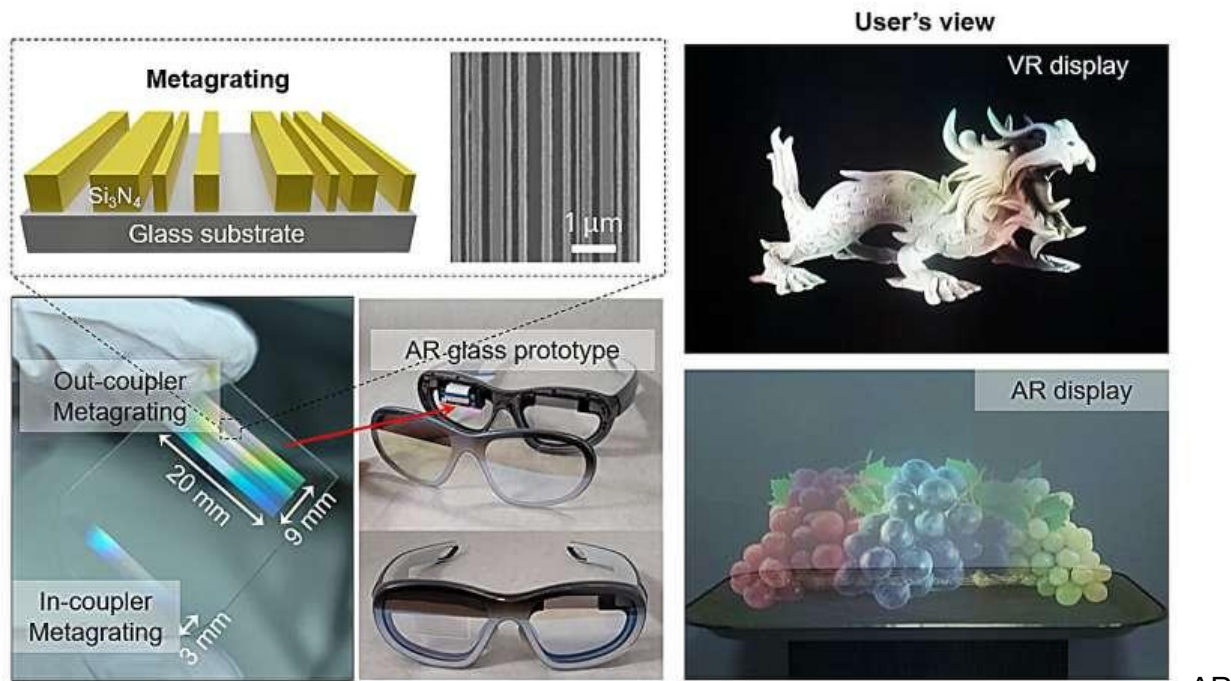


MAY 8, 2025

One glass, full color: Sub-millimeter waveguide shrinks augmented-reality glasses

by Pohang University of Science and Technology



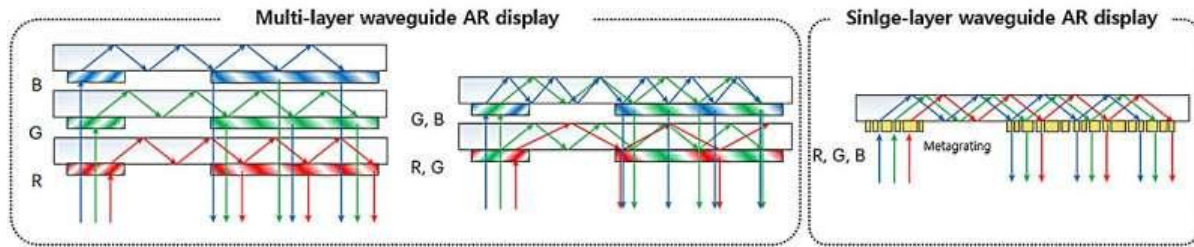
Glass Prototype and Experimental Results Based on Metagrating. Credit: POSTECH
Augmented-reality (AR) technology is rapidly finding its way into everyday life, from education and health care to gaming and entertainment. However, the core AR device remains bulky and heavy, making prolonged wear uncomfortable. A breakthrough from POSTECH now promises to change that.

The study is [published](#) in the journal *Nature Nanotechnology*.

One of the main hurdles to the commercialization of AR glasses has been the waveguide. In AR optics, the lens itself also serves as a "highway of light," guiding virtual images directly to the user's eye. Due to chromatic dispersion, conventional designs have required separate waveguide layers for red, green, and [blue light](#)—three to six stacked glass sheets—inevitably increasing both weight and thickness.

Professor Junsuk Rho and colleagues at POSTECH have eliminated the need for multiple layers by developing an achromatic metagrating that handles all colors in a single glass layer. The key is an array of nanoscale silicon-nitride (Si_3N_4) pillars whose geometry was

finely tuned by a stochastic topology-optimization algorithm to steer light with maximum efficiency.



Architecture of AR waveguide display. Credit: POSTECH

In experiments, the researchers produced vivid full-color images using a 500- μm -thick single-layer waveguide—about one-hundredth the diameter of a human hair. They also secured a comfortable 9-mm eyebox, ensuring images remain sharp even if the viewer's eye shifts slightly.

The new design erases color blur while outperforming multilayer optics in brightness and color uniformity. Once commercialized, this technology could make AR glasses as thin and light as ordinary eyewear, reducing wearer fatigue and trimming manufacturing costs thanks to a simpler process. The era of truly everyday AR is a step closer.

"This work marks a key milestone for next-generation AR displays," said Prof. Rho. "Coupled with scalable, large-area fabrication, it brings commercialization within reach."

The study, authored by Junsuk Rho (corresponding author, POSTECH), Seokwoo Kim, Joohoon Kim, and Seokil Moon, was carried out by POSTECH's Departments of Mechanical, Chemical and Electrical Engineering and the Graduate School of Interdisciplinary Bioscience & Bioengineering, in collaboration with the Visual Team at Samsung Research.

More information: Seokil Moon et al, Single-layer waveguide displays using achromatic metagratings for full-colour augmented reality, *Nature Nanotechnology* (2025). DOI: [10.1038/s41565-025-01887-3](https://doi.org/10.1038/s41565-025-01887-3)

Journal information: [Nature Nanotechnology](#)

Provided by [Pohang University of Science and Technology](#)

Apple Focusing on Smart Glasses which Might Replace iPhone: Reports

Even though Apple's massive fame for its product lineups is margined to infinity, the Cupertino tech conglomerate is promptly in need of variety. The last time this tech world witnessed [Apple](#) releasing new product was the iPad which despite being an inarguable success proved difficult to maintain its momentum. Augmented reality, being a new and exciting platform, wouldn't be of a huge competition (at least as of present) for Apple. Hence Apple working on something massive with AR software is very much a possibility.

Things get clearer with the latest [report](#) which has been subjected to Apple's potential replacement for its flag bearer, the iPhone. Apple's smart glasses have been longly rumored device anticipated to come with the augmented reality feature. The standalone AR device has had its fair share of leaks and anticipations in the recent past. But the latest report indicates that the alleged Apple Glass would be nothing unlike the regular pair of glasses with the design kept simple and stylish. What's great, years ago Google's AR glass saw the light of the day but was failed to impress fans due to the looking design. With the simple smart glass, Apple is apparently set to leave no stones unturned.

Alleged Apple Glasses Might Replace iPhones in Near Future [[Image](#)]



[Source\]](#)

In terms of design, Apple's smart glass will likely be manufactured with high-end metal. The frame might have a slew of cameras, reports Gizbot. In addition, there would be wireless antennas which will enable users to use this particular Apple device as an alternative to their smartphones. So in a way, we are plausibly approaching the world of smart glasses, the potential replacement for smartphones (iPhones).

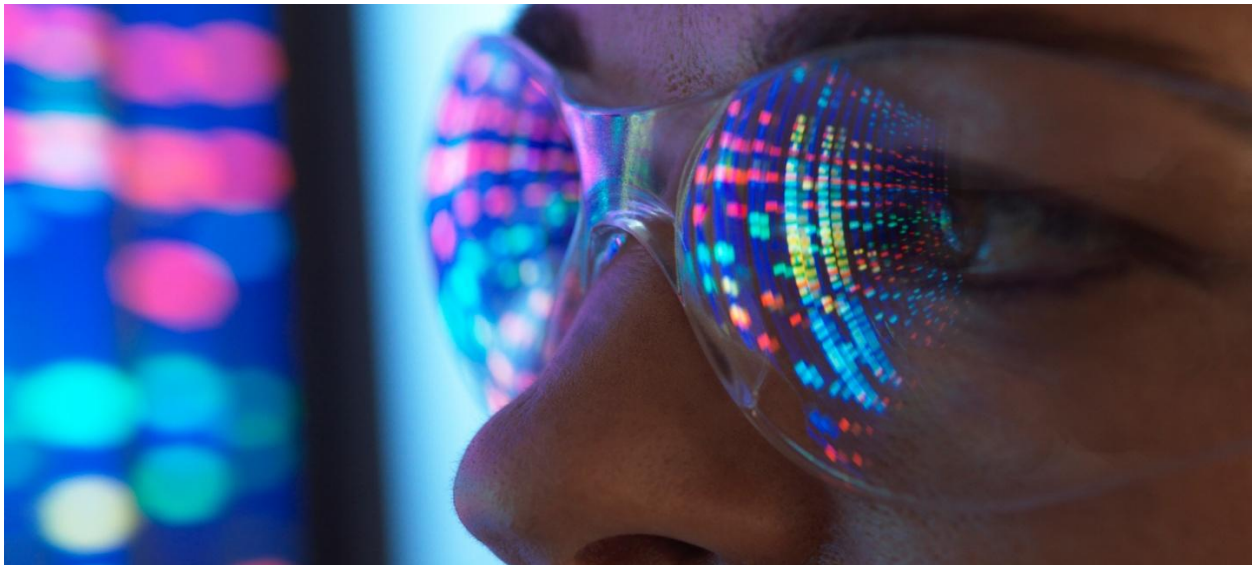
Little do we know that like the iPhone X's controversial 'notch', this Apple glasses might house the camera as well as one of the ambient sensors. The sides of the device will be occupied with Bluetooth and Wi-Fi components. Also, like the iPhone, this smart glasses is believed to come with split antenna design. Fabricated will be the arms of the glasses which will bestow a comfortable design. With the inclusion of Siri, Apple's glasses will also sport display maps, videos as well as texts.

While the glasses are expected to be sans the power port, wireless charging is the ultimate mode to fuel it accordingly. Despite Apple refusing to confirm the existence of smart glasses publicly, [reports](#) already shed lights that the Cupertino tech giant is developing an AR-based device via Tim Cook's speech, and we already know that it apparently will happen and, "it will happen in a big way, and we will wonder when it does, how we ever lived without it. Like we wonder how we lived without our phone today."

Holographic-inspired lenses could unlock '3rd dimension of imaging' in future VR headsets and smart glasses

published November 7, 2024

Future VR headsets could use a new type of lens inspired by holographic devices. The bilayer bifocal lens relies on external voltage to change the intensities in the foci.



(Image credit: Andrew Brookes/Getty Images)

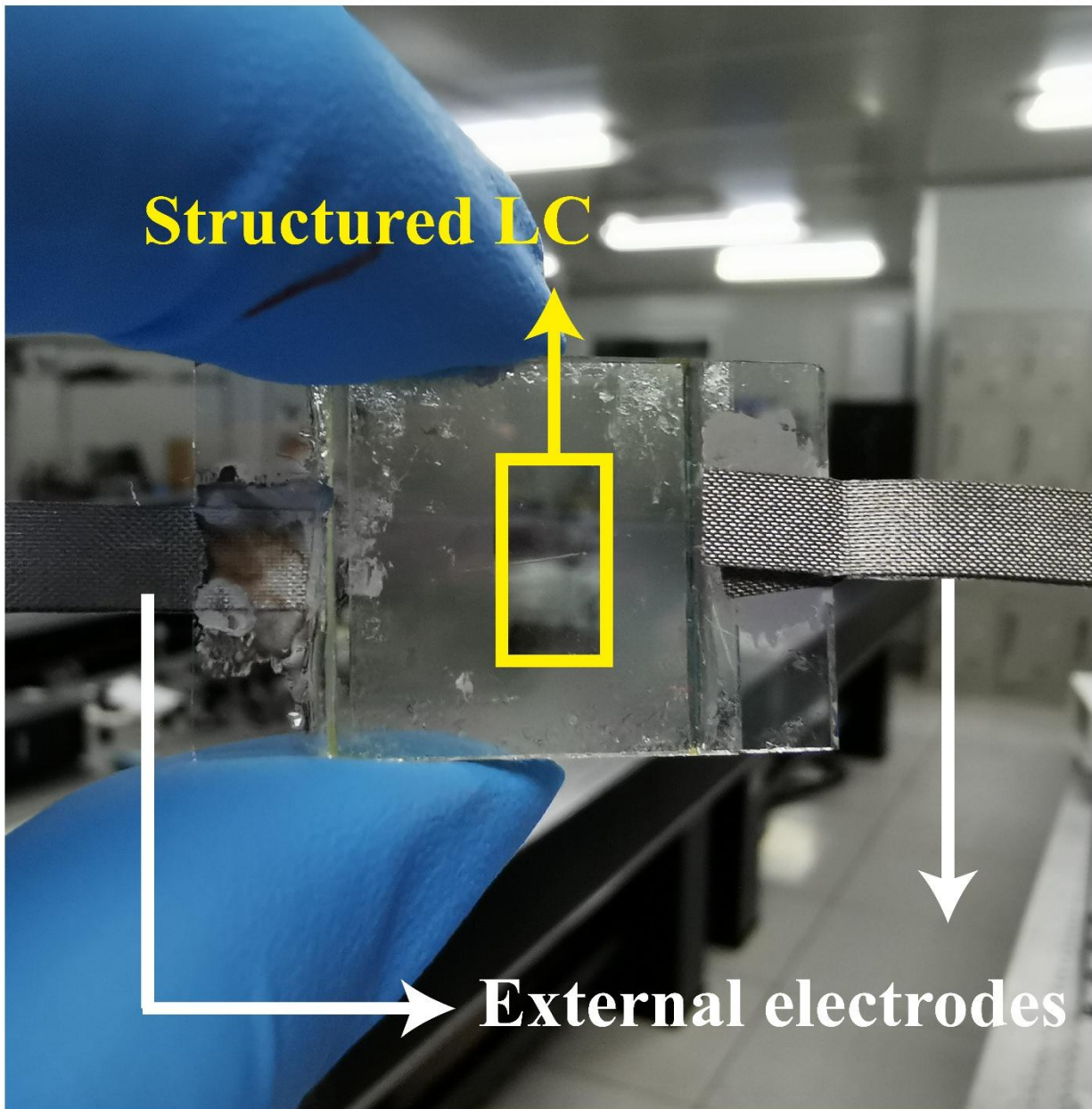
Future virtual reality (VR) headsets could use a new type of lens inspired by holographic devices, researchers in [China](#) say. This proposed new type of bifocal lens can switch between one focus and another at the flick of a switch, letting wearers witness intensities in the lenses change akin to a hologram.

These lenses would be made from two layers of liquid crystal structures that can switch between two foci with external voltage. The researchers described their findings in a new study published Oct. 1 in the journal [Optics Letters](#).

The technology could be applied in imaging devices, optical computing and optical interconnectivity — in addition to future mixed-reality and VR headsets, the team said.

Specifically, they can be used for polarization imaging — often used to enhance image contrast or for edge imaging, which highlights the outline of objects or see finer details. Polarization can be referred to as the [light's third dimension](#), with polarization cameras often detecting physical properties unseen by conventional imaging.

"We believe that the light control mechanism we created using the multilayer structure could also be used to design other optical devices, including holographic devices and beam generators, or for optical image processing," study lead author [Fan Fan](#), professor of physics and electronics at Hunan University, said in a [statement](#).



Researchers developed a bifocal lens based on two layers of liquid crystal (LC) structures. The intensities for the two focal lengths can be easily adjusted by applying external voltage. (Image credit: Fan Fan, Hunan University)

The team focused on creating bilayer structures, rather than single-layer structures, which most liquid-crystal devices are made from. The structures were made from a liquid crystal cell as well as a liquid crystal polymer — both of which are standard materials in the development of lenses intended for holographic imaging uses. This let researchers alter the intensity of the two foci. The development of multi-functional holographic devices was an

inspiration but the technology could be used "beyond the field of holographic displays," Fan said.

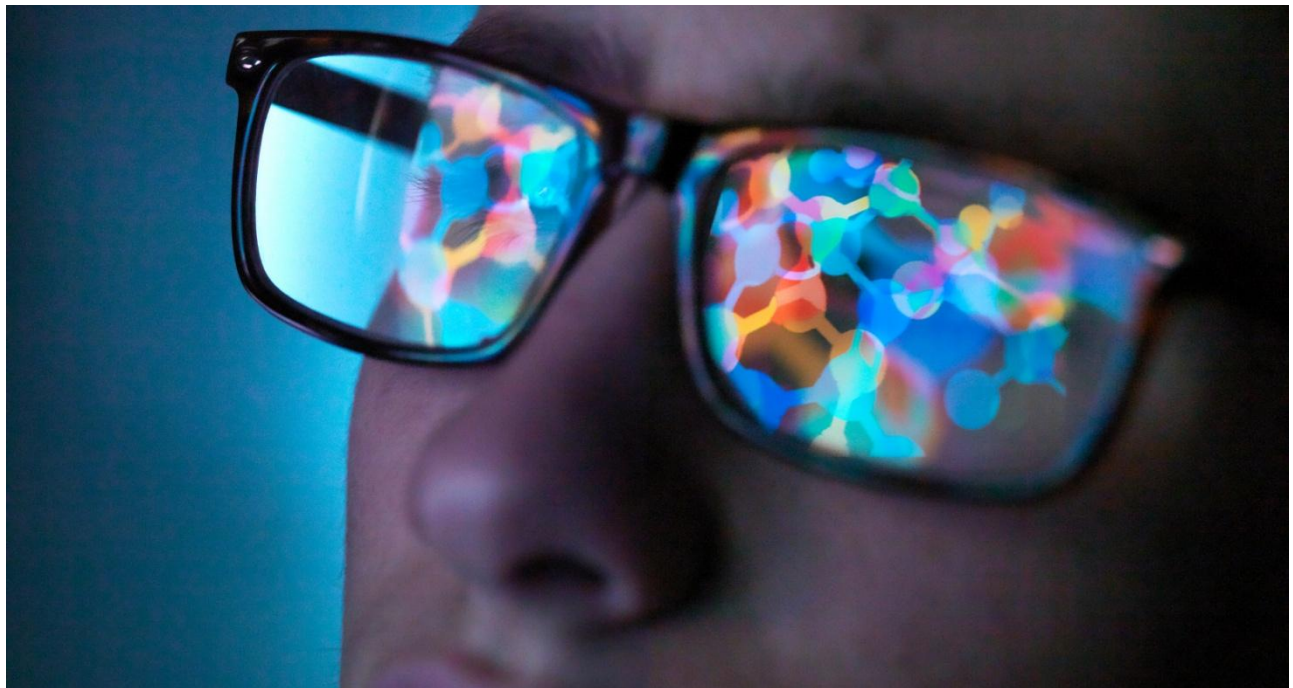
Some bifocal lenses can create different focal points based on the incident light's polarization — but this new design enables the focus to switch on command, manipulating the polarization states of the output beams. The liquid crystal layer also allows the lenses to switch rapidly between focus points when voltage is applied.

