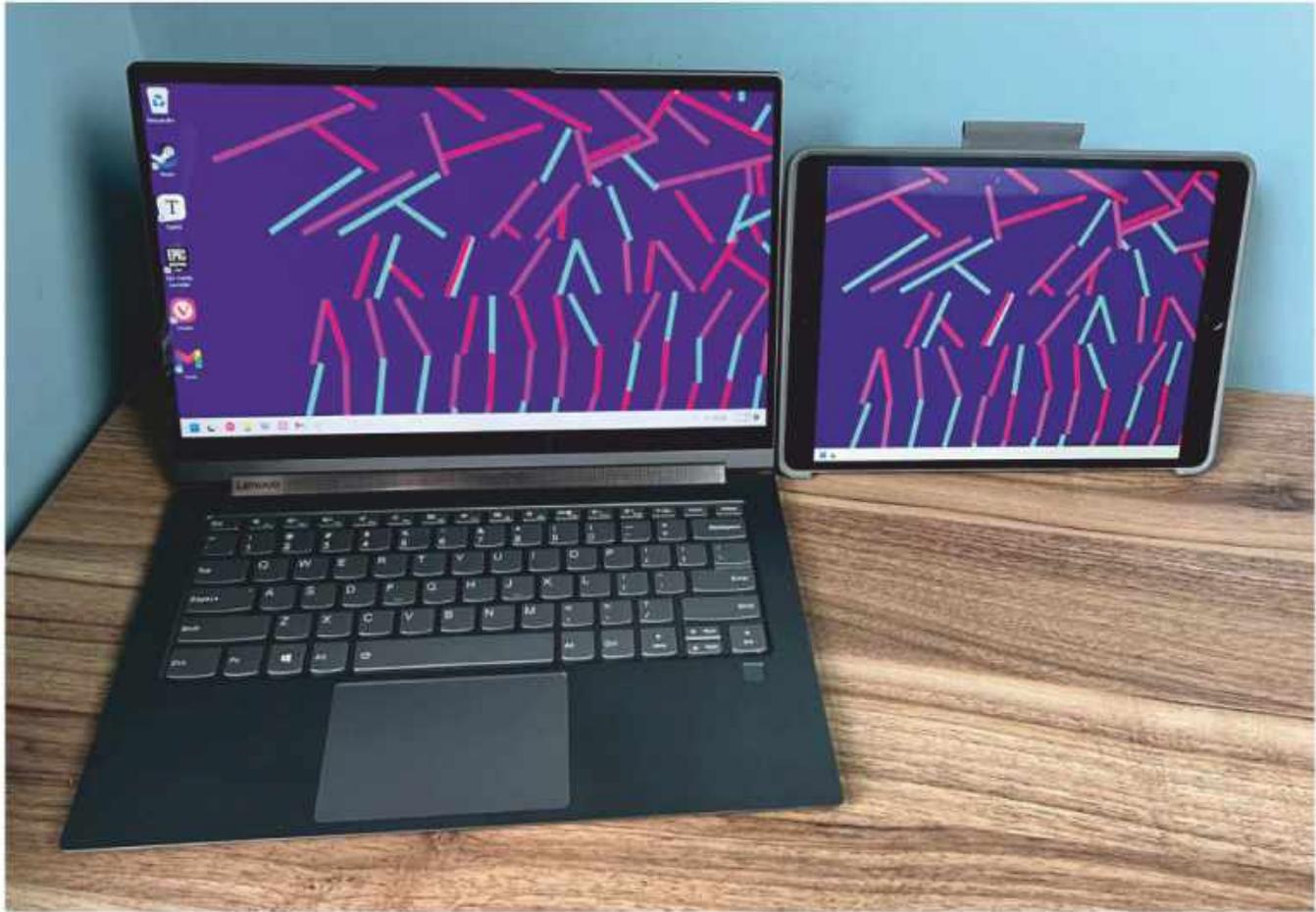
current webpage in a reader-friendly view ([fave.co/3FHduej](https://fave.co/3FHduej)).

**Kill Sticky Headers:** Hide the clunky banners that scroll with you on a webpage ([fave.co/3LEDmvq](https://fave.co/3LEDmvq)).

**The Printliminator:** Hide parts of a webpage to make it printer-friendly ([fave.co/3FJx2z5](https://fave.co/3FJx2z5)).

**URL2QR:** Create a QR code for the current webpage ([fave.co/3Tzo78Y](https://fave.co/3Tzo78Y)).

Visit the links above, and you'll find a button or link to drag into your bookmarks bar. Then just click the bookmarklet to run it. You'll find some other useful bookmarklets here ([fave.co/3Z1a3Gx](https://fave.co/3Z1a3Gx)) and here ([fave.co/3LFJjs9](https://fave.co/3LFJjs9)). You can also create custom search bookmarklets ([fave.co/404sAmK](https://fave.co/404sAmK)) to search directly on sites like Amazon and YouTube with one click. 



# How to turn an old tablet into a second PC monitor for free

Put your spare screens to work with this free software. **BY JARED NEWMAN**

If you're used to working with multiple computer monitors at your desk, traveling with a laptop can be tough. Suddenly, you're back to the single-screen lifestyle, and on a cramped laptop display to boot. Fortunately, though, there's a free way to use old iPads, Android tablets, or even other laptops as extra monitors for your Windows PC.

The solution is a utility called Spacedesk ([fave.co/3ID4UXt](https://fave.co/3ID4UXt)). It may not be the only multi-monitor software out there, but it's the most versatile free option I've found so far.

## INSTALLING SPACEDESK FOR WINDOWS

Spacedesk consists of two parts: Its Driver software runs in the background on your PC



**Spacedesk's Driver software runs in the background on your PC and connects to your other screens.**

and connects to your other screens. You can install it from the Spacedesk website ([fave.co/3ID4UXt](https://fave.co/3ID4UXt)). Note that you'll need to make a firewall exception for Spacedesk to work. An option to do so is included in the installation process.

Spacedesk's Viewer apps can be launched on other devices, at which point your PC will recognize them as additional monitors. Apps are available for Windows ([fave.co/3JArHv9](https://fave.co/3JArHv9)), iOS ([fave.co/3K00WS4](https://fave.co/3K00WS4)), Android ([fave.co/40p6Xx3](https://fave.co/40p6Xx3)), Amazon devices ([fave.co/42tojee](https://fave.co/42tojee)), and any other device via the web viewer ([fave.co/42HwzaG](https://fave.co/42HwzaG)).

The server connection works over Wi-Fi. Once you've

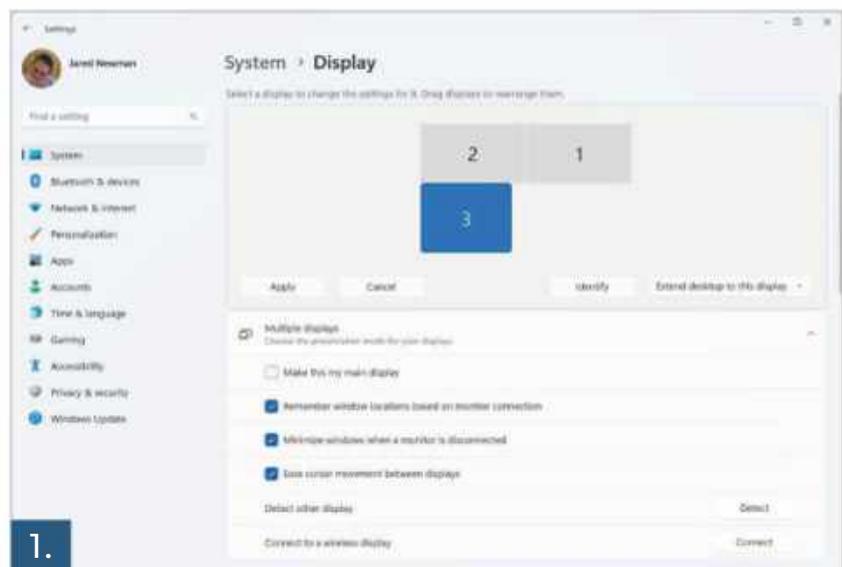
installed the Driver software, open the Viewer app. Spacedesk should recognize your computer automatically if it's on the same Wi-Fi network, so you can select it and launch second-screen mode.

## CONFIGURING SPACEDesk

By default, Spacedesk doesn't scale up any display elements, which can make things look too small on your extra screen.