The scientists are planning to use the new lenses in several kinds of multifunctional devices. For the optical components found in this technology to be more practical, however, they stressed the cost of the mass production of components would have to be lowered. If this happens, the team could design and incorporate fast and accurate layer-to-layer alignment technology, the researchers said in the statement.

New display tech paves the way for 'most realistic' holograms in regular eyeglasses

published May 28, 2024

Building on current holographic technology, a team of optical display experts have invented a way to improve 3D displays that's small enough to work in regular glasses.



Researchers are even closer to realistic holograms. (Image credit: Andrew Brookes via Getty Images)

Researchers have invented a device that's small enough to fit in a regular pair of glasses and could solve an age-old trade-off in holographic displays — leading to the most realistic holograms ever.

Holograms are conventionally created using projecting devices called spatial light modulators (SLMs). Light is emitted through the device so that it changes the shape of the light wave at a specific distance, creating a visible surface.

But because SLMs are made from liquid crystal/silicon (LCoS) display technology, current hologram technology is suited to narrow fields of view like a flat screen or small viewing area (ie a small object). The viewer must be positioned inside a narrow viewing angle – anywhere outside it and the light diffracts too much, making the light invisible.

It's possible to widen the angle within which the image is clear, but fidelity is lost because current LCoS technology doesn't have the number of pixels available to maintain the image across a wider field. That means holograms tend to be either small and clear or large and diffuse, sometimes disappearing altogether if the viewer looks in another direction that's far enough away from the angle within which it's visible.

[Felix Heide](#), assistant professor of computer science at Princeton and the paper's senior author, explained how important the viewing angle is. "To get a similar experience using a monitor, you would need to sit right in front of a cinema screen," he said.

The new technology, detailed in a study published April 24 in Nature Communications, could lead to the creation of more detailed holograms no matter which direction the viewer is looking in or how fast they change direction. The apparatus required to project them too is so small and light that wearers don't need tools like bulky VR headsets.

The finding would also make applications where holograms are used — such as in VR and AR displays — more widespread because the display technology can be easier to use, lighter and ultrathin. Heide mentioned examples from getting directions while driving to assisting in surgery, and even seeing instructions about how to fix a leaky pipe.

The Princeton team's key innovation was to create a second optical element that works with the SLM, filtering its output to expand the field of view while preserving the detail and stability in the hologram with a much lower decline in image quality.

Described in the paper as a small piece of frosted glass, the device is etched with a pattern that scatters the SLM's light into frequency bands not easily perceived by humans. This improves the image quality and expands the field of view.

The trade-off between image quality and field of view has been the biggest obstacle to realistic holograms, but as co-author [Nathan Matsuda](#) said: "The research brings us one step closer to resolving this challenge."

Here's more of what you'll see through Meta's \$1,000 smart glasses



Here's more of what you'll see through Meta's \$1,000 smart glasses

Meta is reportedly preparing a higher-end version of its Ray-Ban Meta smart glasses with a built-in screen to launch as early as by the end of the year, [Bloomberg](#) reports.

The new glasses, codenamed Hypernova, can run apps and display photos, all controlled using hand gestures and capacitive touch on the sides of the frame. *Bloomberg* reports that the screen will only be visible on the right lens at the lower-right quadrant, and is best viewed when looking downward. When the device is turned on, a home screen appears and displays icons horizontally, similar to a Meta Quest.

Hypernova will also feature an improved camera compared to the current model, and will continue building upon the idea of having an AI chatbot on your face, according to *Bloomberg*.

Bloomberg says that Hypernova will cost over \$1,000 and could sell for as high as \$1,300 to \$1,400. For comparison, the current Meta Ray-Ban smart glasses start at \$299.

Meta is reserving advanced augmented reality technology for its [still-in-development Orion glasses](#). In contrast, the Hypernova will target the “mid-tier” smart glasses [shown off in droves at CES](#), such as the Rokid Glasses that display green text.

However, the Hypernova will command a higher price tag than other options, likely since it will come with the Orion’s “neural” wristband controller, codenamed Ceres.

Meta is also working on a next version of Hypernova, with the codename Hypernova 2, that will have two screens, *Bloomberg* reports. The company is apparently planning to launch Hypernova 2 in 2027.

MARCH 3, 2025

Wearable tech has far to go before challenging smartphones

by Mona GUICHARD



Ray-Ban and Meta's connected glasses saw success in 2024.

Wearable gadgets like smart watches and glasses are growing more capable every year, but experts say smartphones will remain ubiquitous for the foreseeable future—not least thanks to artificial intelligence features.

A slew of wearable products and prototypes were on show at the Mobile World Congress in Barcelona Monday, even as smartphone makers and network operators played up AI integration as making handsets more useful.

Such "new product ranges allow manufacturers to diversify the hopes until now placed in phones" said Cesar Corcoles, an IT and telecoms professor at the Open University of Catalonia.

The trade show in Barcelona will see "prototypes and demonstrations of smart glasses that place a small, very limited screen in front of our eyes."

Smart glasses have seemed on the horizon for more than a decade, with Google's Glass headset and camera released in 2013—although it has since been discontinued.

Meta has encountered more success recently with its frames developed alongside Ray-Ban, offering features including a built-in camera, music playback and voice interactions with the company's AI.

Yann LeCun, star AI researcher at the company which owns Facebook and Instagram, is often seen showing off the glasses at public appearances.

Worldwide, the market for smart glasses appears to be surging in terms of unit sales, with a 210-percent year-on-year increase in 2024 according to specialist research firm Counterpoint—far faster than the seven-percent growth in smartphone shipments calculated by analysts Canalys.

'Cool gimmick' for now

But comparing the number of devices rather than growth rates, last year's roughly two million pairs of [smart glasses](#) barely register compared to the 1.2 billion smartphones sold.

Counterpoint predicts the glasses market will grow further in the coming years as more producers—from social media giants to smartphone makers—look to claim a piece of the action.

Other wearable categories may need longer to take off, with the recent shutdown of "AI Pin" maker Humane a sign some wearable tech is not yet mature.

Designed to be worn at chest level like a brooch, the would-be smartphone replacement incorporating a camera and mini projector was designed to be used via AI-powered voice interactions but received poor reviews.

Humane has now been sold to HP after the device failed to make the hoped-for impact.

The "AI Pin" was "just not that useful yet", Canalys expert Jack Leathem said.

Voice-controlled devices are "a cool gimmick, but humans have become very, very used to text-based interactions on touchscreens," he added—habits it would take a powerful sales pitch to change.

"The most challenging thing is getting people to change their behavior," agreed Shen Ye of smartphone maker HTC's Vive wearables arm.

"We still use a QWERTY keyboard because it's what we're used to... even though there are probably much better ways of typing," he added.

AI on your phone

Beyond consumer inertia, wearable tech is still up against engineering challenges stemming from its bid to squeeze smartphone-like functionality into a smaller package.

"There are limits around the computing power currently and battery performance," Leathem said. "You can't make them that compact."

That's one reason why [smart watches](#) able to make calls and send messages largely remain tethered to wearers' smartphones for now.

"Every smart watch that comes out now is there to interact with a smartphone, not to replace it. It's an accessory," Leathem said.

What's more, manufacturers are incentivized to get consumers buying a wider range of gadgets rather than simply swapping one for another.

And even as wearables become more useful, AI is expected to pump more value into smartphones themselves.

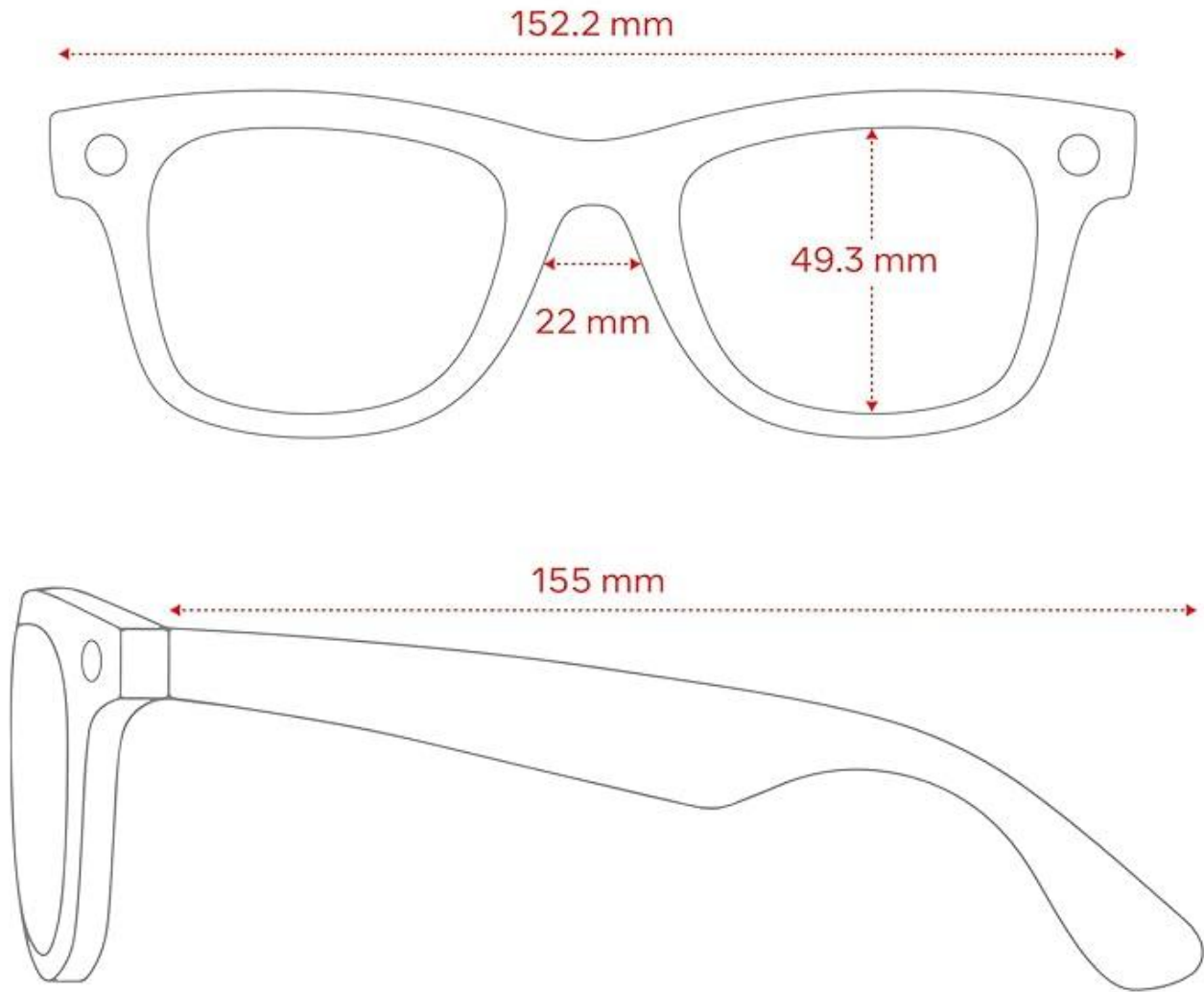
The latest offerings from Apple, Samsung or China's Xiaomi have bet on offering users integrated "AI assistant" features.

"All the money is going into AI... their vision of the future is keeping the same [smartphone](#) form factor, but making it way more useful," Leathem said.

Canalys predicts that the share of smartphones sold worldwide with AI features will leap from 16 percent at present to more than half by 2028.

© 2025 AFP

Large fit



Also available in regular fit

New Ray-Ban Meta Glasses for 2025 could get the upgrade we've been waiting for



New Ray-Ban Meta Glasses for 2025 could get the upgrade we've been waiting for© Future

When Meta revealed the [Project Orion AR glasses](#) during [Meta Connect](#) in September, it hinted at an impressive future for smart glasses, even if Orion is still a prototype.

We may get a teaser of what the future looks like next year as a report from [The Wall Street Journal](#) suggests that a new set of [Ray-Ban Meta smart glasses](#) will feature a "single small in-lens screen." Additionally, it could launch with a sensor wristband controller similar to the one being tested with the Orion glasses.

That information comes from a "person familiar with the project," though the report noted that Meta would not confirm heads-up displays glasses. Meta's vice president of wearables did tell the Journal that one of the most requested features is a viewfinder that would show basic information like notifications. He noted that Meta is working on multiple "sizes and form factors."

It seems to fit with a [leaked Meta roadmap from 2023](#) that revealed Meta planned to launch a viewfinder pair of co-branded Ray-Ban glasses in 2025. That report also indicated that a "neural interface band" that allows for hand movement controls would debut alongside the third-generation of Ray-Ban smart glasses. A strong indicator of the sensor strap's existence was revealed with

Project Orion. The strap could turn into a smart watch as suggested by the road map, though it's unclear when or if Meta is actually working on a "Meta Watch."

The road map specifically mentions "Orion" and reportedly set a launch window of 2027 as part of a new line of AR glasses dubbed "Innovation."

Assuming the road map and the Journal reports are accurate, as they appear to be, we will probably expect to see Meta release the viewfinder version in September or October around the annual Meta Connect event. Of course, Meta could shake things up, but its launch history suggests a fall window is most likely.

A viewfinder sounds interesting, but we do wonder if Meta will make other upgrades to make the display an effective tool. Currently, the Ray-Bans have an effective 6 hours of active use. We found in our review that livestreaming absolutely drained the battery and a tiny display with AR capabilities could easily eat away at it.

I also am curious if they can retain their stylish look or become a bit blockier the way the Orions are or more like the [Xreal One AR glasses](#), which are nice but not a fashion statement.

Ray-Ban Meta upgrades

Just recently Meta rolled out [three big upgrades for the Ray-Ban Meta smart glasses](#) with Meta AI. This comes via the v11 software update.

The first upgrade is Shazam integration, which means you can say "Hey Meta, what is this song?" and your glasses will use the built-in mic to identify the track.

In addition, Meta AI can now 'see' what you're looking at via its camera. You'll be able to ask Meta AI questions about what you're looking at and get answers.

Lastly, live translation through the Ray-Ban Meta glasses promises to let you get real-time translations in French, Italian or Spanish — either via the open-ear speakers or as text on your phone.

Ray-Ban Meta smart glasses just got three big upgrades — here's the new features

last updated December 17, 2024

Shazam, live translation and new video AI powers



(Image credit: Future)

We were rather impressed with the 2nd gen [Ray-Ban Meta smart glasses](#) when we reviewed them, but thanks to [Meta AI](#) they've got steadily better over time. Even something as mundane as [grocery shopping can be transformed with the AI implementation](#) if you're wearing them.

But the latest update is the most significant yet. [Teased at Meta Connect](#) back in September, three new updates have arrived at the same time, making the glasses all the more useful. However, two of the features are only available to those on the early access program, and all three are currently for those in the U.S. and Canada only.

As detailed on the [Meta blog](#), the three upgrades arrive with the v1.1 software update. The one that's available outside of early access is Shazam integration.

If you somehow hear a track you want to hear more of amidst all the Christmas muzak that's currently on repeat, you can simply say "Hey [Meta](#), what is this song?" and your glasses will use the microphone to listen and come up with the answer for you to stream at your leisure. Again, this is only available in North America, so if you're elsewhere, you'll just have to rely on the Android and iOS apps.

Live AI: Meta AI can now 'see'

Then there are the two extras that require you to be a member of the Early Access program. Live AI is the first of these, adding video to Meta AI on your glasses. When activated, Meta AI can now "see" what you're looking at, and converse naturally about what's going on before your very eyes.

Meta thinks this will be hugely useful for activities when your hands are busy (think cooking or gardening), or just when out and about. You'll be able to ask Meta AI questions about what you're looking at, for example how you can make a meal out of a bunch of ingredients in front of you. There will be battery drain though, with Meta suggesting you'll get around half an hour of live AI use on a full charge.

Still, it's an exciting development, and one that Meta teases will improve over time: "Eventually live AI will, at the right moment, give useful suggestions even before you ask," the post reads.

Meta gets an F in first AI safety scorecard — and the others barely pass

published December 16, 2024



(Image credit: Shutterstock)

As [artificial intelligence](#) evolves, it's clear there's some need for oversight. Most AI labs openly support regulation and provide access to frontier models for independent evaluation before release — but they could be doing more. The world is turning to AI to solve all manner of problems, but without proper oversight, it could always create more.

Future of Life has developed a report card for the different AI labs including [OpenAI](#), [Meta](#), Anthropic and [Elon Musk's xAI](#). The [AI Safety Index](#) is an independent review looking at 42 indicators of "responsible conduct".

AI Safety Index has worrying stats for the biggest AI companies

Firm	Overall Grade	Score	Risk Assessment	Current Harms	Safety Frameworks	Existential Safety Strategy
Anthropic	C	2.13	C+	B-	D+	D+
Google DeepMind	D+	1.55	C	C+	D-	D
OpenAI	D+	1.32	C	D+	D-	D-
Zhipu AI	D	1.11	D+	D+	F	F
x.AI	D-	0.75	F	D	F	F

Firm	Overall Grade	Score	Risk Assessment	Current Harms	Safety Frameworks	Existential Safety Strategy
Meta	F	0.65	D+	D	F	F

Source: Future of Life Institute
Grading: Uses the [US GPA system](#) for grade boundaries: A+, A, A-, B+, [...], F

The panel includes a series of luminaries in education and think tanks to check on how AI companies are operating, and the initial results are alarming.

Looking at Anthropic, [Google](#) DeepMind, Meta, OpenAI, x.AI and Zhipu AI, the report has found "significant gaps in safety measures and a serious need for improved accountability." According to the first report card, Meta scores lowest (x.AI isn't far behind), while Anthropic comes out on top — but still only gets a C.

All flagship models were found to be "vulnerable to adversarial attacks", while also having the potential to be unsafe and break away from human control.

Perhaps most damning, the report says "Reviewers consistently highlighted how companies were unable to resist profit-driven incentives to cut corners on safety in the absence of independent oversight."

"While Anthropic's current and OpenAI's initial governance structures were highlighted as promising, experts called for third-party validation of risk assessment and safety framework compliance across all companies."

In short, this is the kind of oversight and accountability we need to see in the burgeoning AI industry before it's too late, as the more powerful the models get, the more real the harms become.

Future wearable devices could draw power through your body using background 6G cellphone signals

published December 3, 2024

Excess energy from wireless 6G networks could be harvested by a copper coil and the human body.



(Image credit: Oscar Wong via Getty Images)

Your body could become a battery for wearable devices, thanks to a breakthrough in harvesting waste energy from 6G wireless communication.

Researchers from the University of Massachusetts Amherst found that waste radio frequency (RF) energy given off by [visible light communication](#) (VLC), if used to deliver 6G, can be harvested with small, inexpensive copper coils and transmitted to power other devices via the human body. 6G is a future wireless communication technology that is currently in development and is set to be deployed before the end of the decade. As outlined in [a 2022 research paper](#), the crux of this mechanism lies with VLC — which transmits data through extremely fast flashes of [visible light](#) from sources such as LEDs. VLC is one method through which 6G signals might hypothetically be transmitted in the future. But LEDs also emit side-channel RF signals, as a form of leaked energy. The researchers found that this could be harvested by a coiled copper wire, whose energy recycling efficiency is boosted when touching human skin.

According to the study, skin contact boosted efficiency by up to 10 times compared to using the coil on its own. The human body also proved to be better at amplifying the coil's ability to collect leaked radio energy than wood, plastic, cardboard or steel.