To fix this, head to Windows Settings > System > Display (1), select your new display from the list of monitors, then try adjusting both the display resolution and scaling to a more comfortable level.

Also, note that by default, the Spacedesk Driver will always launch when your computer boots up. To change this, right-click on



Spacedesk's taskbar icon, select "Spacedesk driver console," and then uncheck the box that says "Automatic Start at System Boot Time (2)."

Make sure to configure your monitors in Windows as well. Head to Settings > System > Display, and you'll see a layout of all your screens, which you can drag and drop to reflect their actual positioning at your desk. Now you can move your mouse in the direction of your additional screens, and they'll be right where you expect them.

In the Viewer app, you can also click the Gear icon and select Settings for additional options, including screen resolution and quality (3).

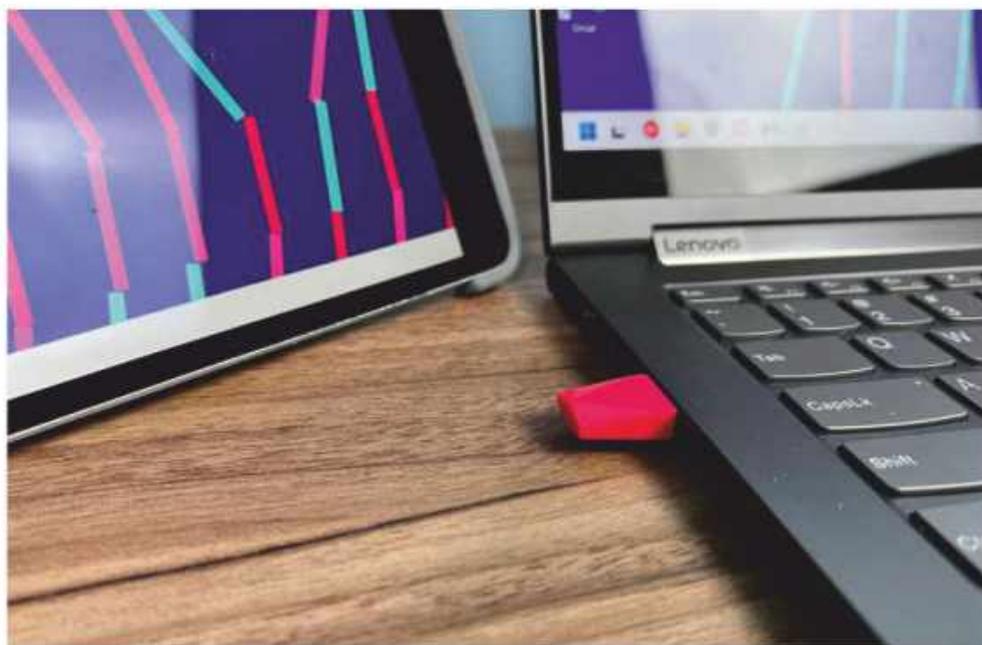
Unfortunately, Spacedesk only supports wired USB connections on Android devices, and the company has indicated that this may become a premium feature in the future. But even over a wireless connection, Spacedesk is good enough for referencing emails, documents, or team chats alongside your main windows.



It also has no issues playing video in sync with system audio.

## MORE MULTI-MONITOR SOFTWARE OPTIONS

If you're interested in exploring more multi-monitor apps, here are a few to consider:



**Luna Display has a dedicated dongle for connecting with an iPad.**

Luna Display ([fave.co/3lzeCdA](https://fave.co/3lzeCdA)) is a \$130 dongle (available in USB-C, HDMI, or DisplayPort for Mac) that turns either an iPad or a spare Mac into a secondary computer screen. It eliminates the cursor lag typically found on other solutions, so it's a compelling alternative for graphic design or any other application where fine-grained input is important.

Duet Display ([fave.co/3JBXdsF](https://fave.co/3JBXdsF)) supports both wired and wireless connections, but requires a subscription starting at \$25 per year.

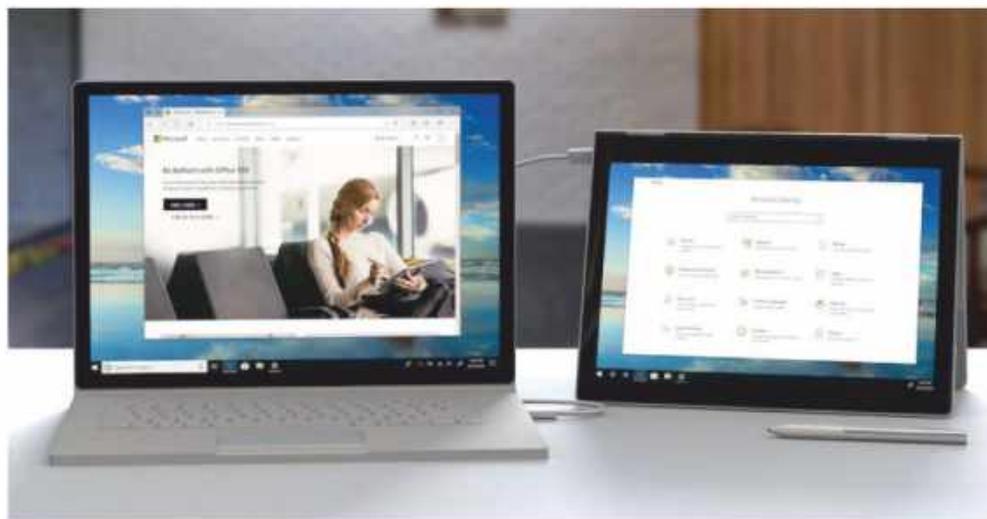
Samsung Galaxy Tab owners can take

advantage of Samsung's Second Screen app ([fave.co/3jxljlx](https://fave.co/3jxljlx)), turning the tablet into a secondary computer monitor at no charge.

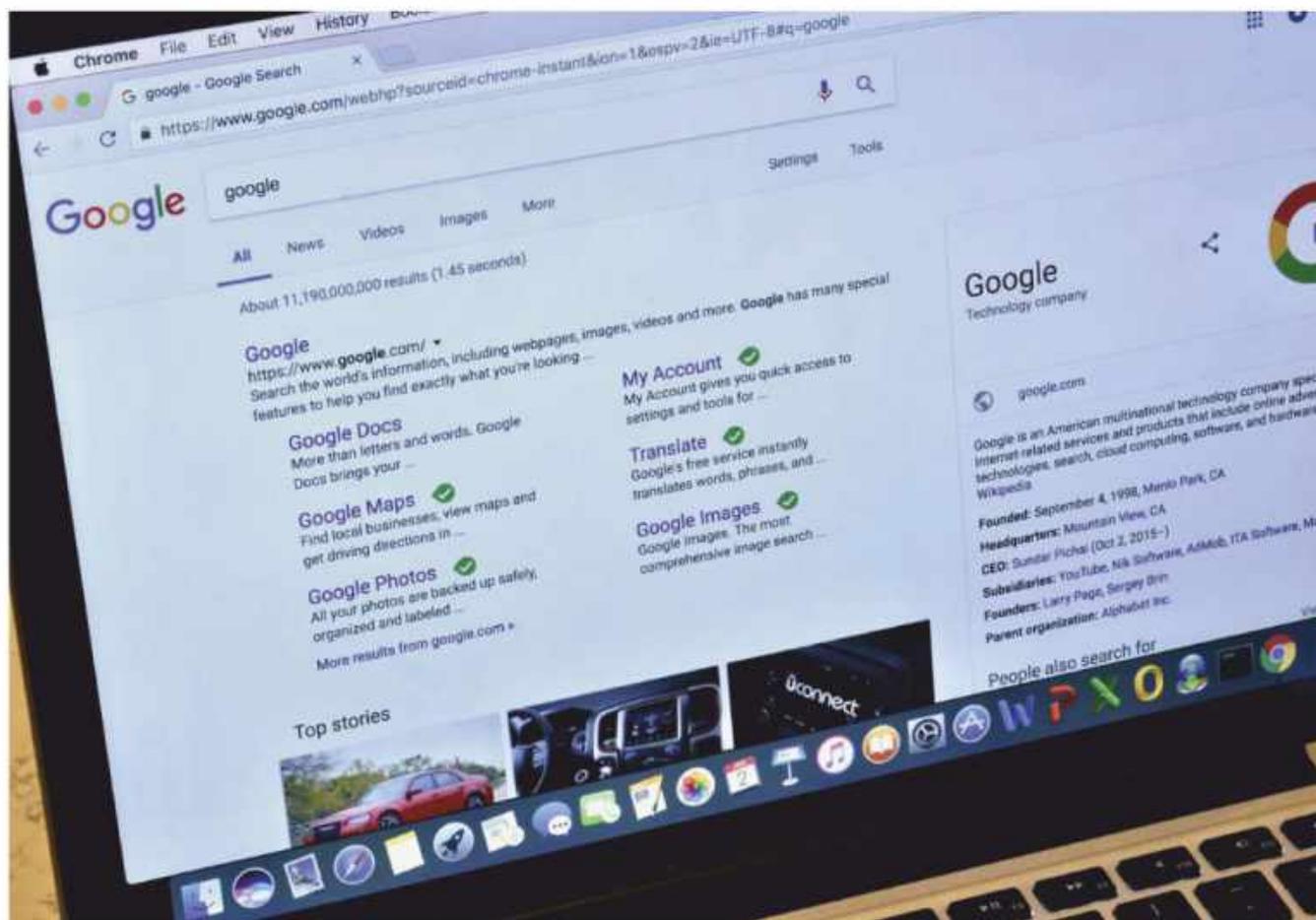
For Mac users, the built-in Sidecar feature lets you use an iPad as a space screen. You can activate it through Control Center by clicking the Display button, then selecting