Body batteries

From this, the researchers created "Bracelet+" — a simple copper wire coil that could be worn as a bracelet on the upper forearm. The design can also be adapted to be worn as a necklace, anklet, belt or ring, although the scientists found the bracelet occupied a happy medium between power harvesting and wearability.

"The design is cheap — less than fifty cents," said the authors of the study in a [statement](#). "But Bracelet+ can reach up to micro-watts, enough to support many sensors such as on-body health monitoring sensors that require little power to work owing to their low sampling frequency and long sleep-mode duration."

With this in mind, such technology could solve the issue of limited battery life on wearable devices. Even highly rated smartwatches, like the Apple Watch, tend to need charging on a near-daily basis, which can mitigate how useful they are unless charging is part of one's

daily routine. And now that smart rings are growing in popularity, there are even more devices that require regular power top-ups.

The energy harvesting technology that the Bracelet+ facilitates could, therefore, become a form of in-situ charger for next-generation wearable devices, providing of course that such devices come with a way of taking power from the bracelet.

Of course, this relies on 6G networks that use VLC, which are currently far away from deployment, let alone widespread adoption and integration into consumer or industrial devices.

But this could be the advent of turning the human body into a form of battery to power technology, only in a more harmonious fashion than the future envisioned by "The Matrix."

"Ultimately," said lead author of the study [Jie Xiong](#), professor of information and computer sciences at UMass Amherst, in a statement, "we want to be able to harvest waste energy from all sorts of sources in order to power future technology."

Are we on the verge of an XR wearable breakthrough?



Many popular technologies today are the product of several technological and economic factors converging at the right time. A recent example is the rise of generative AI, which rapidly transitioned from an emerging technology to mainstream phenomenon, sparking revolutionary changes across various industries and societies.

Similarly, extended reality (XR), which includes augmented reality (AR), virtual reality (VR), and mixed reality (MR), has long been touted to transform immersive experiences on devices. While adoption among consumers is steadily increasing, the true impact of XR to date has been seen across a variety of [business](#) use cases, including training, manufacturing, communication, content creation and retail.

According to the PWC “Seeing is Believing Report”, the growing adoption of XR technologies across businesses could boost global GDP by US\$1.5 trillion, which is nearly 2 percent of overall GDP. Through integrating XR into their processes, businesses will see significant productivity and efficiency improvements, along with substantial time and cost savings.

While challenges around wider XR adoption still exist, the tech industry is making great strides to address them, paving the way for XR to become a more mainstream technology, not just for businesses but for consumers too.

The XR challenges and how the industry is addressing them

One of the primary computing challenges with XR has always been meeting the power efficiency requirements of small wearable devices that need to be always-on. Some early XR wearable devices suffered from short battery life while untethered, limiting their practicality for extended use. The industry has

responded by investing in advanced battery technologies and power management systems, leading to more efficient, longer-lasting XR wearables.

Early XR wearable devices also faced [security and privacy](#) challenges. Initially, businesses were hesitant to adopt the devices due to potential vulnerabilities in data handling and [encryption](#). However, with the integration of enhanced encryption protocols and secure data management practices, XR devices are now far safer and more secure. The security improvements allow companies to integrate XR technologies into their operations with greater confidence, knowing that sensitive information is well-protected.

The final challenge was the lack of ecosystem support for XR technologies. Developing quality [applications](#) that met business expectations was both expensive and complex, hindering widespread adoption. Today, the industry is addressing this by creating more accessible development tools and platforms. These simplify the process of developing and deploying XR applications, enabling businesses to create tailored solutions that meet their specific needs.

Ongoing technological breakthroughs in XR

Beyond these challenges, companies are investing heavily in research and development to improve XR wearable devices and elevate the user experience. Hardware advancements, including touch screens and camera miniaturization, as well as [software](#) improvements in applications and operating systems, have created significant opportunities for XR wearable devices to become more mainstream.

[AR smart glasses](#) are one device type where there has been plenty of interesting technology innovation during the past year. For instance, Snap's fifth-generation Spectacles, Meta's next-generation Ray-Ban smart glasses, and Meta's Orion smart glasses are all examples of how XR wearables are evolving to meet business and consumer needs, with features like advanced AR displays and real-time [AI video](#) processing. More specifically, Meta's Orion glasses now offer lightweight, immersive hands-free AR, with future versions expected to add social awareness features.

Wider innovations in lightweight materials and better batteries are making XR wearable devices easier to use and wear. New AR smart glasses entering the market are now adopting ultra-thin silicon carbide waveguide technologies that not only enable high-definition displays, but also dramatically reducing the thickness and weight of the devices. This marks a significant breakthrough in AR technology. AI features are also enhancing the XR wearable device experience, making them more personalized and context aware.

How AI will transform XR Technology

In fact, new compact language models are becoming highly influential across XR wearable technologies. These models, designed to run efficiently on smaller devices, enable real-time natural language processing and interaction, allowing users to interact with XR applications using real-time voice commands. For example, in manufacturing, workers can use a voice command to get information about assembly instructions or safety protocols without taking off their XR headsets.

Compact language models are also transforming XR experiences for consumers, businesses and healthcare, making them more immersive and interactive. For consumers, this is enabling them to create and consume new types of content via XR wearables. Meanwhile for businesses, XR wearable devices are providing [employees](#) with highly interactive real-time feedback and guidance during training. This feedback helps improve training outcomes and reduce errors, especially in manufacturing and medical sectors, leading to higher levels of efficiency and safety. Finally, in healthcare, clinicians can use XR to augment different treatments during medical procedures, reviews and training, leading to improved patient outcomes.

The next wave of digital transformation

Looking ahead, the combination of XR and AI will continue to unlock new possibilities, driving innovation across a variety of industries. With ongoing improvements in power efficiency, security and software support, and advancing technology capabilities, XR wearable devices are likely to see rising adoption among businesses and consumers. While we have yet to hit the XR tipping point,

the journey ahead appears to be promising, as more consumers and businesses embark on the next wave of digital transformation.

JANUARY 11, 2025

Smart glasses enter new era with sleeker designs, lower prices



Halliday-branded smart glasses on display at the Consumer Electronics Show in Las Vegas, where wearable tech innovations are on prominent display.

Producers of hi-tech connected eyewear are multiplying their innovations with increasingly discreet models in an attempt to make a difference in a highly competitive—and fast-emerging—market.

Live translation, GPS, cameras: glasses are quickly adopting new functionalities.

"There are so many of these smart wearables, and more of them are going on your face," said Techspontential analyst Avi Greengart at the Consumer Electronics Show (CES) in Las Vegas, where numerous smart glasses manufacturers showcased their latest innovations.

The industry has come a long way from its early days. Gone are the conspicuous protrusions of Google Glass and the bulky frames and cables of Epson's Moverio from the early 2010s.

Today's smart glasses, all paired with smartphone apps, increasingly resemble traditional eyewear. The Ray-Ban Meta, developed by Mark Zuckerberg's social media giant, currently leads the market with this new approach.

According to a recent MarketsandMarkets study, the sector's growth is "driven by advancements in augmented reality, artificial intelligence, and miniaturization technologies, which are pushing the boundaries of what these wearable devices can achieve."

However, integrating technology into fashionable frames requires careful compromise.

The Ray-Ban Meta, for instance, can capture photos and videos, play music, and provide information about objects in view, but doesn't offer augmented reality with superimposed images.

Meta representative Robin Dyer explained that while AR capabilities may come later, they would likely double the current price.

200 dollars

Price is a major battleground in this market, particularly with the entry of Chinese manufacturers.



Amazon's Echo Frames connected glasses on display at CES on January 7, 2025 in Las Vegas.

While Google Glass initially retailed for around \$1,500 in 2013, today's smart glasses are approaching the price of premium conventional frames.

Meta's James Nickerson noted that their Ray-Ban collaboration starts at \$300, just \$50 more than standard Ray-Bans, offering "a cool camera" as a bonus.

California startup Vue has pushed prices even lower, offering basic models with voice assistant and music capabilities for \$200. Some manufacturers, like XReal, focus on augmented reality, projecting smartphone, computer, or gaming console displays—though this is a market for which Apple's Vision Pro failed to create excitement last year.

For AR, recent advances help move away from the bulk of a virtual reality headset towards that of classic sunglasses, even if they require a cable to be connected to the device. Meta's ambition is to launch its own pared down version, the Orion, currently in the test phase but not expected to be marketed until 2027 at the earliest.

Chasing cool

Companies like Even Realities and Halliday are pioneering ultra-thin frames that look identical to standard glasses while offering basic AR capabilities.

"If we want to make a good pair of smart glasses, we must first make a pair of cool glasses," emphasized Carter Hou, Halliday's second-in-command.

Halliday's \$489 model, launching in March, displays text in the upper corner of the wearer's vision. Using AI, it can suggest responses during conversations, provide real-time translation, and function as a discrete teleprompter.

Even Realities has also taken a minimalist approach.

"We got rid of the speaker, we got rid of the camera," explained the company's Tom Ouyang. "Glasses are for the eyes, not the ears."© 2025 AFP

Smart contact lenses MARCH 4, 2025

Dubai-based startup Xpanceo is aiming to fit smart features including an "extended reality" display, health monitoring and wireless power reception into a flexible contact lens.

Demonstrator models at their stand show off proofs of concept for each of the capabilities that co-founder Roman Axelrod says they want to pack into a single prototype device "by the end of 2026". For now, the devices are relatively clunky, with a large metal coil needed to receive the wireless power to light up a single pixel on one demonstration lens.

Those components would be miniaturized using "two-dimensional materials... only one atom thick," Axelrod said.

"That is the scientific know-how that differentiates us".

NOVEMBER 14, 2024

Defining XR: What It Means and How It Works

Extended reality describes virtual, augmented, and mixed-reality technologies

Extended reality sounds cutting-edge and futuristic, and in a way it is. But you might be surprised to learn that you've probably used XR without knowing it. That's because it's really just a blanket term to refer to various types of reality.

What Does XR Mean?

XR stands for extended reality. It summarizes a group of technologies—VR, AR, MR—that let you experience and interact with [virtual reality](#), [augmented reality](#), and [mixed reality](#) environments.

This means XR is really just an umbrella term for those experiences. Whether you're talking about a virtual reality headset or an augmented reality mobile app, what you're referring to is *extended reality*.

How Does XR Work?

Here's an overview of these three technologies:

Virtual Reality

This is arguably the most well-known XR term. Virtual reality is just that: a *virtual* view of the world, meaning it's a fully simulated 3D environment that can be interacted with in a seemingly physical way. If you're after a truly [immersive experience](#), VR is where you want to be.

Virtual reality is often used for gaming and entertainment, but its other applications include training, education, and design.

A headset is used for VR experiences. It interrupts your normal vision to display the virtual environment, tracks your head movement, and usually includes

controllers or other input devices so you can interact with the virtual world much like you would the real world.

Augmented Reality

Augmented reality covers the real world with computer-generated images and other information. Unlike VR, these virtual elements don't take over your whole vision, so you can see and interact with both the real world and the virtual items simultaneously.

AR applications include education, training, entertainment, and marketing.

You can use AR through a smartphone or a headset.

Mixed Reality

Mixed reality blends the real and virtual world in a way that lets you interact with both simultaneously. It's similar to AR, but it allows for a greater level of immersion and interaction with the virtual environment.

MR systems typically use headsets to track movements and position in the real world and to display the appropriate virtual information.

Applications of XR

Extended reality has a wide range of applications, including:

- **Entertainment:** VR and AR are used in a variety of entertainment applications, such as video games, movies, and live events. Check out these [VR travel experiences](#) for some examples.
- **Education and training:** XR technologies are used to create immersive learning experiences that allow students to explore and interact with virtual environments and simulations. Think VR flight lessons before manning the cockpit.

- **Healthcare:** Extended reality can be used in the healthcare industry for training, surgical simulations, and therapy.
- **Manufacturing and design:** XR technologies are used in the manufacturing and design process to visualize and test products before they're built. Blueprints can be scaled down to the size of a table and examined by designers for inaccuracies before implementation.
- **Marketing and advertising:** AR is used to create interactive and immersive marketing and advertising experiences. For example, a brand could use AR to let customers "try on" a new line of clothing or makeup, or visualize how furniture would look in their room next to their other décor.

Are Smart Glasses XR?

VR, MR, and AR are related terms like headsets and smart glasses. VR, and often MR and AR, are experienced through a headset. Smart glasses (at least some models) can fall into the AR category because they display virtual information next to real-world information, similar to AR smartphone apps. This makes smart glasses a form of extended reality.

Frequently asked Questions

When was virtual reality invented?

The technology surrounding the ideas mentioned above began to emerge from research started in the 1960s and 1970s. As progress on miniaturizing components continues, the hope is these devices will be lighter for when you wear them over your head (VR headsets) and smaller for when you wear them on your face (augmented reality glasses). New models of headsets are coming out each year with improvements.

How does virtual reality work?

While each device will have different capabilities, they consist of sensors and screens working in conjunction to display images to your eyes based on your

body's position and where you're looking. The sensors include motion detection and accelerometers, and the screens use high-resolution displays and stereo projection so the correct image is displayed to the correct eye, giving a 3D effect.

AR vs. VR vs. MR vs. XR: What's the Difference?

All augmented, virtual, and mixed reality experiences are called 'extended reality,' but each is different in very specific ways

If you've heard of immersive video games, virtual travel, or AR shopping, then you've no doubt run into labels like [augmented reality](#) (AR), [virtual reality](#) (VR), [mixed reality](#) (MR), and [extended reality](#) (XR). We've reviewed these terms in depth to learn what they mean and how they differ so you can have some clarity about which one is right for you.

LIFEWIRE

Overall Findings

AR	VR	MR	XR
Virtual elements overlaid on the real world.	Fully virtual experience.	Anchored virtual elements that can interact with the real world.	Umbrella term for AR, VR, and MR.
Works through a headset or smartphone.	Works through a headset.	Usually works through a headset.	
View your physical surroundings at the same time.	View only the virtual world.	View your physical surroundings at the same time.	
Can be used for free through mobile apps.	There are free apps, but they require a headset.	Can be used for free through mobile apps.	

Extended reality is a blanket term that refers to a group of technologies: augmented reality, virtual reality, and mixed reality. Therefore, a [virtual reality headset](#) and an [augmented reality headset](#), for example, while different, are both considered extended reality technologies.

These perception-changing technologies deal with virtual elements, meaning an onboard computer generates all the objects. In VR, the CGI fully covers your vision, so you're immersed in a totally fake world. AR and MR use computer-generated images, too, but since the point is to also see your surroundings, those elements don't take over your whole vision. Instead, your physical environment is enhanced or changed in some way.

You can use some AR and MR implementations from a standard smartphone without needing headgear, but VR requires a full headset.

The rest of this article doesn't include XR in the comparison tables because it's a term used to describe the other three. It's akin to comparing [computer hardware](#) with a mouse, keyboard, and webcam.

Technology: VR Blocks Your Vision, AR/MR Doesn't

AR	VR	MR
Superimposes virtual elements on real world items.	Shows only virtual elements.	Superimposes virtual elements on real world items.

Before digging into these XR technologies, we first need to make a clear distinction between how they work. The links at the beginning of this article provide an in-depth look, but for now, you need to know that there's a single factor that separates AR and MR from VR, and that's the fact that VR totally blocks your vision.

Virtual reality is built to hide everything but computer-generated images. Augmented reality and mixed reality are built to show you the real world *and* the virtual world.

It works this way because AR and MR, as you'll read below, are designed to enhance and change what you're already doing and seeing around you, while VR is designed to replace reality with something completely fake.

Availability: AR Can Run Straight From a Phone

AR	VR	MR
Can work through a smartphone.	Requires a headset.	Usually requires a headset.
Often free when used from a phone.	There are free apps, but only after you have the hardware.	Most useful after purchasing a headset, but it's not always necessary.

In terms of widespread availability, AR (and sometimes MR) is already in use on smartphones all over the world. By just holding your phone in front of you, you can experience things like live language translations, filters that change how your face looks in real time, and 3D models anchored in space.

Contrast this with virtual reality that's available only through a headset, and it's clear how easily accessible AR and some MR implementations are with nothing more than a smartphone. Most mixed reality experiences are accomplished through a headset, too, but with the line blurred so much between these terms, you could say some form of MR is also possible with just a phone.

Furthermore, there are plenty of free AR/MR apps, so no additional investment is needed to experience those XR types, which can't be said for virtual reality.

Immersion: VR Is the Clear Winner, MR Is Close

AR	VR	MR
You see both real and virtual elements.	Everything you see is virtual.	You see both real and virtual elements.
View simulated elements in the real world.	View and interact with fully simulated objects in a fake world.	View and interact with fully simulated objects in the real world.

An **immersive experience** is meant to simulate a different reality, ideally making you forget that you're even in it. VR is the only extended reality method of achieving that because you're completely engrossed in the simulated world. If you walk around in the room with your real legs, you won't know where you're going because you can't see anything but what the computer is generating (though, some VR experiences digitize real obstacles for safety reasons).

However, if you think of immersion as an altered perception where your environment is simply different from what it is usually, then MR is a close second because there's a level of interaction between the virtual and real elements, something that AR doesn't permit.

Mixed reality objects can be anchored in real space, meaning you can physically walk around them and often interact with them as if they were real. It creates a solid bridge between a completely real and a completely virtual environment.

Applications: VR/MR Excel in Education, VR in Entertainment

AR	VR	MR
Guided navigation.	Fully immersive gameplay.	3D asset collaboration.
Training exercises.	Training exercises.	Training exercises.
Real-time diagnostics.	Real-time, avatar-based socializing.	Semi-immersive gameplay.
Gaming and shopping.	Virtual movie theater and other entertainment.	Enhanced marketing.

There are lots of applications for all three XR types, and many of them bleed into the others.

AR includes your real surroundings, so it's useful for critical information in the real world, like overlaying on a body a hospital patient's vitals or X-ray details for precision surgery. Similar is MR, which isn't as helpful for a scenario like that but instead more beneficial for 'performing' the surgery with virtual objects, something that might be set up during an unqualified surgeon's training phase.

Arguably more relevant to the masses are entertainment and gaming. AR, VR, and MR create fun experiences in their own unique ways, but the deepest immersion level can be achieved only through virtual reality. With VR, an entire movie theater can be erected just for you, and realistic first-person shooter video games and [virtual tourism](#) are best enjoyed with a headset and no distractions from the outside world.

AR and MR can drastically change how we shop by letting us do all sorts of neat reality-bending tasks, like trying on clothes, testing how

furniture will fit in a room, and viewing customer ratings on top of in-store products. Even VR can provide a fully simulated shopping mall for you to browse through with just a headset.

Final Verdict: They All Have Their Place

All three of these extended reality types are useful, so the one you choose depends entirely on what you want to accomplish. AR and MR are built for truly mixing real and imaginary elements, with the latter having an edge over the former by leaning deeper into the actual *mixing* of realities. VR doesn't let you view the real world around you, but that's the whole point; it excels in that you're fully immersed in a digital reality that you can enjoy alone or with friends.

If escapism and rich, life-like experiences like gaming are what you're after, you can't go wrong with VR. While MR is nearly synonymous with AR, its advantage is that it feels more real than augmented reality because you can interact with virtual elements that stay where they are regardless of how you view them. AR, however, is much more ubiquitous, available in some form on nearly all modern smartphones, often for free.

- What is Windows Mixed Reality?

[Windows Mixed Reality](#) is a virtual- and augmented-reality framework built into Windows 10 and 11. The main hardware it uses is HoloLens 2, a set of AR glasses. WMR also runs Windows-compatible VR games like Beat Saber.