your iPad. Alternatively, hover your cursor over the green full-screen button on any window, then choose the option to move it to your iPad.

For most people, though, Spacedesk is a great free option for those times when a single screen just won't suffice. 



**Duet Display requires a subscription.**



# Tricks to use Google Search more efficiently

Find what you need faster with these tips! **BY MARSHALL GUNNELL**

**W**hether you're shopping, doing research, or just looking to settle a debate with friends, Google is probably one of the first places you turn to for answers. But with billions of results at our fingertips, finding the information we need can sometimes feel like searching for a needle in a haystack.

Fortunately, there are a few tricks and tips you can use to make your Google search ([fave.co/3yXwdik](https://fave.co/3yXwdik)) more efficient and effective. Here are a few of the best ones.

## 1. SEARCH A WEBSITE FOR EXACT KEYWORDS

Some websites don't have great built-in search functions, which can make it hard to

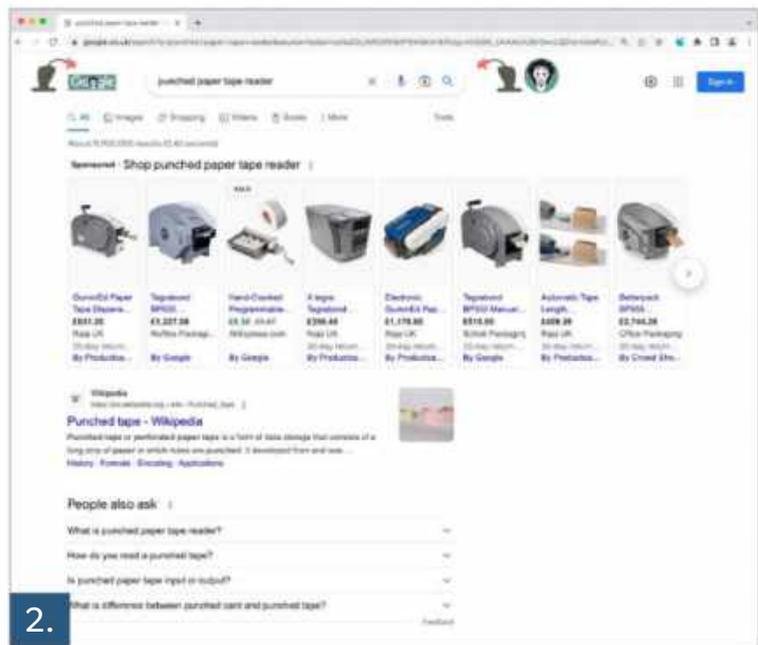
find something you're searching for on that particular site. Google, being the sophisticated search engine that it is, can do just this.

The search query you use is **site:website.com keywords**. So, for example, if you want to search PCWorld for "security," you'd enter:

**Example search query:**

site:pcworld.com security

The search results will return pages that have "security" in them, as well as keyword variations such as "secure."