- How is augmented reality used in businesses?

The most common way you'll see businesses use augmented reality is in mobile shopping apps. For example, you might be able to use AR to see how a piece of furniture or art will look in your home. Businesses may also use AR internally for training (e.g., projecting assembly instructions onto a workspace or identifying different work tools).

What Is Augmented Reality?

AR enriches perception with virtual elements in the physical world

The word "augment" means to increase, extend, or make better. Augmented reality (AR) can be understood as a type of [extended reality](#) (XR) where the real world is expanded or enhanced through the use of virtual elements, usually overlaying those elements on the view of the real world through the use of a visual device.

AR can work in several different ways and is used for many different reasons, but in most cases augmented reality virtual objects are overlaid on and tracked in a view of the real world, creating the illusion that they occupy the same space.

Augmented reality devices have a display, input device, sensor, and processor. These devices can be monitors, [head-mounted displays](#), eyeglasses, contact lenses, gaming consoles, and even smartphones, among others. Sound and touch feedback can be included in an AR system, as well as through other non-visual methods and devices.

Although augmented reality is somewhat similar to other forms of XR, like [virtual reality](#) (VR), it's distinctly different. Virtual reality is an experience that's entirely simulated—both the view of "reality" and the objects in it—while AR only uses some virtual aspects, which are mixed into reality to form something different.

The term "augmented reality" was coined by researcher Tom Caudell in 1990, who helped develop the first [industrial augmented reality](#) (IAR) at Boeing.

How Augmented Reality Works

Augmented reality is live. For it to work, the user must be able to see the real world as it is right now. AR manipulates the real world space the user sees, altering their perception of reality.

In one form of AR, the user watches a live recording of the real world with virtual elements imposed on top of it. Lots of sporting events utilize this type of AR; the viewer can watch the game live from their own TV, but also see the scores overlaid on the game field.

Another type of AR allows the user to look around their environment normally and in real time, but through a display that overlays information to create the augmented experience. An example might be a headset that appears much like a regular pair of glasses, but through the screen, the user can see GPS directions on the road or sidewalk as they drive or walk, or see the current temperature in the sky when they look up.

When a virtual object is placed between the user and the real world, object recognition and computer vision can be used to allow the object to be manipulated by actual physical objects, and allow the user to interact with the virtual elements.

For example, some retailer mobile apps let shoppers select a virtual version of something they're considering purchasing, such as a piece of furniture, and view it in the real space of their home through their phone. They can see their actual living room, for example, but the virtual couch they've chosen is now visible to them through their screen, letting them decide if it will fit in that room and if they like the look of it within that room.

Another example allows customers to scan products or special codes (such as UPC symbols) that use augmented reality to show the customer more information about a physical product before they buy it, see reviews from other buyers, or check what's inside their unopened package.

Marker and Markerless AR

When object recognition is used with augmented reality, the system recognizes what's being seen and then uses that information to engage the AR device. It's only when a specific marker is visible to

the device that the user can interact with it to complete the AR experience.

These markers might be [QR codes](#), serial numbers, or any other object that can be isolated from its environment for the camera to see. Once registered, the augmented reality device might overlay information from that marker directly on the screen or open a link, play a sound, etc.

Markerless augmented reality allows a system to use a location or position-based anchor points, like the compass, GPS, or accelerometer. These types of AR systems are implemented when the location is key, such as with navigation.

Layered AR

This type of AR uses a device to recognize a physical space and then overlay virtual information on top of it. It's how you can try on virtual clothes, display navigation steps in front of you, check whether a new piece of furniture will fit in your house, put on fun tattoos, and more.

Projection AR

This might seem at first to be the same as layered or superimposed augmented reality, but it's different in one specific way: actual light is projected onto a surface to simulate a physical object. Another way to think of projection AR is a hologram.

One specific use for this kind of augmented reality might be to project a keypad or keyboard directly onto a surface, allowing a user to type using the virtual keyboard.

There are many advantages to using augmented reality in areas like medicine, tourism, the workplace, maintenance, advertising, the military, and others.

AR in Education and The Workplace

In some senses, it can be easier and more fun to learn with augmented reality, and there are tons of [AR apps](#) that can facilitate that. A pair of glasses or a smartphone can be all you need to learn more about physical objects around you, like paintings or books.

One example of a free augmented reality app is SkyView, which lets you point your phone at the sky or the ground and see where stars, satellites, planets, and constellations are located at that exact moment, both during the day, at night, and from the opposite side of the planet.

SkyView is considered a layered augmented reality app that uses GPS. It shows you the real world around you, like trees and other people, but also uses your location and the current time to teach you where these objects are located and give you more information about each of them.

[Google Translate](#) is another example of an AR app useful for learning. With it, you can scan text in a language you don't understand, and it will translate it for you in real time. When viewed through the app on a phone, it looks like the physical space that occupies that text has changed to the target language.

Job education, too, is changing due to AR. Doug Stephen, president of [CGS Enterprise Learning](#) division, says it's becoming part of on-the-job training options.

"Often considered an emerging and disruptive technology, [AR] provides learners with an immersive format," he says. "An example of how to use consumer-focused AR for education is use of mesh modems that homeowners install to extend their internet reach. By using AR, the person can visualize the internet strengths throughout the home on a tablet or mobile device. This can alleviate in-home service (because) customer support is better enabled to see what the customer sees.

"It can also offer immediate education on set up and installation as well as help the user determine more-effective modem placements to

optimize the range of the internet connections. This will ultimately help the consumer save time, effort, money and potential frustration from waiting for a technician to do in-home service."

AR in Navigation

Displaying navigation routes against a windshield or through a headset delivers augmented instructions for drivers, bicyclists, and other travelers so that they don't have to look down at their GPS device or smartphone just to see which road to take ahead. Pilots might use an AR system to display transparent speed and altitude markers directly within their line of sight for much the same reason.

Another use for an augmented reality navigation app might be to overlay a restaurant's ratings, customer comments, or menu items right on top of the building before you go inside. It might also show you the quickest route to the nearest Italian restaurant as you walk through an unfamiliar city.

GPS AR apps like [Find Your Car with AR](#) can be used to find your parked car, or a holographic GPS system like [WayRay](#) might overlay directions right on the road in front of you.

AR in Games

There are lots of augmented reality games and toys that can merge the physical and virtual world, and they come in many different forms for lots of devices. One well-known example is [Snapchat](#), which lets users overlay fun masks and designs on their faces before sending a message. The app uses a live version of your face to put a virtual image on top of it.

Other examples of augmented reality games include [Pokemon GO!](#), [INKHUNTER](#), [Sharks in the Park](#), [Sketchar](#), [Temple Treasure Hunt Game](#), and [Quiver](#).

AR vs MR

[Mixed reality](#) (MR), as the name suggests, mixes real and virtual environments to form a hybrid reality. MR uses elements of both virtual reality and augmented reality to create something new. It's tough to categorize MR as anything but AR because it works similarly, by overlaying virtual elements directly onto the real world and letting you see both at the same time.

However, one primary focus with mixed reality is that the objects are anchored to real, physical objects that may be interacted with in real time. This means that MR could allow virtual characters to sit in the actual chairs in a room, or for the virtual rain to fall and hit the actual ground with life-like physics.

Mixed reality lets the user seamlessly exist in both a real state with the real objects around them and the virtual world with software-rendered objects interacting with real-world objects to create a fully [immersive experience](#). One good example of what's meant by mixed reality is [Microsoft HoloLens](#).

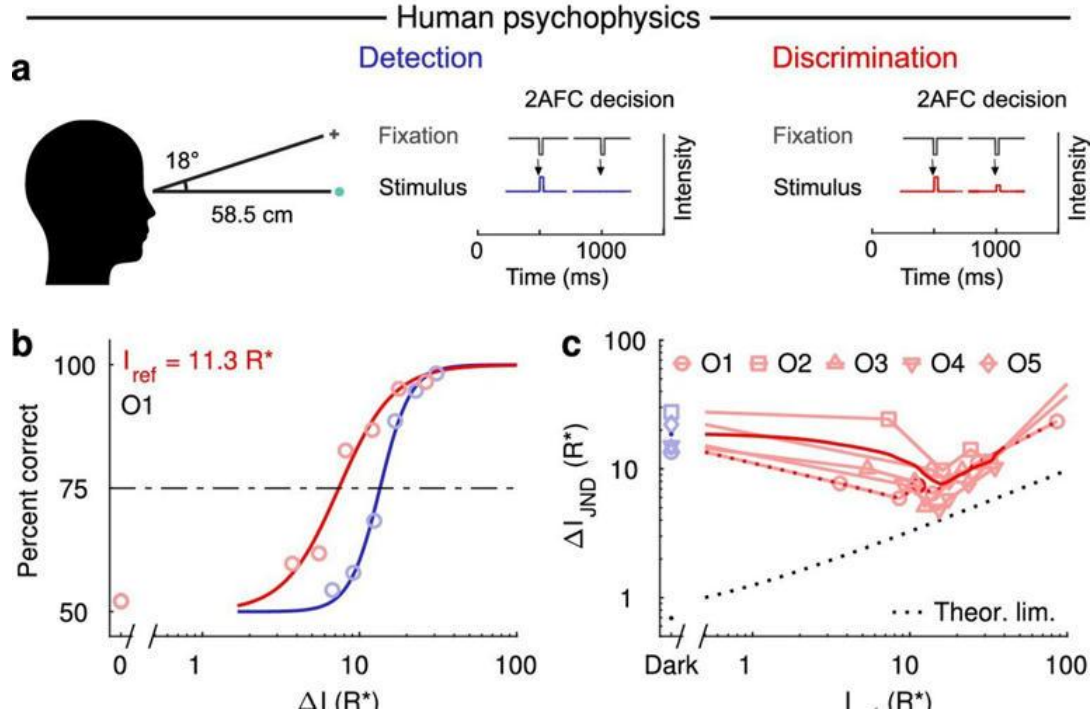
- What's the difference between AR and VR?

Augmented reality fundamentally works and exists in the real world, adding layers of interactivity on top, like [Pokémon GO](#). Virtual reality is full immersion in a completely virtual world, such as the survival game *Half-Life: Alyx* on the [Valve Index](#).

- When was augmented reality invented?

The technology that powers AR experiences was invented decades ago, but AR technology first entered the mainstream in the 1990s. AR became more popular in the 2010s due to the various AR games and products released.

New research shines light on highly sensitive human visual system



The performance of human observers agrees with the new dim light detection model where performance is fundamentally limited by retinal thresholding nonlinearities along the ON pathway. Credit: Nature Communications (2024). DOI: 10.1038/s41467-024-48750-y

Researchers at the University of Helsinki have made a breakthrough in understanding what neural mechanisms allow the extreme sensitivity of human vision in darkness. The new research shows that humans can perceive minute differences in the intensity of light but that this sensitivity is achieved at the cost of the ability to detect light particles.

For nearly one hundred years, neuroscientists have pondered whether the human eye could distinguish an individual light particle, known as a photon, which is the smallest possible quantity of light. This question has been difficult to answer because it was previously impossible to accurately reconcile human visual perception and retinal activity at the extreme sensitivity conditions in darkness.

Research conducted at the University of Helsinki reveals that the human visual system sacrifices the ability to detect individual photons in order to gain greater fidelity in detecting faint lights. The research findings challenge previous conceptions of how the visual system works. The study is [published](#) in the journal *Nature Communications*.

"This research is a major step forward in visual neuroscience, providing new insight into how the human visual system functions under extreme conditions in darkness. Our study shows that the sensitivity of the human eye approaches the fundamental limits of physics, and the entire visual system performs at the absolute threshold of its capacity," says Professor Petri Ala-Laurila who led the study. He runs his two laboratories at the Faculty of Biological and Environmental Sciences at Helsinki University and at the department of Neuroscience and Biomedical Engineering at Aalto University in Finland.

"Our research shows that the human visual system has evolved to detect faint contrasts with extreme precision, which has apparently been more important than detecting individual light particles," says Dr. Markku Kilpeläinen from the University of Helsinki's Faculty of Psychology, the first author of the article.

Visual perception at the edge of darkness

The research showed that humans can detect extremely small differences in the intensity of light at the threshold of darkness. This precision is achieved thanks to the visual system's highly effective ability to eliminate what is known as neural noise. However, this means that the visual system sacrifices the ability to detect individual photons.

The researchers took accurate electrophysiological measurements of the retina and conducted observational psychological tests measuring the activity of the visual system under identical conditions at the absolute threshold of perception. This allowed them to directly connect the person's conscious visual perception to the activity of certain neurons in the retina for the first time.

"Above all, we were able to show that certain types of output neurons in the retina, known as retinal ON ganglion cells, are responsible for encoding faint light increments. This result reveals the exact division of responsibilities within the retina during a single visual task," summarizes Professor Ala-Laurila.

Implications for the development of retinal prostheses

Eye diseases typically cause changes in the neural substrate and function of the retina. Understanding how particular retinal cell types participate in encoding visual information helps to design more effective treatment methods.

The results of this research could help improve the detection and diagnosis of certain visual impairments and lay the foundations for understanding how the brain interprets the retinal code across specific cell types. This knowledge will greatly benefit developers of retinal prostheses.

More information: Markku Kilpeläinen et al, Primate retina trades single-photon detection for high-fidelity contrast encoding, *Nature Communications* (2024). DOI: [10.1038/s41467-024-48750-y](https://doi.org/10.1038/s41467-024-48750-y)

Provided by University of Helsinki

The new XREAL AR glasses are what Microsoft HoloLens should've been: on-board spatial computing takes the new 'XREAL AR One' and 'One Pro' to the next level

What you need to know

- XREAL is an augmented reality glasses company that is at the forefront of miniaturising the tech.
- Up until now, XREAL relied on external computing solutions to add spatial anchors to its insanely sharp hologrammatic screens, but not anymore.
- The XREAL One series (One and One Pro) have a new XR chip baked straight into them, side-stepping the need for apps and external add-ons.

- The XREAL One and One Pro are available now in the United States, United Kingdom, and Europe, starting at \$499 USD, £449 GBP, and €549 EUR.

XREAL is back, and this time, they're even better.

I'm a big fan of XREAL. In my [XREAL Air review](#), I detailed how the subtle lenses do all the things I wish HoloLens would've ended up doing, albeit with a key concession: they have no on-board compute. The worst thing about the XREAL glasses previously was underbaked software and integration with Windows and Android, although the app situation has improved immeasurably over time. XREAL even launched its own compute module for their glasses called the XREAL Beam, although it was a bit like carrying an extra phone around in your pocket, and not exactly ideal.

XREAL agreed, which is why their shiny new XREAL One and XREAL One Pro now have on-board computing for the first time, completing the augmented reality circle HoloLens failed to accomplish.

XREAL describes its new One series as the "biggest leap forward" for consumer AR, owing to its independently-designed X1 processor platform. Previously, without a connected XREAL Beam, Android app, or Windows app, the XREAL was unable to independently reconfigure its virtual 3D display. You basically got an external monitor in glasses form, which while admittedly a very *good* external virtual reality monitor, the lack of configuration options was always a bit of a drag. Now, however, the X1 chip and the new XREAL SDK should enable an entire universe of new possibilities without having to rely on additional devices and apps to do the heavy lifting.

"Using XREAL's brand new, in-house designed X1 independent spatial computing co-processor, XREAL One Series creates a spatial display from nearly any device and for anything the wearer sees, leaping beyond the limits of today's AR and VR devices by introducing a fully customizable cinematic virtual screen that is for the first time spatially controlled by the glasses themselves."

The new glasses feature a variety of other tweaks and improvements over their predecessors. We now have speakers by BOSE, alongside official eye health certifications and even an AI-powered optional modular camera for added

tracking and spatial awareness features. The new glasses have dynamic interpupillary distance control as well for the first time, which should make for a more comfortable experience and easier positioning. There are also options for prescription lenses as was the case with the previous glasses.

The XREAL glasses are compatible with a huge range of devices, giving them broad applications for all kinds of use-case scenarios. Connect them to a Steam Deck or ASUS ROG Ally for large display gaming. Connect them to a Windows PC as a second virtual monitor. Expand your Samsung S24 with Samsung DeX, and so on.

XREAL is what HoloLens could've been

The XREAL One glasses have boosted 57-degree field of view, incredibly sharp 1080p visuals, clocking in at 84 grams and 87 grams for the Pro respectively. This is orders of magnitude more usable and convenient than HoloLens, or even devices like the Meta Quest 3.

I think therein lies the big gap between what some platforms want to push vs. what consumers will actually want in reality. Yes, the XREAL aren't cheap, but they're also something I use regularly as someone who travels frequently. I watched Cyberpunk Edgerunners while travelling exclusively on the XREAL devices connected to my phone. They're great for playing [Xbox Cloud Gaming](#) titles, and also adding a bigger display to the [Lenovo Legion Go](#) and so on.

The downside was always that you couldn't resize the monitors or anchor them without extra steps. The new X1 computing platform should help resolve that situation. We'll be back with a full review soon.

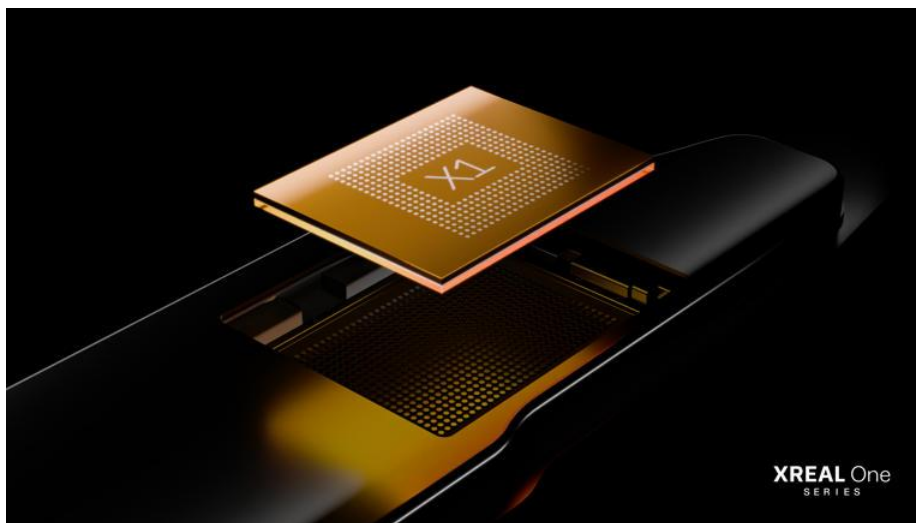
I just tried Xreal's new smart glasses and they're a leap forward for AR

Xreal already offers some of the [best smart glasses](#) in the [Xreal Air 2](#) and today, the company announced two new smart glasses that may knock the Air 2s off the proverbial throne.

The Xreal One Series introduces a number of upgrades to its glasses lineup, including a newly developed X1 chip that powers "independent spatial computing." The X1 enables the glasses to connect to any USB-C device creating a spatial display for gaming, work, apps and websites.

I got to give the new Xreal One and Xreal One Pro a test run a couple of weeks ago and they are impressive. We'll have a full review in the coming weeks, but here's what's new and more of my thoughts.

X1 Chip



((Image credit: Xreal))

Previously, Xreal smart glasses like the Air 2 need an accessory like the expensive [Xreal Beam Pro](#) that lets them access and create spatial displays for devices, especially ones that feature USB-C connectors with video out.

The X1 essentially takes that capability and puts it in the glasses themselves. Surprisingly, the addition of the chip doesn't really alter the way the glasses look.

"X1 powers the kind of spatial computing we've always envisioned and that customers have been eagerly waiting for," said Chi Xu, CEO and co-founder of Xreal.



((Image credit: Xreal))

During my test run of the One series, I was able to see the glasses connected to an iPhone 16, a Steam Deck and a MacBook. These were curated experiences but I was able to comfortably watch a YouTube video via the glasses that was outputting directly from the phone. Connecting to the MacBook enabled me to see three spatial monitors in a virtual workspace.

Both work well, with improvements to the fluidity afforded by the X1 chip and a lower latency helping especially when running a few laps in DiRT 5 on the [Steam Deck](#). It felt very intuitive and I didn't notice any lag between the glasses and Valve's machine as I played.

Xreal says that X1 enables a "low motion-to-photon" latency of 3ms at 120Hz which is far lower than the 20ms on the currently available Air 2. And in our experience, that is especially noticeable.

Display and Design



((Image credit: Future))

Xreal has improved the display for the One and One Pro. Where the Air 2s offer 1080p per eye and 46-degree-field-of-view (FOV), the One features the same resolution with a 50-degree FOV with a larger display.

The One Pros have a 57-degree FOV, which Xreal says is the largest in the industry. They achieved this through a "flat-prism lens" that is different from the triangular birdbath design in the One and older Xreal glasses.

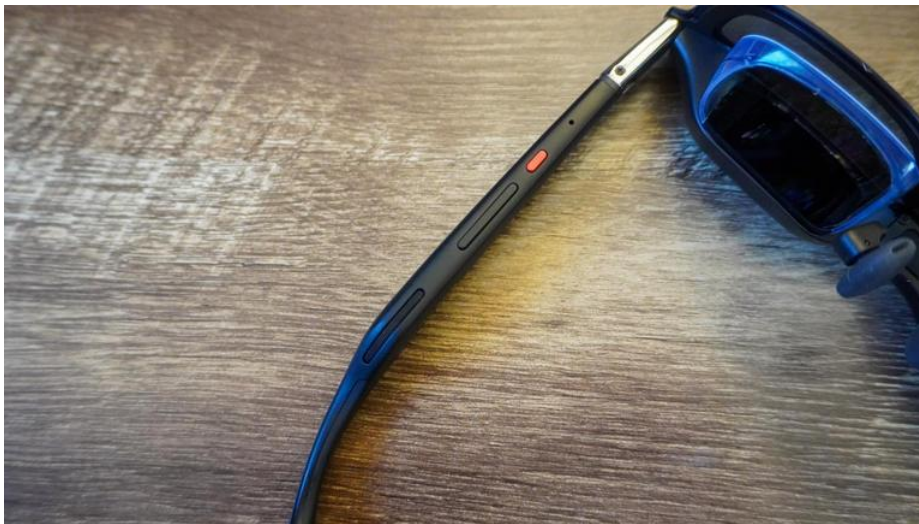
The new glasses are certainly more sleek than older Xreal glasses too, with silver banding at the temples and an interchangeable front frame for a customizable look. Alongside this, its dimensions are certainly a lot more low-profile, with the front of the glasses themselves being thinner too when compared to Air 2.



((Image credit: Future))

But one thing Xreal has been good to not compromise is the comfort. The Air 2 sit nicely on your face, and the One and One Pro follow suit.

The One and One Pro are listed at 84 and 87 grams (slightly heavier than the current specs). But in wearing them, I didn't feel uncomfortable with the weight, but this was only a short viewing. They did feel nicely balanced and I wasn't annoyingly aware of them like some wearable tech.



((Image credit: Future))

One cool feature that I got to hear was the new Bose speakers that are integrated into the arms of the glasses. The revs of the engine in DiRT 5 reverberate through the specs with impressive clarity, and the higher volume capability does mean you could listen to these on louder public transport with relative ease.

"Our audio tuning expertise creates a powerful and distinguished sound experience for the XREAL One Series. Content is more vibrant and lifelike, and we know consumers will hear the difference," Nick Smith, Senior VP of Strategy and Business Development for Bose said in the press release.

Xreal is also introducing a new RGB camera called the Xreal Eye that attaches to the bridge of the glasses. During my brief time with the glasses I tried on a pair with the camera attached and it didn't feel noticeably different. Though, I did not get to test out how the camera work with the One or One Pro.

Xreal says that the camera can capture "real-time" 12MP photos and record video up to 1080p at 60fps. Down the line, the camera will get multimodal AI features "including image recognition and communication via voice commands in unison with an AI or voice assistant coming from the glasses' host device."

It can be paired with the Xreal Beam Pro for augmented reality displays.

Availability and price

((Image credit: Xreal))

Starting today, the Xreal One and One Pro are available for pre-order via the Xreal website.. The One will set you back \$499/£449/€549 while the Pro One adds \$100 starting at \$599/£549/€649. There will also be bundles with the Xreal Beam Pro available.

If you want to get your hands on one of these sets, the One is supposed to start shipping in "mid-December" while the One Pro won't release until "early 2025."

Alibaba-backed Xreal launches augmented reality glasses with new chip as Meta rivalry heats up

- Xreal on Wednesday launched its latest generation of augmented reality (AR) glasses as it looks to fend off competition from the likes of Meta and Snap.
- The Xreal One Series features the X1 chip which is the company's first self-designed processor for its glasses and marks a big step for the product's capabilities.
- Xreal is among the companies that is betting on glasses, rather than large headsets like Apple's Vision Pro or the Meta Quest, to be the mass-market winners in AR.



The Xreal One Series features the X1 chip which is the company's first self-designed processor for its glasses.

Xreal on Wednesday launched its latest generation of augmented reality (AR) glasses as it looks to fend off competition from the likes of Meta and Snap.

The company, which is backed by Chinese e-commerce giant Alibaba, is hoping to capitalize on the growing interest in AR glasses.

The Xreal One Series features the X1 chip which is the company's first self-designed processor for its glasses and marks a big step for the product's capabilities.

Xreal talks up the ability for wearers of its glasses to be able to connect to devices such as a phone, laptop or games console, and see their content on a huge digital screen in front of them. The [previous generation of Xreal's product](#) required a companion device called the Beam for connections to a device, but the latest chip means that the Beam is not required.

"I think that it's the biggest upgrade in Xreal history and probably the biggest upgrade for the entire consumer AR glasses [sector]," Chi Xu, CEO of Xreal, told CNBC in an interview.

The X1 chip was in the works for three years, Xu said, adding that he sees it as a way to increase the capabilities of the glasses to differentiate from the competition.

"We have to step up to define a chip that is really defining some of the new features for these types of glasses," Xu said.

Xreal is one of the biggest players in the AR glasses space, but it is facing intense competition from the likes of [Snap, which unveiled a new set of its Spectacles in September](#), as well as Facebook parent Meta's continued efforts with the [Meta Ray-Ban product](#). Meanwhile, [CNBC reported](#) this year that Qualcomm is working on a set of glasses with Google and Samsung.

Xreal is among the companies that are betting on glasses — rather than large headsets like Apple's Vision Pro or the Meta Quest — to be the mass-market winners in AR.

"People have started to realize a headset doesn't make sense, we need to go to lighter form factors to the glasses category," Xu said. "But the challenge for glasses is can we push the limit to deliver a headset experience on a much smaller form factor?"

The Xreal One and Xreal One Pro start at \$499 and \$599 respectively.

AR, which refers to a technology that overlays digital content over the real world, has been hyped up over the last few years. However, the market had not

exploded like many had predicted. Large headsets have proved too expensive or uncomfortable and firms including Xreal and Meta are focusing on how they can make the experience with glasses more compelling.

There is also still a lack of content and killer use cases for the product, an issue Xu said needs to change before the product category reaches a wider user base. The CEO added that this begins with good hardware.

"We need a platform, we need an ecosystem to improve the experience because we don't have any content yet. But in order to have the developers getting excited ... you need to have good hardware to begin with," Xu told CNBC.

Xu said the company is expecting to sell 500,000 units of its previous products in 2025, roughly doubling the figure of this year.

Will VR ever take off? 30 years since the first headset, it's still not there yet

Virtual reality has been close to mainstream adoption for decades, yet it remains a niche technology. While promising developments and incremental improvements continue, the game-changing app that will propel VR into every home remains elusive despite the efforts of tech giants like Meta, Google, and Apple.

History is littered with VR failures, from the early Nintendo Virtual Boy to the [pricey Apple Vision Pro](#), but the promise of immersive digital worlds keeps companies investing billions. The stakes are high, as whoever unlocks mass-market VR will shape the future of the user experience across [gaming, fitness, productivity, and beyond](#).

Google has been innovating in augmented reality and virtual reality for much longer than Apple

A roller coaster of hype and disappointment

VR's journey has been a roller coaster of hype and disappointment. Early attempts, like the vaporware Sega VR headset and Nintendo's ill-fated Virtual Boy, were hampered by technical limitations, high costs, and a lack of compelling content. What's worse, early VR users complained of vertigo-like symptoms.

VR didn't take off, even with the advent of more capable headsets like the Oculus Rift and HTC Vive. Google's forays into the market with Cardboard, Glass, and Daydream fizzled out, while Apple's Vision Pro stumbled with a hefty price tag and limited functionality. Meanwhile, Facebook keeps doubling down, and Samsung appears poised to re-enter the VR market. This makes us wonder who and what can succeed where capable tech companies fail.

The quest for VR's game-changing app spans three decades

VR's biggest challenge is the lack of a must-have experience that compels users to embrace the technology. While VR has shown promise in gaming, entertainment, and perhaps productivity, nothing has taken off after decades of trying.

Source:gamehistory.org

My first VR experience was in the early 90s in San Francisco. I remember donning a heavy headset and exploring an 8-bit, 3D world. It was exciting and felt innovative, but the experience didn't make me need VR in my daily life. As illustrated by the timeline below, VR's "gotta have it" application has eluded many companies in a cycle that continues to this day.

VR reached numerous milestones but never thrived

The following timeline does not capture every event or product launch in VR's history. Still, it paints a lengthy history of false starts in the seemingly forever-nascent category.

1991: Virtuality Group launches VR arcade machines. Sega announces the Sega VR headset, but it is never released.

1995: Nintendo releases the Virtual Boy, a commercial flop.

2010: Palmer Luckey creates the first prototype of the Oculus Rift.

2014: Facebook acquires Oculus for \$2 billion. Sony announces Project Morpheus (later PlayStation VR). Google releases the \$15 Google Cardboard.

2015: Samsung launches the Gear VR series for its Galaxy phones.

2016: The Oculus Rift and HTC Vive hit the market, marking the beginning of modern consumer VR. Google extends its VR line with the Daydream View, a sub-\$100 headset that, like the Cardboard, leverages a smartphone as its brain and display. The new model incorporates fabric into the design to address comfort.

2017: Facebook launches the Oculus Go VR headset, a self-contained headset for less than \$250.

2019: Google discontinues Cardboard after it fails to scale the VR market. Facebook launches the standalone Oculus Quest and updates the Oculus Rift.

2020: Google officially ends support for Daydream VR, hampered by soft demand and limited content. Facebook launches the freestanding Oculus Quest 2, which becomes a category leader at \$300. Samsung ends support for its Gear VR devices and services.

2021: Facebook changes its name to Meta and promotes its metaverse to mixed reception.

2022: Meta unveils the Meta Quest Pro at \$1,500. It's still available for around \$1,000.

2023: Apple jumps into VR/augmented reality with the \$3,500 Vision Pro headset. Meta releases its Quest 3, focusing on gaming and productivity at a more affordable \$500. According to multiple sources, Mark Zuckerberg claims it's "better than the Vision Pro."

2024: Reports surface of Apple scaling back or ending Vision Pro production due to disappointing sales. No surprise there, given its eye-popping price tag.

2025: Samsung, in partnership with Google and Qualcomm, is expected to launch a new mixed-reality headset.

After a relatively dormant period in the early 2000s, the 2010s brought a resurgence of interest in VR, fueled mainly by Palmer Luckey's Oculus. Facebook's acquisition of Oculus in 2014 and Mark Zuckerberg's interest in VR amplified this excitement. This period saw the launch of high-end consumer VR headsets such as the Oculus Rift and HTC Vive. Google tried the budget angle with its \$15 Cardboard, and Samsung offered its Gear VR. Since then, we've seen numerous fully standalone headsets at various price points. Despite initial buzz, these devices failed to gain widespread consumer acceptance.

Overcoming the VR content hurdle

Source: Steam

Compelling VR content is crucial to scaling the category but has been in short supply. To address this, companies adopted multiple approaches. For example, centralized platforms like the Meta Quest Store and SteamVR were created as hubs for content discovery. To expand VR's appeal to wider audiences, companies also championed the development of non-gaming experiences, spanning genres such as education, fitness, social interaction, and cinematic immersion. These efforts haven't solved the chicken-and-egg dilemma of hardware adoption and content availability.

Google keeps trying to crack the VR code

Google's attempts to conquer the VR market have been unsuccessful. Google Cardboard and Daydream View were discontinued due to low consumer

adoption. On the augmented reality (AR) side, Google Glass was massively hyped and massively flopped. The company seems to have adapted its approach via its partnership with Samsung on an extended reality (an umbrella term for VR and AR) headset. The Google Play Store is rumored to be [preparing to support apps for XR](#) (extended reality) devices, indicating the growing anticipation for this technology.

Samsung takes another swing at VR

As numerous outlets have reported, Samsung is preparing to re-enter the VR market with a headset and potentially AR glasses. Samsung's platform is being developed in collaboration with Google and Qualcomm. A Samsung patent suggests the platform could reveal hidden objects in the user's field of view by overlaying digital information. Although initially expected in 2024, the launch has been delayed until 2025, and it might coincide with the [Samsung Galaxy S25](#) debut.

Is Apple's Vision Pro heading for an exit?



Apple Vision Pro VR headset

Source: Apple

Apple launched the Vision Pro headset in 2023, positioning it as a spatial computer. Despite its advanced technology, including high-resolution displays and a powerful processor, the steep price of \$3,500 put it out of reach for many consumers. Furthermore, the Vision Pro doesn't support motion controllers, a key feature for many popular VR games and applications. The high cost and limited

functionality proved to be significant hurdles in attracting a wider consumer base, leading to scaled-back production and what may become the device's sunset in 2025.

Meta doubles down on VR again

Meta has long been devoted to VR and released the Quest 3 headset in 2024. The Quest 3 [distinguishes itself](#) by integrating with Windows 11. This feature positions the Quest 3 as a potential productivity tool. It will be interesting to see if this angle finds a market. Meta is also betting big on the metaverse and social experiences.

VR hurdles remain

Even if a game-changing app materializes, VR must overcome a few other barriers. Issues like the screen door effect, latency, and high component costs have improved but continue to exist.



Meta Quest 3s VR headset

Source: Meta

Let's not forget about comfort. VR headsets can feel bulky and hot and may cause eye strain for some. While motion sickness is less of an issue than it used to be, it still affects some users. Until these concerns are addressed, widespread adoption might remain out of reach.

Hope for a brighter VR future

Despite these challenges, VR isn't going away anytime soon. Companies like Meta, Google, and Samsung continue to invest heavily in [VR and AR](#).

Advancements in AI and hardware offer hope for a brighter future. However, until VR delivers compelling experiences that resonate with a wider audience, it seems destined to remain on the cusp of mainstream acceptance.

Perhaps the key to unlocking VR's potential lies in finding that elusive game-changing app, or maybe it will be a convergence of factors: compelling content that goes beyond gaming, relatively inexpensive AI-powered hardware, and comfortable, lightweight designs. Whatever the solution, one thing is clear: VR's journey to mainstream adoption continues.

Is this the world's first truly wearable spatial computer? Viture's Pro Neckband aims to augment AR glasses

Wearables come in many forms, from the well-established smartwatch to

2024's sleeper hit in smart rings. However, wearable computers are often limited in scope, be that due to usability or those pesky laws of physics. Yes, the Apple Watch is great, but it's still a far cry from the futuristic Pip-Boy 3000-like Sci-Fi dreams of what wearable computers could be.

However, I'd like to take this moment to welcome you to that future as today, AR Glasses maker [Viture has revealed its all-new Pro Neckband](#) — not just a wearable computer, but a wearable *spatial* computer that brings more of a standalone experience to the company's incredible [Pro XR Glasses](#).

XR/AR glasses have been one of the most fascinating gadgets to track throughout 2024, especially as smart glasses increasingly find a home with mainstream audiences. These wearables bring simple mixed reality entertainment

to the masses, transforming how many consume media along the way. But the Pro Neckband looks to be a major leap forward for Viture's glasses.



[7 Best Black Friday smart glasses deals: Save on Ray-Ban Meta, Viture, XREAL, and RayNeo](#)

Top-rated product

Excited about Viture's new Pro Neckband? Save \$100 on the Viture Pro XR Glasses during Black Friday sales at Amazon and outfit yourself with the perfect companion to Viture's wearable wonder.

I gave these glasses a [four-and-a-half star review](#) earlier this year, and I routinely use them to play games and watch movies across their vivid 135" holographic display. It's IMAX in front of your eyes and works with mobile, tablets, Macs, and PCs to make play and productivity possible in an AR space.

Features: Built-in micro-OLED displays (1920 x 1080, 120Hz, equivalent of 135" screen at nine feet), Electrochromic dimming lenses, Harman-tuned speakers. [View Deal](#)



VITURE Pro Neckband: A very spatial wearable computer

Viture's Pro Neckband is the next step in that bold, mixed reality direction, taking the capabilities of the company's AR glasses and pairing them with the powerful backing of a portable spatial computer featuring its own AI assistant, gesture-based controls, 3DoF tracking, and some clever tech that takes advantage of the dual-screens of AR glasses to turn flat media into 3D.

Viture's Pro Neckband comes in two models: the \$299 Classic, which offers 8GB of RAM and 128GB of storage, and the \$399 Elite, featuring 12GB of RAM and 256GB of storage.

Both models offer the same core improvements, including a longer-lasting 3,280mAh battery, improved 6nm 8-Core CPU, Wi-Fi 6E, Bluetooth 5.2, and improvements to the Neckband's build, fans, and cooling to reduce noise, heat,



VITURE Pro Neckband: Augmenting the AR experience

The new Viture Pro Neckband doesn't run on the same Google TV framework as Viture's original Neckband. Instead, it runs on Android and is officially certified with the Google Play Store — unlocking access to literally millions of Android apps and allowing them to run natively on-device.

Alongside this, the new Pro Neckband also features hand tracking to interact with the AR environment, which can now span multiple windows. Simple gestures can control the size of each window and the Pro Neckband also allows for similar operability as the Apple Vision Pro or Meta Quest 3/3S by using your hand to move a virtual cursor and tapping your fingers to click.

Taking things even further, the new Pro Neckband also features an AI agent, cutely dubbed Vizard — an LLM-like assistant that can answer questions, handle your schedule, and even take notes for you.

The power of AI extends beyond Vizard, and merges into your entertainment. Using AI, Viture has been able to develop a way of translating 2D media into 3D, elevating your favorite content and greatly improving the viewing experience for all. This feature is also expected to make its way to games in the future, granting you a new way to enjoy your classics.

Outlook

Alongside AR glasses makers XREAL, RayNeo, and Rokid, Viture has been paving the way for entertainment-focused smart glasses to take flight in the mainstream. While the company's AR glasses have been impressive (to say the least), the Pro Neckband aims to bring the Viture experience forward tenfold.

It's hard to get across how much of an impact something like the Pro Neckband can have on AR glasses, but a similar impact was made by XREAL with their recent Android-based Beam Pro device.