## 2. SEARCH FOR AN EXACT PHRASE

You can narrow your search down by prompting Google to return results that contain exact keyword matches. This is useful if you don't know which site you want to find the content on, but you know which phrase you're looking for. To do this, you just need to put the words for which you want the exact match in quotation marks.

For example, if you want to return results that contain the exact phrase "punched paper tape reader" you'd enter:

**Example search query:** "punched paper tape reader"

This will only return results that contain exactly the same words in exactly the same order as what you put in quotes. So it won't return results that contain just "punched tape" or "paper tape."

## 3. FIND ITEMS BETWEEN A CERTAIN PRICE RANGE

This query is perfect for those who are looking for a product within a certain budget. This search allows you to tell Google that you want it to return results for an item that falls within a specific price range by placing two periods between the numbers. This saves you time from looking through items that are way over budget by excluding them from the search—or at least the top results.

For example, if you want to search for flash drives that cost between \$10 and \$45, you'd search for the following:

**Example search query:** flash drives \$10..\$45

This may also return pages that have expensive flash drives on them, but that also have flash drives in the price range you are looking for.

## 4. EXCLUDE CERTAIN WORDS FROM A SEARCH

If you want to search for something, but that search term is dominated by a brand, you can exclude that brand from the search results by adding a hyphen next to it.

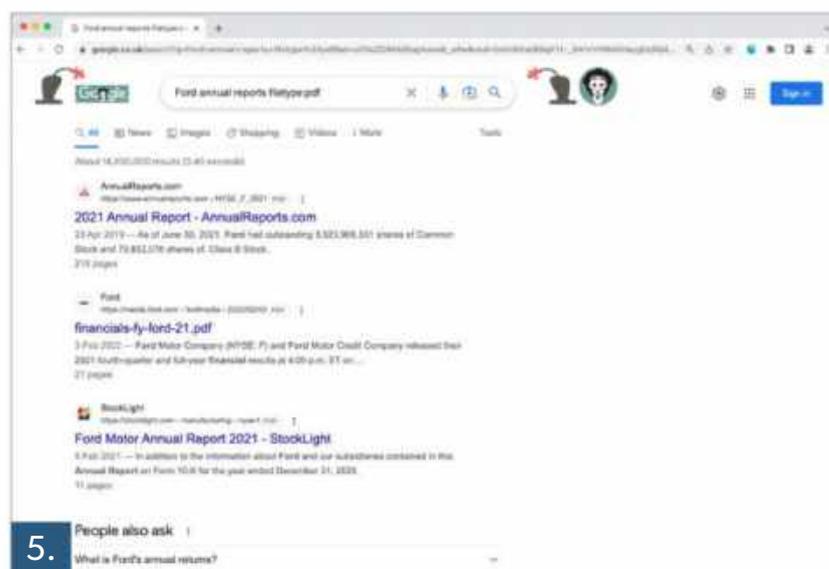
For example, if you're wanting to look at laptops, but you don't want Dell laptops ([fave.co/3lpjddG](https://fave.co/3lpjddG)) in the search results, you'd enter:

**Example search query:** laptops -dell

Dell laptops will be excluded from the search, but this doesn't apply to ads in the search results. So if Dell is running an ad campaign for "laptops," its ads will still appear at the top of the search results.

## 5. SEARCH FOR A CERTAIN FILE TYPE

The web is full of content. This can make it difficult to find certain documents, as the results will often be different web pages,



images, and so on. But you can narrow down your search by telling Google to only return results of a specific file type by using the filetype: prompt.

For example, if you want to find Ford's annual reports in PDF format ([fave.co/3V8Y9bO](https://fave.co/3V8Y9bO)), you'd search:

**Example search query:** Ford annual reports filetype:pdf

Now all of the search results are PDF files.

## 6. PERFORM MULTIPLE SEARCH QUERIES AT THE SAME TIME

You can be an efficient Google searcher by performing multiple search queries at once. To do this, you just need to add OR between the two searches. This will provide results of both search queries, but both search queries won't necessarily appear in the same result—they'll be mixed in.