Viture's Pro Neckband looks to be taking the same steps into the next generation of wearable AR tech, stepping out even further into what's possible with the

inclusion of the Vizard AI agent, creating 3D experiences from 2D media, and offering an intuitive hand-tracked method of interfacing with its AR elements.

Those interested in trying out Viture's latest Pro Neckband for themselves won't have to wait long. Pre-orders for the AR accessory are now available at the Viture Store for the [\\$299 Classic](#) and [\\$399 Elite Neckband](#) models. The Pro Neckband is expected to ship in two batches so far, with the first batch due toward the end of December, and the second batch in early January 2025.

Aside from celebrating the launch of its new Pro Neckband, Viture is also celebrating [Black Friday](#) by hosting a slew of discounts on its best AR-friendly tech. You can catch many of these sales on the [Viture Amazon Storefront](#), and if you follow this page you'll also get a free Viture x 8BitDo Ultimate C game controller on any purchase of the Viture Pro XR glasses.

Viture's new Pro Neckband grants AR glasses extra superpowers

Viture already has some of [the best smart glasses with displays](#) currently

available. However, the market is maturing, and accessories that expand capabilities are becoming important as well — which is where the company's newest release comes in: the Pro Neckband.

[All The Level-ups You've Been Waiting For — Secure Your VITURE Pro Neckband on 11/26!](#)

The Pro Neckband expands the features of Viture's smart glasses, while also adding extra battery life. The current way of using the Viture smart glasses is by using the Spacewalker app for iOS and Android, which lets Viture glasses display multiple virtual screens, browse the web, and view content, though it can't run any other apps. That limits what's possible.

The Pro Neckband changes that. It's a standalone Android device that Viture says can run "millions of apps" in a [multi-window spatial computing environment](#). Viture describes it as "all the level-ups you have been waiting for."



Viture's Pro Neckband is a hands-free wearable that can run Android apps. Viture

The Pro Neckband does a similar thing as [Xreal's Beam Pro](#), which adds advanced features found in [Apple's Vision Pro headset](#), as well as Rokid's AR Lite, and includes a separate compute puck so you don't need to connect your phone.

While [VR headsets like the Meta Quest 3S](#) borrowed AR features with advanced mixed-reality technology, Viture smart glasses paired with the Pro Neckband incorporate what was once a VR feature: hand-tracking.

To control the Pro Neckband, you simply use your hands. Viture added sensors that recognize hand gestures so you can move or resize windows and interact with apps by using wave and pinch motions.

If you're familiar with the original Neckband, Viture says the Pro Neckband is seven times faster and has 40 times the GPU performance while being lighter and offering a longer battery life. The unnamed 6nm 8-core processor supports up to 12GB of memory, 256GB of storage, Bluetooth, and Wi-Fi 6E.

That's plenty of RAM for its AI assistant Vizard, and enough space to load it up with your favorite games and movies. You can stream from YouTube, Netflix, and more, watching 3D movies or using Viture's AI to turn 2D videos into 3D.

FEBRUARY 27, 2025

Why does music evoke emotions?

by Katrina McFerran, [The Conversation](#)



Credit: Pixabay/CC0 Public Domain

Imagine a scene from the movie *Jaws*, with [the great white shark closing in](#) on another helpless victim. The iconic semi-tone pattern builds and your heartbeat rises with it; the suspense pulls you further to the edge of your seat.

Now picture that scene without the score. Much of the tension evaporates.

Maybe it's a heartfelt pop ballad or a suspenseful soundtrack. If you are my age, it might be the [Friends theme song](#), forever associated with the (largely unfulfilled) hope for sharing apartments with mates and growing old together in a blissful acceptance of one another's limitations. Music is a powerful force to induce and pre-empt all kinds of emotions in us.

But how do so many different combinations of rhythm, harmony and melody trigger such profound reactions?

The categorical approach

Swedish music psychology researcher Patrik Juslin proposed the [most popular explanation](#) of music's ability to trigger emotion.

He identified eight key mechanisms under the acronym BRECVEMA. The categories begin with more fundamental connections:

Brain stem reflexes—maybe a movie jumpscare moment or another sudden, frightening sound triggering a pre-conscious response. Evolution programmed these reactions into the brain over thousands of years in order to influence arousal levels and initiate the necessary emotional response.

Rhythmic entrainment, like the tendency to [tap your foot to the beat](#); the benefits of moving in time together have been critical to human survival and evolution.

Then, the listings become increasingly complex:

Evaluative conditioning in the fashion of Pavlov's dog. After years of watching and cultural references, we hear the Jaws music and automatically feel tense.

The **contagion effect**, wherein we feel the emotions we perceive in the music. Lyrics aren't necessary; the [Peanuts cartoon's signature tune](#), for example, strongly conveys childhood wonder and freedom without any words.

The **visual imagery** many people experience when listening to music, imagery which is often tied to some deep emotion.

Episodic memories, when hearing certain music brings up recollections of a past event. [Music therapists can monitor](#) the emotional reactions people have when unexpectedly reminded of particular situations, be they positive, negative or both. The therapists then use their expertise to support people in processing these resulting emotions.

From there, Juslin's model gets more technical and music theory-based:

Musical expectancy, when we anticipate the resolution of a chord or phrase. This is something you might feel rather than consciously notice. Take "My Heart Will Go On": a delicate tension builds through the chorus, before finally resolving as Celine Dion sings the final line of the section and listeners are put to ease.

Aesthetic judgements, closely related to the ways we experience pleasure, are our personal emotional responses to how beautiful (or not) we consider a piece of music.

It makes sense that a theory using the brain to explain otherwise indescribable relationships would be popular. It provides a level of objectivity to what is, in essence, a purely subjective and non-generalisable experience.

Is it just about neurological pathways?

Evolutionary theories suggest music and emotions are connected because of the inherent musicality [we are each born with](#), essential to our ability to develop relationships and flourish.

Parent-infant interactions often have musical aspects to them, [described as](#):

- **pulse**, a shared tempo, where infant and caregiver move in time together and synchronize to one underlying beat
- **quality**, the character and melodic interplay of voices and movements, mirroring one another in dynamics and timbre
- **narrative**, the tendency for the same phrases, gestures and movements to be repeated on the same pitch and pace over time.

When responding to musical sounds, [babies are also able to recognize](#) musical phrases even when they start on a different note.

Subsequently, however, other learning and our limited brain capacity mean this ability is buried deep, so it rarely translates to [perfect pitch](#) or other forms of music theory knowledge that underpin Mozart-like genius.

This baby-talk theory may be the most intimate and emotion-based explanation for why music affects us so strongly—it was designed to enhance our emotional bonds with others. When adults coo and dance with babies, [they are being musical](#), meaning emotional reactions to music are implicit in human nature.

Cognitive developmental theorists like Steven Pinker have opinions firmly in contrast to this. Pinker calls music "[evolutionary cheesecake](#)," functioning only to tickle the senses and serving no evolutionary purpose.

Pleasure for purpose

Cultures across the world have long acknowledged the healing power of music.

Sound healing practitioners in India and China, for example, [point to ancient traditions](#) of healing and draw correlations between recovery from illness and certain tones, scales and chants. [Some suggest](#) the vibrations of different tones can serve specific purposes.

In the West, [the idea of emotional differences](#) between major and minor scales still has public traction even though its academic credibility hasn't really extended in the past 100 years.

None of these concepts have been used in the modern practice of music therapy, but they do reflect assumptions many people hold about how music works.

Instead, a fundamental principle of music therapy is based on how each person's unique connections with music shapes their emotional reactions. What moves your sibling to tears might leave you cold, for example. It always depends on a range of conditions—historical, cultural and personal.

Cultural upbringing, simple song-like phrases from infancy and our own unique musical preferences and behaviors all shape these connections. They're powerful, but they sure ain't simple.

Provided by [The Conversation](#)



Viture

We're eager to go hands-on with this new accessory that could make Viture One and Pro smart glasses into one of [the best wearable AR devices](#).

Check back for our full review. In the meantime, you can learn more about the Pro Neckband and preorder it now on [Viture's website](#).

Meta Orion AR glasses could get these 3 incredible sci-fi tricks, according to new Project Aria update

- **Researchers have shared their impressive Meta Aria projects**
- **Aria is a research kit to help developers better understand AR and AI**
- **These projects could become Meta Orion features if we're lucky**

Meta has just shared [an update](#) on its Aria AR glasses research project collaborations, and they reveal some exciting potential ways that the publicly available versions of its [Meta Orion AR Glasses](#) could shape our real-world lives when they launch.

Project Aria's goal is to help software developers and researchers "better understand how to build the software and hardware necessary for future AR and AI-powered glasses." Initially an internal undertaking, Meta expanded Aria access to partners like BMW and various universities across the globe – and what they've created so far highlights some awesome use cases for AR glasses.

It's worth noting that all of these tools are still at the research stage, so we're likely still years from them being packaged into a consumer usable app – something which may not even happen with any of these projects. But they highlight some of the ways Orion could be used, and who knows? With Orion likely years away there's still plenty of time to turn these projects into the world's best AR apps before they launch.

1. Learning from the experts

The Matrix series is not a dystopian setting anyone wants to live in, but there's one aspect of that world I'm sure most of us would want to bring into our real one: the ability to download any skill we could need.

While the Orion glasses might not instantly make you a master of kung fu, or teach you how to fly a helicopter in seconds, they could help us gradually improve our skills with feedback it has learned from experts.

For its Project Aria research, the University of Bristol has been capturing data from highly skilled people – from chefs, to musicians, to athletes, to mechanics – tracking their movements and how they move objects to learn more about how they “interact with and change the world to achieve their goals.”

With this understanding it’s easy to see how Orion could offer AR lessons about how to repair a bike or cook a delicious meal, going so far as to highlight the real-world object you need to use and showing you how to use it in real-time.

2. Driving more safely

Researchers at IIIT Hyderabad have used Project Aria to develop its Driver Intent Prediction Project. Using the AI glasses’ outward cameras, and their inward eye-tracking cams – as well as various other car sensors – the team is able to tell where drivers are looking and importantly where they aren’t.

If a pedestrian mindlessly steps into the street while you’re looking in your mirrors, the glasses can detect that you haven’t seen them yet and warn you – allowing you to take action. The project’s goal is to reduce traffic accidents and it’s easy to see how this tool could help make us safer drivers if Orion were to launch with a version of it.

3. Maximizing accessibility

The last two Aria projects demonstrate the glasses’ accessibility credentials. University of Iowa researchers are using Aria to help people with hearing loss by using the specs’ microphone array to help determine the direction sound is coming from. This could then be combined with prompts on an AR glasses’ display, or used in conjunction with traditional hearing aids to improve its effectiveness.

Meanwhile, researchers at Carnegie Mellon University have used the glasses to help people with visual impairments. Using the glasses’ sensors (and some

external beacons) Aria could help people more easily navigate unfamiliar environments with real-time guidance.

These kinds of accessibility features and more are exactly how technological advancements like Meta Orion could (and should) be put to use.

As more people get their hands on Aria research kits I'm excited to see what other projects they work on, especially as that hopefully means that Orion will have some awesome tools when it eventually releases to the public.

"The most advanced pair of AR glasses ever made":Meta unveils Orion augmented reality glasses

A natural step in the progression of technology, or deeply concerning? Tech giant Meta, owner of Facebook, Instagram and more, has unveiled the first pair of what it calls "true" augmented reality (AR) glasses.

Called Orion, Meta describes the product as "the most advanced pair of AR glasses ever made." However, they are still a prototype at present.

One of the reasons they haven't been released to the public is not a fear that people will become even more insular than they currently are, but rather that they would cost a prohibitive \$10,000 (approximately £7,900 / AU\$15,600) a pair.

Orion's hardware consists of three individual parts: the actual glasses, a wireless mouse and a wristband for gesture control.

A "feat of miniaturization," according to Meta, Orion has the largest field of view in the smallest AR glasses form to date. "From multitasking windows and big screen entertainment to life-size holograms of people – all digital content that can seamlessly blend with your view of the physical world."

Embedded into the wristband are electromyography sensors that capture and process electric signals generated by physical movement, and the mouse's dual

processors carry part of the computing load, including some artificial intelligence (AI), graphics rendering and machine perception.

The glasses contain custom chips that consume less power and are optimized for its functions. They're made from magnesium, a lightweight material that efficiently dissipates heat, and miniature cameras and sensors surrounding the frame rims help the eye in hand-tracking and identifying objects in the real world. Additionally, microLED projectors beam holographic displays through the holographic lenses.

Apparently the glasses enable you to open your fridge and ask for a recipe based on what's inside, or for some inexplicable reason "video call a friend while adjusting a digital family calendar as you wash the dishes."

If that rather stressful-sounding scenario feels like something you'd be interested in, it's probably best to mention how Orion looks.

Meta claims that "what makes Orion unique is that it is unmistakably a pair of glasses in both look and feel – complete with transparent lenses."

As you can see, this is clearly not the case. They're clunky, cartoonish, and resemble the ever-trendy 'Coke bottle' glasses style.

While just a prototype at the moment, Meta is hoping that its development team can "learn, iterate and build towards our consumer AR glasses product line, which we plan to begin shipping in the near future."

Take a look at our guides to the [best AI image generators](#), the [best 360 cameras](#), and the [best cameras for professionals](#).

Meta Orion hands-on: if this is a prototype the finished product is going to be incredible.



(Image credit: Future / Lance Ulanoff)

I didn't want to love it. My plan for my first [Meta Orion](#) AR glasses experience was to dispassionately try them and quickly identify the highlights, shortcomings, and pitfalls of this not-ready-for-primetime mixed reality product. But I can't do that because I enjoyed every bit of it, almost to the point of giddiness. Let's back up for a minute.

Meta Orion AR glasses made their global debut just weeks ago at the [Meta Connect Conference](#) on the face of company founder and CEO Mark Zuckerberg. The live demo raised eyebrows for its build, image quality, eye and gesture tracking, and smart [Meta AI](#) integration.

Orion looked like everything [Google](#) once hoped [Google Glass](#) could be and, honestly, everything Apple Vision Pro should be today.



The look like fat glasses (Image credit: Future / Lance Ulanoff)

I read some of the early hands-on' with interest and some jealousy. I've been trying AR, VR, and mixed-reality headsets, and smart glasses for well over a decade, and I sensed a tipping point in Orion. Even so, I assumed it couldn't be that good. If Meta wasn't ready to release it to the public, Orion had to be more experiment than product and the utility would be limited at best.

Meta invited me to its New York headquarters this week to wear and try Orion for myself. Since I first heard of them, it seemed like a long road to get to this moment, but to be fair, Meta's traveled far further.



You can bend some at the hinges, but I never fully collapsed them (Image credit: Future / Lance Ulanoff)

The Orion project started inauspiciously five years ago with a massive headset that was attached to a heavy backpack (see the progression below). Meta VP of Wearable Devices Ming Hua, who is also leading the Orion team, told me the joke at the time was that you had to be very strong to work on AI glasses.

Meta worked quickly in the intervening years to shrink the system. By 2022, the project, then known as Balboa, was a torn-down Quest Pro. It was only marginally smaller in 2023. It is almost miraculous that Orion made the leap from this massive and unwieldy headgear to a pair of almost fashionable magnesium glasses that weigh just under 100 grams.



This is how we got here. Yes, the guy on the left is wearing a backpack. (Image credit: Meta)

Figuring out how to shrink components, which often seems to involve building custom silicon and then spreading it throughout the body of Orion, is an achievement in and of itself. I saw an image of a see-through version of Orion, which showed virtually every square millimeter filled with circuitry, silicon, and components. Even so, Meta has yet to fit everything inside the frames.

Some supporting custom silicon lives in the wireless puck. While Meta has experimented with additional puck features like a six-degree of freedom thumb control and some cameras, during my demo, the puck sits nearby like a silent partner.

There are enough sensors built into the glasses to track eye and head movement, but Meta went a different route for Orion input. It developed an Electromyography (EMG) band that reads subtle electrical signals produced in the wrist when you perform various hand gestures. I've used some of the EMG bands in the past and they were bulky and

uncomfortable. Orion's companion band is not much thicker than a sweatband and no less comfortable.



The puck has some vestigial technology that's not being used. During my demo, I never touched it. (Image credit: Future / Lance Ulanoff)

Orion's defining feature, though, may be its display system. The lenses appear mostly clear, but there's a complex interplay of tiny micro-LED projectors, silicon carbide, and waveform etching that creates a remarkably seamless AR experience.

The projectors live in the frame, sitting in stems and right next to lenses, which have a thin coating of silicon carbide, chosen for its high refraction and low image ghosting capabilities. The waveguide technology involves fine etchings on the silicon carbide surface that guide the light and imagery across the lens surfaces for a wider-than-it-sounds 70-degree field view. The resolution ends up being 13 pixels per degree (ppd).

The specs are fascinating, but the experience is what convinced me. I just got a glimpse of our AR glasses' future.



This band provides Electromyography input. If it's not tight enough, it picks up the signals. (Image credit: Future / Lance Ulanoff)

Wearing tomorrow

The first thing I noticed when they handed me the black Orion frames was that they were much lighter than expected. Yes, they are a lot thicker than, say, my glasses, but they're not actually much bigger.

When I put them on first the first time, they don't feel much different than when I'm trying to pick out a new pair of glasses. The only adjustment Meta's team insists on is finding the right nose piece. I think this has a lot to do with making sure the cameras looking at my eyes for eye tracking are in the right place. I recall Ming Hua mentioning to me that the frames use magnesium for its lightness, but also for rigidity because even a hair-width shift in the frame could set the dual displays off-axis and result in double AR vision.

Owing to this being a work in progress, some of my demos are driven and managed by a guy behind a computer. He mostly troubleshoots and reboots from afar; otherwise, I get to drive Orion.

In addition to the smart glasses, I'm fitted with an EMG band. It's positioned high on my wrist and tight enough that it can pick up my finger movements, so I can feel the haptic feedback to let me know that I've successfully transmitted a gesture instruction.



The right nose guard is important. (Image credit: Future / Lance Ulanoff)

The setup and calibration are quite similar to [Apple Vision Pro](#) in that the system asks me to, using only my eyes, look at a series of floating dots that appear in a circle in front of me. I notice right away that it doesn't seem to matter where I look, I can always see Orion's AR display. Later, I learned how to find the edges of the 70-degree FOV, but it takes effort, and in normal wear and activity, the visuals fill my view (without ever blocking them).

The system also trains me on the few gestures I'll use to access and control menus and engage with apps. Mostly, it's a pinch of the index finger and thumb or a pinch with my middle finger and thumb. I had less success with a flicking gesture that was supposed to let me scroll. Throughout my lengthy demo, the EMG band slowly slips down my wrist and eventually hangs like a bracelet. Naturally, this means it can't read any of my gestures. If I keep it high and tight on the wrist and use slightly assertive gestures, it works consistently.

Home base

The home menu also reminds me of Vision Pro, and I reflexively pinch and grab a bar below it to bring the interface closer to me. Throughout the demo, I can't wear my glasses, which means some of the visuals are a little blurry, which is why I pulled them closer. I wondered how much better the experience would've been if I owned or had ever worn a pair of contacts.

I have several core Orion experiences, and each one was impressive in its own way.



Meta supplied me with some b-roll images of the experiences. These images closely match what I saw. (Image credit: Meta)

When Ming Hua calls, and after I look at the call button and pinch to accept, her video call pops up in front of my face, looking much like a floating 42-inch screen. When I get up and move around, the screen stays in place. I can even look at it from the side. It really looks like part of my real world. I can see the home gesture to pull the interface in front of me. Not only is the video of decent quality, but the spatial audio, which sits near my ears, is clear. The six microphones mean I can talk in a normal tone of voice, and Hua can hear me perfectly.



Different room but the collection of ingredients is basically the same and, yes, I saw the labels appear right over the ingredients. (Image credit: Meta)

I stand up and walk over to a collection of ingredients, including a pineapple, cacao, bananas, whey, dates, and coconut flakes. There is a gesture to enable Meta AI, but it never works for me, so I look at the Meta AI icon and tap my fingers to access it that way.

Then I say, "Give me a recipe." Meta AI understands this to mean that it should look at the ingredients in front of it and come up with a recipe. It's something we do all the time without the assistance of AI.

In this instance, though, I watch as Orion identifies all the ingredients, putting little labels on each one. The 3D mapping here is spot on. Within a few moments, I have a usable recipe that I could page through. When I remove an ingredient from the table and ask for another recipe, Meta AI adjusts and gives me a coconut-encrusted banana. Yummy.



"Give me a recipe" (Image credit: Future / Lance Ulanoff)

I open Instagram, which is naturally part of the main menu, and then use a pinch and sweep-up gesture to scroll. The flick gesture doesn't work here, either. Someone messages me in another window, and when a call comes in, I look up at the call answer option, pinch my fingers, and a third window appears with a slightly unsettling-looking VR avatar of the caller. He is wearing a [Quest 3s](#) headset on his end but says that it would be two people wearing Orion glasses talking to each other with their VR avatars in the future.



Multitasking in AR is a thing. (Image credit: Meta)

As we talk, I look around at the three screens. It's hard to assess the image quality at the edges because, well, I'm not looking there. When I do, everything is in focus. Hua told me the system not only tracks your gaze but uses something called pupil replication, which ensures that wherever you're looking, you still see the same image.

Put another way, the image doesn't distort if you look at it incorrectly. I think this is what helps with the casually immersive feel of the Orion experience. I have none-too-fond memories of using Google Glass and always having to glance up and to the right to see the tiny screen. If the headset wasn't on right, things looked weird.

I get very serious when I'm playing AR games. (Image credit: Future / Lance Ulanoff)

Orion can play games. My first experience is a space game where I steer a ship with my gaze and head movements and shoot by tapping my thumb and index finger. The game fills my field of view and is so entertaining I play all five levels and end up with a respectable 6,000+ score.

My only complaint is that I keep doing something to dump myself out of the game and into the Meta AI. I don't know why it's happening, but I quickly return to gameplay by using the home gesture.



This multiplayer game was a lot more fun than it looks. (Image credit: Future / Lance Ulanoff)

After that, we play a multiplayer game. My opponent wears a pair of Orion glasses and stands 8 feet away from me as we play virtual ping pong. I move my virtual paddle with my open palm and bounce the translucent green ball off the walls and into his space. I don't fare as well here, though, and lose both rounds. After we play, they encourage me to step around the play area to see it from the side. My losing playfield is aglow; I reach out to touch...nothing.



Yup, this accurately represents what I saw. (Image credit: Meta)

I've had some [concerns about the viability of Orion](#), especially after I heard that Meta thought they might not be able to source and scale up the manufacturer of enough silicon carbide to support mass distribution. Hua, though, seemed less sure that is the case, telling me they'd had many people in the silicon carbide manufacturing industry reach out after the reveal. The material remains very much on the list of display technology possibilities. That's good news because I have a sense that silicon carbide plays a significant role in the wide and relatively immersive field of view. Interestingly, the base experience I just had turns out to be only one step on the way to even better Orion smart glasses in the future.

The screen resolution of the set I wore is 13ppd, but Meta already has a pair of Orion prototypes running at 26ppd, double the resolution of the first frames. They had the pair in the room and offered to let me try them out.



(Image credit: Future / Lance Ulanoff)

In one of my earlier demos, I'd opened a browser window and watched a clip from the recent Mets versus Phillies MLB division series. It looked pretty good. Now, though, on the 26ppd Orion smart glasses, there was a noticeable difference in image quality. The player's faces and the ballpark were all clearly sharper.

I realized that while everyone is talking about wearing the future, Meta is moving apace, quickly swapping and trying new components and features. Orion smart glasses that are thinner, lighter, more efficient, with a better resolution, and that cost as much (or as little) as a high-end smartphone might arrive much sooner than we think.

When I finally took off the Orion AR smart glasses after almost an hour of wearing them (they finally asked to recharge them), I was struck by how no part of my face ached. I loved my Vision Pro and Quest 3s experiences, but after 15 minutes, you know you're wearing a pound of silicon and plastic on your face. Orion felt like glasses, very, very smart and AR-capable glasses.

What if the future is almost now?

Ray-Ban Meta Smart Glasses are getting even more AI features, like live language translations and Meta AI for live video



(Image credit: Future)

The [Ray-Ban Meta Smart Glasses](#) might be the most popular smart glasses around, and that's likely thanks to their feature set and housing. Meta partnered with Ray-Ban to bring the iconic Wayfarers into the technological age with slightly thicker frames, two cameras, some speaker tech, microphones, and connectivity.

These smart glasses started out as a unique way to capture photos or videos, at times even more 'in the moment', given that you didn't need to take your phone out and launch the camera. In recent months, Meta has infused these smart glasses with [Meta AI](#), enabling you to look at something and simply say, "Hey Meta, what's this?" and let it look, analyze it, and then provide you an answer. It's pretty neat.

Now, though, at Meta Connect 2024, the team working on the Smart Glasses wants to make these even smarter – and if you guessed that they're doing that with AI, you'd be correct.

Language translations and visual reminders

Kicking things off with what might be the most helpful new feature, the Ray-Ban Meta Smart Glasses will get live language translation later this year. Similar to what [Samsung accomplished with the Galaxy Buds Pro 2](#) or [Google with the Pixel Buds Pro 2](#), the Ray-Ban Metas will be able to translate languages near-live, initially between English and Spanish, Italian, and French.

This could prove pretty helpful, and more natural than attempting to do this with earbuds in, as it's baked into the smart glasses, which you might already be wearing daily if you've opted to install prescription lenses.

Furthermore, beyond asking Meta to set a reminder verbally, you can now set up reminders based on things that you see, and therefore Meta is viewing – so it could be as you're getting milk out of the fridge and realize you're almost out, or maybe a package that you left near your front door that you need to be sure you take with you. This feature should be rolling out sooner rather than later.

Similarly, you'll now be able to scan QR codes for events, phone numbers, and even full contact information. If a QR code is visible, you'll be able to ask Meta via the Ray-Ban Meta Smart Glasses to scan it – we imagine the information will then appear in the Android or iOS companion app.

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An ambitious video step

Likely the most ambitious forthcoming feature, also set to arrive later this year, Meta AI for video, meaning that Meta can view what you're looking at in real time, not just an image snapshot, and provide clarity or answer questions. This could be helpful for navigating around a city, cooking a meal, completing a math problem, or helping you finish a Lego set.

This is likely a big step and would raise some privacy concerns, as it's a live view from your glasses that's being processed immediately. You'll also need the Ray-Ban Meta Smart Glasses to be connected to the internet via an iPhone or Android for this to work, as it would need to process the information in real time.

Still, though, it does likely give us an idea of where Meta is headed with the smart glasses category, and it's great to see that Meta is continuing to roll out new features to the smart glasses. And that's the good news here – these updates don't, so far as we know, require new hardware. These are set to arrive as over-the-air updates for folks who already have the Ray-Ban Meta Smart Glasses, or who purchase them.

Another update that's on the way is integration with [Amazon](#) Music, Audible, iHeart, and Spotify integration, which will give you easier access to your favorite songs, artists, podcasts, and books hands-free. You'll also see new Transition lens options arriving from EssilorLuxottica, the eye giant behind brands ranging from Dolce & Gabbana to Oakley. So, if you haven't loved the available looks enough to get a pair yet, or want to freshen yours up, once those hit the scene it'll a good time to consider them again. We'll be going hands-on with these new features, from language translation to Meta AI for video, as soon as we can, so stay tuned to TechRadar.

Startup's displays engineer light to generate immersive experiences without the headsets

“We are adding a new layer of control between the world of computers and what your eyes see,” says Barmak Heshmat, co-founder of Brelyon and a former MIT postdoc.

Zach Winn | MIT News

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“Wherever you want to increase visual efficiency with screens, Brelyon can help,” Barmak Heshmat says.

One of the biggest reasons virtual reality hasn’t taken off is the clunky headsets that users have to wear. But what if you could get the benefits of virtual reality without the headsets, using screens that computationally improve the images they display?

That’s the goal of the startup Brelyon, which is commercializing a new kind of display and content-rendering approach that immerses users in virtual worlds without requiring them to strap goggles onto their heads.

The displays run light through a processing layer before it reaches users’ eyes, recalculating the image to create ultrawide, visual experiences with depth. The company is also working on a new kind of content-rendering architecture to generate more visually efficient imagery. The result is a 120-inch screen that simulates the sensation of looking out a window into a virtual

world, where content pops in and out of existence at different angles and depths, depending on what you feed the display.

“Our current displays use different properties of light, specifically the wavefront of the electric field,” says Brelyon co-founder and CEO Barmak Heshmat, a former postdoc in the Media Lab. “In our newest architecture, the display uses a stack of shader programming empowered with inference microservices to modify and generate content on the fly, amplifying your immersion with the screens.”

Customers are already using Brelyon’s current displays in flight simulators, gaming, defense, and teleoperations, and Heshmat says the company is actively scaling its manufacturing capacity to meet growing demand.

“Wherever you want to increase visual efficiency with screens, Brelyon can help,” Heshmat says. “Optically, these virtual displays allow us to craft a much larger, control-center-like experience without needing added space or wearing headsets, and at the compute level our rerendering architectures allow us to use every bit of that screen in most efficient way.”

Of light and math

Heshmat came to MIT in 2013 as a postdoc in the Media Lab’s Camera Culture group, which is directed by Associate Professor Ramesh Raskar. At the Media Lab, Heshmat worked on computational imaging, which he describes as “combining mathematics with the physics of light to do interesting things.”

With Raskar, Heshmat worked on a [new approach](#) to improving ultrafast cameras that used time as an extra dimension in optical design.

“The system essentially sent light through an array of mirrors to make the photons bounce many times inside the camera,” Heshmat explains. “It allowed us to capture the image at many different times.”

Heshmat worked across campus, ultimately publishing papers with five different professors, and says his experience at MIT helped change the way he perceived himself.

“There were many things that I took from MIT,” Heshmat says. “Beyond the technical expertise, I also got the confidence and belief that I could be a leader. That’s what’s different about MIT compared to other schools: It’s a very vibrant, intellectually-triggering environment where everyone’s very driven and everyone’s creating their own universe, in a sense.”

After graduating, Heshmat worked at a virtual reality company, where he noticed that people liked the idea of virtual reality but didn’t like wearing headsets. The observation led him to explore ways of achieving immersion without strapping a device to his head.

The idea brought him back to his research with Raskar at MIT.

“There’s this relationship between imaging and displays; they’re kind of like a dual of each other,” Heshmat explains. “What you can do with imaging, the inverse of it is doable with displays. Since I’d worked on this imaging system at MIT, what’s called time-folded imaging, I thought to try the inverse of that in the world of displays. That was how Brelyon started.”

Brelyon’s first check came from the MIT-affiliated E14 Fund after Heshmat built a prototype of the first device in his living room.

Brelyon's displays control the angles and focus of light to simulate wide, deep views and give the impression of looking through a window. Brelyon currently sells two displays, Ultra Reality and Ultra Reality Mini. The Ultra Reality display offers a 10-foot-wide display and a depth of around 3 feet. The displays are fully compatible with standard laptops and computers, so users can connect their devices via an HDMI cable and run their favorite simulation or gaming software right away, which Heshmat notes is a key benefit over traditional, headset-based virtual reality displays that require companies to create custom software.

"This is a plug-and-play solution that is much smaller than setting up a projection screen, doesn't require a dedicated room, doesn't require a special environment, doesn't need alignment of projectors or any of that," Heshmat says.

Processing light

Heshmat says Brelyon has sold displays to some of the largest simulation training companies in the world.

"In simulation training, you usually care about large visualizations and large peripheral fields of view, or situational awareness," Heshmat says. "That allows you to look around in, say, the cockpit of the airplane. Brelyon allows you to do that in the size of a single desktop monitor."

Brelyon has been focused on selling its displays to other businesses to date, but Heshmat hopes to eventually sell to individuals and believes the

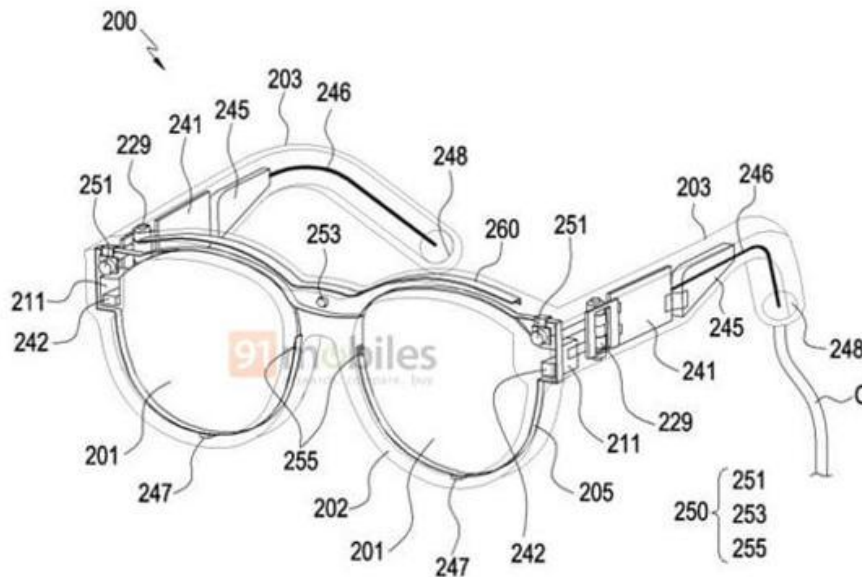
company's displays hold huge potential for anyone who wants to improve the experience of looking at a monitor.

“Imagine you're sitting in the backseat of a car, and instead of looking at a 12-inch tablet, you have this 14-inch or 12-inch aperture, but this aperture is looking into a much larger image, so you have a window to an IMAX theater,” Heshmat says.

Ultimately, Heshmat believes Brelyon is opening up a new platform to change the way we perceive the digital world.

“We are adding a new layer of control between the world of computers and what your eyes see,” Heshmat explains. “We have this new proton-processing layer on top of displays, and we think we're bridging the gap between the experience that you see and the world of computers. We're trying to connect that programming all the way to the end processing of photons. There are some exciting opportunities that come from that. The displays of future won't just let the light out just like an array of lamps. They'll run light through these photon processors and allow you to do much more with light.”

Samsung patent hints at plans for smart glasses



Samsung smart glasses patent

According to a recent rumor, [Samsung](#) is expected to introduce a bunch of new products in January 2025. The Galaxy S25 series is a pretty obvious candidate, but the rumor also suggests that the Galaxy Ring 2 could be part of the announcement, [along with a pair of smart glasses](#). A recently discovered [patent](#) reveals the potential design of the Samsung smart glasses, along with interesting features such as speakers protected by electromagnetic interference.

A familiar look

This patent was discovered by the folks over at 91mobiles. It shows what appears to be a pair of regular-looking glasses, except that it comes with a [bunch of tech shoved inside it](#). If this looks familiar, it is because it's hard not to draw comparisons to another pair of smart glasses on the market.

Meta introduced its own smart glasses back in 2023. The company created it in [collaboration with Ray-Ban](#). While the concept of smart glasses isn't new, Meta's efforts made these hi-tech glasses look more casual and less nerdy.

Samsung's take on smart glasses doesn't appear to be too different from what's available in the market. It houses a bunch of sensors that can detect touch and pressure so users can interact with it without taking it off. It also comes with a built-in set of speakers. The speakers are the more interesting bit of this patent.

According to the patent, Samsung has come up with a way of protecting the speakers of the smart glasses from electromagnetic interference. This occurs when a power line and speakers are close to each other. The magnetic field generated by the powerline creates noise when that happens.

Samsung's patent suggests that the company has figured out a way to overcome that issue. Reducing unwanted noise is important for a pair of smart glasses, especially for listening to music and making calls, even though it might seem trivial.

Not Samsung's first rodeo

While this patent hints at a potentially new form factor, it would not be Samsung's first attempt at a headset. Some of you might recall that the company dipped its toes in the scene with the Samsung Gear VR headset.

More recently, the company teased a [new headset codenamed "Moohan"](#) (which means "infinity", in Korean). For those unfamiliar, Moohan is a mixed-reality headset that runs on Google's Android XR platform. Some believe that this could be Samsung's answer to Apple's (very expensive) Vision Pro headset.

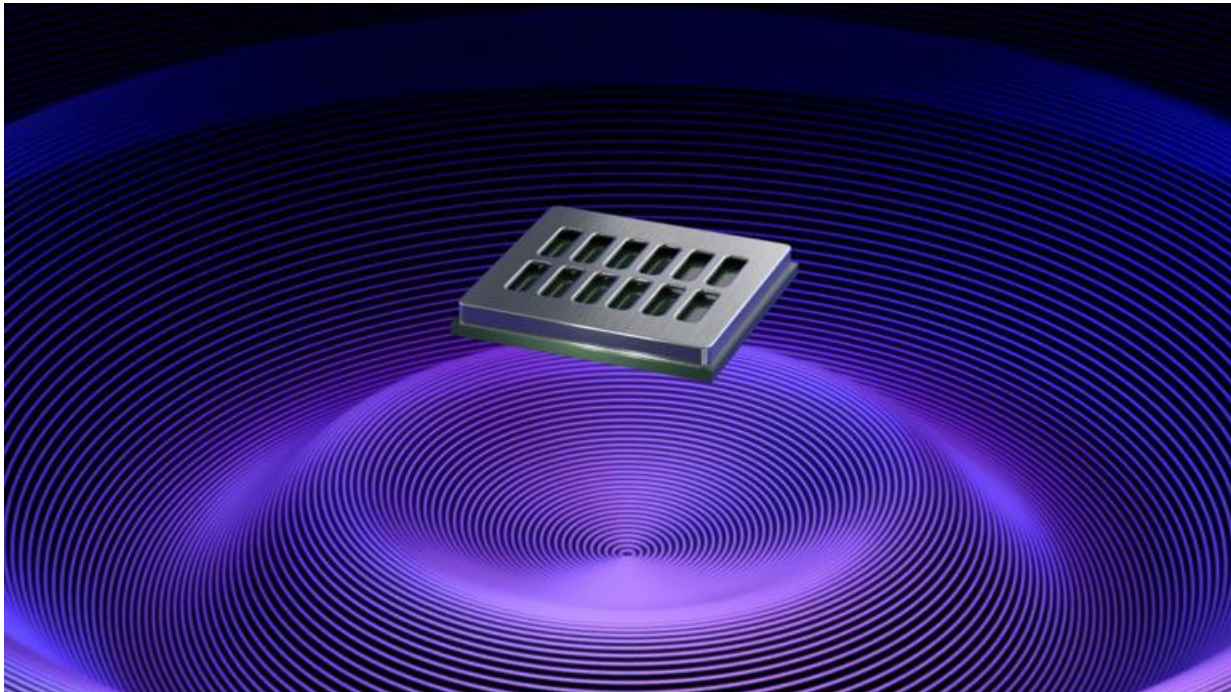
It's interesting to see Samsung explore a variety of headset designs. Both the Gear VR and Moohan seem designed for indoor use, such as at home or the office. In contrast, this patent could allow users to wear the device outdoors. Google attempted something similar with Google Glass back in the day, but the public didn't react very well to it.