For example, if you want to search for both "Best 1 TB HDD" or "Best 1 TB SSD" at the same time, you'd enter:

**Example search query:** "Best 1TB HDD" OR "Best 1TB SSD"

The order of the keywords doesn't have an effect on the results, so it won't make any difference whether you put "Best 1 TB HDD" before or after OR.

## 7. GET RESULTS FOR MULTIPLE KEYWORDS

This search trick is similar to the OR search, but instead you'll use AND to return results that contain both keywords in the search—not just one or the other. So if you wanted to find pages that had results for both “Best 1 TB HDD” ([fave.co/3n5NIMC](https://fave.co/3n5NIMC)) and “Best 1 TB SSD” on the same page, you'd enter:

**Example search query:** “Best 1TB HDD” AND “Best 1TB SSD”

Pages that contain one of the keywords but not the other are omitted from the results.

## 8. FIND RESULTS PUBLISHED BEFORE OR AFTER A CERTAIN DATE

If you've ever searched for something and felt flustered because the results were outdated or too new, you're not alone. Fortunately, you can use `before:<date>` and `after:<date>` to filter out the results.

So if you wanted results for tips for efficiently working from home ([fave.co/3YPZjMz](https://fave.co/3YPZjMz)), but you only wanted to see articles on the topic that were posted after 2021, then you'd enter:

**Example search query:** tips for efficiently working from home after:2021

Only articles posted after 2021 will appear. Alternatively, if you wanted to search for tips for

efficiently working from home before 2020, when working remotely still seemed like a fantasy of a distant future, then you'd search:

**Example search query:** tips for efficiently working from home before:2020

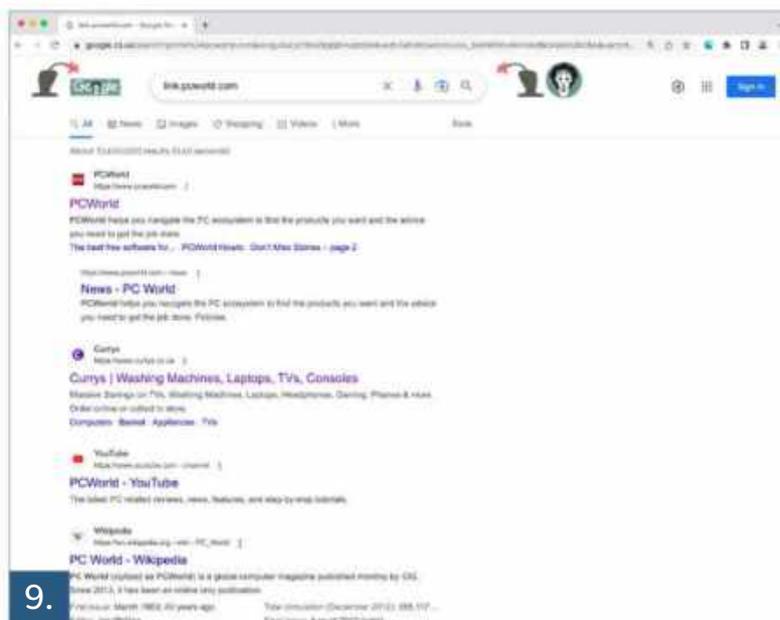
Only articles posted prior to 2020 will appear in the results.

## 9. FIND CONTENT THAT LINKS TO ANOTHER SITE

This trick is less known and can only really be used in certain situations—for example, if you're curious about who cited an article on a different website. For example, if you're wanting to see which websites have linked back to [pcworld.com](https://www.pcworld.com), you'd enter:

**Example search query:** link:pcworld.com

This is obviously a broad example, but you can put any URL you want in the query, even one for a specific article. 🛑



# Help a lost pet get home

Posting a lost pet notice can reunite a family for a lifetime.



[PetsAndPeopleTogether.org](https://PetsAndPeopleTogether.org)



# Tech Spotlight

A video showcase of the latest trends



Watch the video at  
[youtu.be/WibczqINifA](https://youtu.be/WibczqINifA)

## Take A Lab Tour Of This Solid-State Cooling Tech

➔ One of the most impressive products to come out of CES 2023 was AirJet, new solid-state cooling system that can replace fans with cooling components using a fraction of the power and space. Seshu Madhavapeddy, founder and CEO of Frore Systems, was kind enough to give us a tour of the company's offices and development labs in San Jose.