Reports claimed that establishments banned the headset over concerns that users were being recorded without permission.

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Provided by RIKEN

Tiny Speaker Promises Big Sound From Smartwatches and Smart Glasses



Tiny Speaker Promises Big Sound From Smartwatches and Smart Glasses© xMEMS Labs

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The latest micro fidelity driver from xMEMS Labs is not meant to go inside typical audio products like [earphones](#) or [headphones](#). Instead, the full-range Sycamore speaker aims to bring audio to a wide variety of wearable devices that broadcast sound near your ear rather than inside it.

The jump in quality should make such devices far better at delivering enjoyable audio experiences beginning in late 2025.

The Sycamore micro-electromechanical systems (MEMS) driver measures 8.41 by 9 by 1.13mm (HWD) and weighs 150 milligrams. It's one-seventh the size of a

typical dynamic driver and one-third the thickness, xMEMS Labs says. This, in turn, reduces the area needed behind the driver to produce good sound.

It's this incredibly small size that allows it to fit inside the confines of spaces like [smartwatches](#), [smart glasses](#), and other wearables. The "membrane" that moves is made from silicon rather than a more fluid material like paper or rubber, and it is much more rugged, earning an [IP58 rating](#) for protection from sweat or rain—a key feature for devices meant to be worn.

(Credit: xMEMS Labs)

Despite its small size, xMEMS' Sycamore doesn't skimp on performance; the driver covers a full range of audio, including sub-bass, mid-bass, and high frequencies, xMEMS Labs claims. It can do so at surprisingly high volumes, which allows it to push sound across the air between the device and the wearer's ear.

Target devices include open wireless earbuds, XR headsets, and more. "The applications for Sycamore...are limited only by designers' imagination," xMEMS Labs says.

Sampling for the Sycamore begins in early 2025, with full production slated to start in October.

Samsung is eyeing smart glasses that could shake up the market

Samsung is ready to take a stab at another wearable segment, less than a year after introducing [its first smart ring](#). A Shenzhen-based research company, Wellsen XR, shared in an investor note about Samsung's plans to launch smart glasses that could arrive late next year, or early in 2026.

"Samsung Electronics' plan to release AI smart glasses was confirmed earlier this month, and its first production volume is 500,000 units in the third quarter of 2025," says the note, which was reported by [Maeil Business Newspaper](#).

Interestingly, Samsung is not chasing something too ambitious, or innovative in terms of the tech stack. Instead, the company is taking the safe route and eyeing

the same formula as the runaway success that was the [Meta Ray-Ban Stories smart glasses](#), down to the core internal hardware.

The Samsung smart glasses will reportedly come armed with Qualcomm's AR1 Gen 1 wearable silicon and an NXP semiconductor as a secondary processing unit. Multimedia capture duties will be handled by a 12-megapixel camera with a Sony CMOS sensor at its heart.



Ray-Ban Meta (top) and Solos AirGo 3 smart glasses. Andy Boxall / Digital Trends

The smart glasses are said to draw power from a 155 mAh battery and tip the scales at 50 grams. As far as capabilities go, the front camera sensor will come in handy for code scanning, gesture recognition, and more, aside from the usual photo and video capture duties.

Despite the fundamental similarities with the Meta Ray-Ban smart glasses, the software stack would be different. Instead of the [Meta AI](#) bundle that is now

available on the Stories smart glasses with multi-modal capabilities, Samsung will look at Google.

Specifically, the Korean electronics giant will put [Google's Gemini AI](#) at the heart of its smart glasses. That partnership isn't surprising, since Samsung's Galaxy smartphones were also among the first to introduce native Gemini-powered features as part of its [Galaxy AI bundle](#).

This would be quite a substantial edge, as Gemini already has been integrated deeply within Google's products, especially the Workspace suite that is used by hundreds of millions of users. At the moment, it can pull off a lot of meaningful tricks in products like Gmail, Docs, and more, while also letting users access custom AI agents.

Moreover, the Android collaboration would go a long way in seamlessly connecting the smart glasses with phones and other ecosystem products. However, Samsung won't be the lone player in the smart glasses game. Chinese arch-rival, Xiaomi, is reportedly developing its own version that would try to emulate the success of Meta's offering.

These new smart glasses are set to bring spatial displays to the mainstream

I'm learning more about augmented reality (AR) [smart glasses](#) everyday, and I think they're probably the most underrated tech on the market right now. From Meta's ambition with futuristic frames to the immensely premium VITURE Pro specs for gaming, can it get any better?

Apparently so, as XREAL has just [unveiled two new products](#) including the world's first Cinematic AR glasses with the XREAL One and XREAL One Pro Series. These wearable displays are the first of their kind, and set to deliver next-generation three degrees-of-freedom (3DoF) spatial computing, while representing "the most advanced consumer AR glasses on the market" according to XREAL's co-founder and CEO, Chi Xu.

Our sister site, [Tom's Guide](#), has already had the opportunity to get hands-on and try out these new XREAL One smart glasses with devices including an iPhone 16, a Steam Deck, and a MacBook. The verdict? They're pretty impressive.

These AR glasses are available for [pre-order right now from XREAL's website](#) starting at \$499 / £449 for the standard specs, and \$599 / £549 for the Pro option, which has a wider 57-degree field of view and brighter virtual screen.



((Image credit: XREAL))

XREAL has also developed its first silicon co-processing chip, the X1, which is built directly into the new specs and boasts independent spatial computing. Essentially, these AR glasses have the power to create a spatial display from nearly any compute device (though it must have the option for video-out over USB-C), introducing a cinematic virtual screen that is, for the first time, spatially controlled by the glasses themselves.

Explained in more simplified human words, what makes this launch so special is not only the unique X1 chip, but the fact that wearers can experience a stable virtual screen to display unlimited apps, games, websites, and productivity tools by anchoring this screen anywhere they choose in three-dimensional space, with the simple press of a button on the glasses.

This eliminates the need for the expensive [Xreal Beam Pro device](#) which is used for creating spatial displays and was required for previous XREAL specs like the [Air models](#).



((Image credit: XREAL))

Other notable new features with the XREAL One and One Pro smart glasses include adjustable interpupillary distance (IPD) ranges, which is apparently a pretty big deal, plus multiple TÜV Rheinland eye health certifications meaning they're safe to replace physical monitors.

The glasses also have high-quality Sound by Bose fitted, plus there's an optional XREAL Eye detachable AI camera available for recording 12MP high-definition photos and video capture from the wearers' point of view. The front frame of the specs is interchangeable for a customised look, and the 4-microphone layout enables audio recording for meeting summaries, transcriptions and translations.

As both a photographer and gamer, these specs sound like an absolute dream. If you're hoping to preorder, keep in mind that the XREAL One Pro model won't be released until early 2025, but the regular XREAL One is expected to ship mid-December, which is perfect timing for Christmas.

Apple ramps up smart glasses project as it looks past Vision Pro



Apple ramps up smart glasses project as it looks past Vision Pro© Mac World

With [Vision Pro](#) failing to set the market alight-and being officially labeled as “[not a mass-market product](#)”—the big question is how Apple plans to build a commercially viable product in the VR/AR space, if that’s even possible. Ultimately, the most appealing option for a mainstream audience would probably be a slimline pair of glasses with smart tech built in, but the state of technology and Apple’s own developments mean this isn’t likely to appear for some years yet.

There are signs of progress, however. In the [latest edition](#) of his Power On newsletter, knowledgeable Bloomberg reporter Mark Gurman claims that Apple recently commenced focus-group research to explore its options in the smart glasses market, in a sign of real intent. (This follows what was described as a [technology investigation](#) earlier this year.) Such groups previously preceded the launch of the AirPods and HomePod, and Vision Pro itself.

Rather than seek opinion from the public, Apple restricts focus group discussions to its own employees. This might seem less illuminating, but enables the company to keep a lid on future developments and prevent them from reaching

the media... in theory. It isn't clear how Gurman obtained his information on the proceedings in this case.

The groups have been discussing their feelings about currently available smart glasses, which include products from Snap and Meta. Apple is behind in this market, as it is so often—one of Cook's mantras is "Not first, but best"—but those companies haven't cracked the formula yet. Indeed, as Gurman observes, their products are far more limited in terms of AR functionality than what Apple is planning.

So the question becomes this: should Apple pursue its own more ambitious plan, and attempt to reproduce Vision Pro's capabilities in a far smaller chassis? Or should it simply create "a version of its AirPods in glasses form," as Gurman puts it? That's the dilemma which the focus groups are intended to solve.

Whatever conclusion is reached, we won't officially know about it for some time. Gurman says five years is the minimum before Apple is able to create a "true AR" set of smart glasses that meets its expectations. But Apple isn't alone in this, with Meta and Snap experiencing similar issues with their own prototypes. Wherever the market is going, it isn't going there yet.

I tried this brain sensing wristband at CES 2025 — the mouse could be dead

Imagine if you took one of the coolest aspects of the [Apple Vision Pro](#) — the Minority Report-style gestures — and paid \$199 for the fun instead of \$3,500. That's the idea behind the Mudra Link from Wearable Devices, which reads your brain signals and essentially turns your hand into a remote control.

The Mudra Link is dubbed as the first neural wristband that works with Android, macOS and Windows devices, and I got a chance to try it out at [CES 2025](#) ahead of its release at the end of January.

How does the Mudra Link work? Proprietary Surface Nerve Conductance sensors pick up electromyography signals from subtle finger movements, translating them into commands. There's also an accelerometer and gyroscope on board.

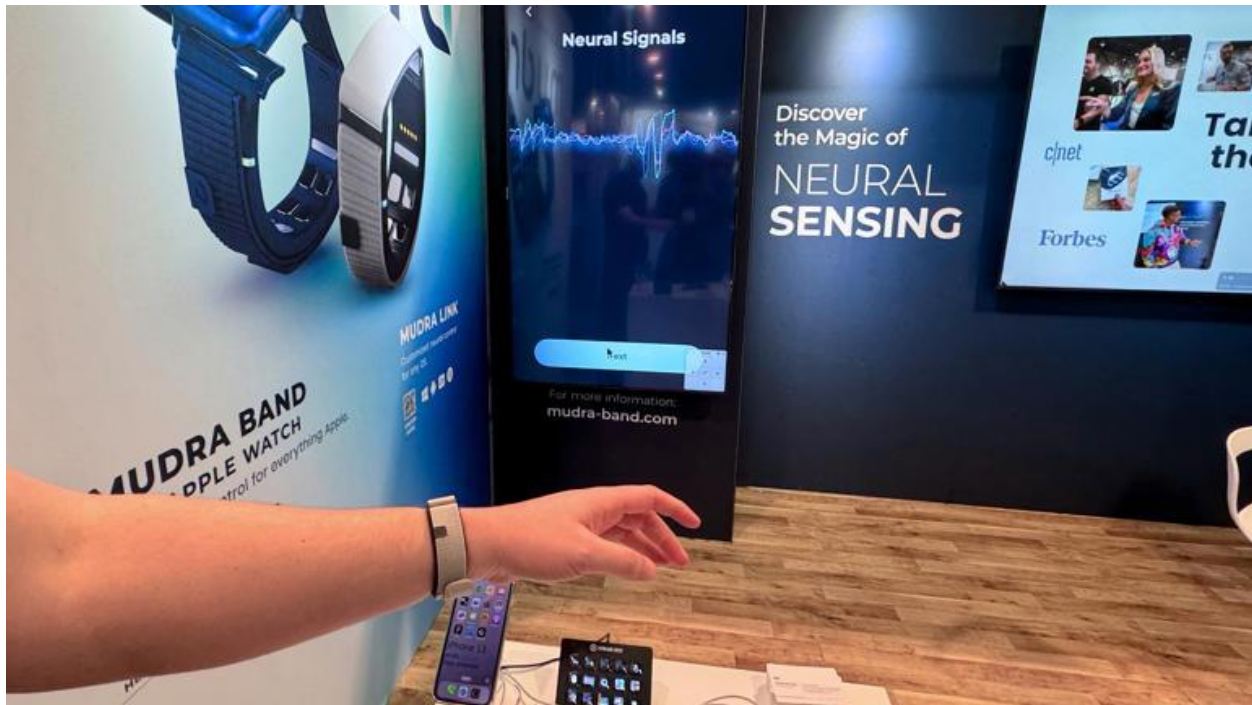
I did a bunch of demos with the Mudra Link, and most of them worked smoothly. There was a large display in front of me as a Wearable Devices rep cycled

through a range of apps on a Mac. In the first demo I could pull a face like a rubber band in multiple directions by simply putting my hand in the air and doing a pinch gesture as I moved my arm subtly.



From there, I played a virtual violin (which was a bit finicky to get right). But my favorite demo was a round of Fruit Ninja. I was able to slice through multiple fruits at once without a problem.

So it's pretty cool to turn your hand into a mouse, but what's the point? The next wave of wearable devices — [smart glasses](#) — will need a better method of control. And that's exactly what Meta is doing with its [Meta Orion](#) concept. The company is making its own electromyography (EMG) wristband, which senses the electrical signals of your muscle movements, beaming gestures to the glasses.



The idea behind wristbands like this is that you can keep your hand at your side, making subtle gestures to control the glasses instead of having to constantly touch the glasses themselves. So it's no surprise that Wearable Devices is partnering with TCL so that its wristband will function as a remote for its smart glasses.

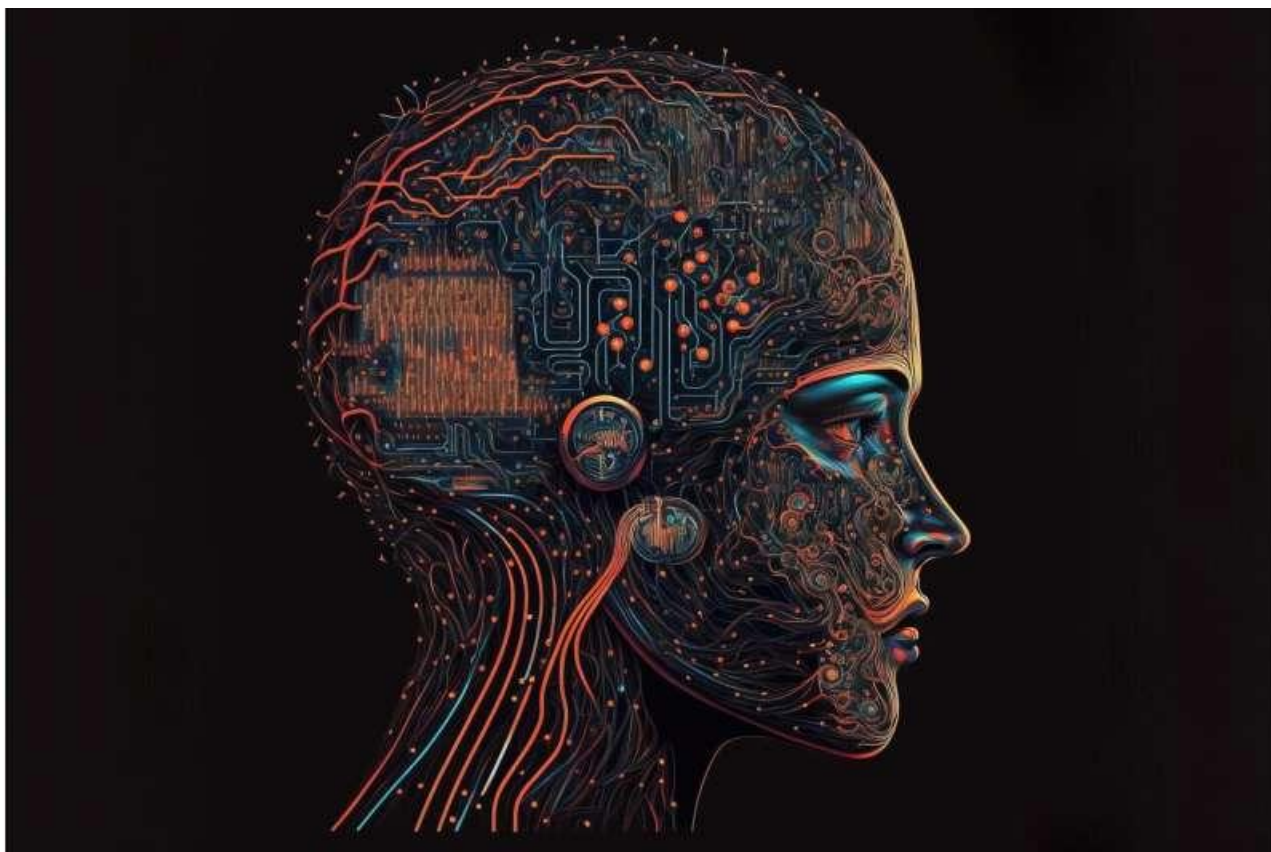
Still, \$199 is not cheap for an accessory to smart glasses, so it will be key for TCL and other smart glasses partners to offer a bundle at a cheaper price.

Journal information: [Nature Mental Health](#)

MARCH 4, 2025

AI could supercharge human collective intelligence in everything from disaster relief to medical research

by Hao Cui and Taha Yasseri, [The Conversation](#)



Credit: Pixabay/CC0 Public Domain

Imagine a large city recovering from a devastating hurricane. Roads are flooded, the power is down, and local authorities are overwhelmed. Emergency responders are doing their best, but the chaos is massive.

[AI-controlled drones](#) survey the damage from above, while [intelligent systems](#) process [satellite images](#) and data from sensors on the ground and air to identify which neighborhoods are most vulnerable.

Meanwhile, [AI-equipped robots are deployed](#) to deliver food, water and [medical supplies](#) into areas that human responders can't reach. Emergency teams, guided and coordinated by AI and the insights it produces, are able to prioritize their efforts, sending rescue squads where they're needed most.

This is no longer the realm of science fiction. In a [recent paper published in the journal *Patterns*](#), we argue that it's an emerging and inevitable reality.

Collective intelligence is the shared intelligence of a group or groups of people working together. [Different groups of people](#) with diverse skills, such as firefighters and drone operators, for instance, work together to generate better ideas and solutions. AI can enhance this human [collective intelligence](#), and transform how we approach large-scale crises. It's a form of what's called hybrid collective intelligence.

Instead of simply relying on human intuition or traditional tools, experts can use AI to process vast amounts of data, identify patterns and make predictions. By enhancing human decision-making, AI systems offer faster and more accurate insights—whether in [medical research](#), disaster response, or [environmental protection](#).

AI can do this, by for example, processing large datasets and uncovering insights that would take much longer for humans to identify. AI can also get involved in physical tasks. In manufacturing, [AI-powered robots](#) can automate assembly lines, helping improve efficiency and reduce downtime.

Equally crucial is [information exchange](#), where AI enhances the flow of information, helping human teams coordinate more effectively and make data-driven decisions faster. Finally, AI can act as [social catalysts](#) to facilitate more effective collaboration within human teams or even help build hybrid teams of humans and machines working alongside one another.

AI-driven improvements to all these different aspects can make the entire, interconnected system more adaptive and intelligent.

We're already seeing the impact of AI-enhanced collective intelligence. In [disaster response](#), AI systems already analyze satellite imagery and sensor data, generating risk assessments that help human responders to prioritize rescue efforts and allocate resources efficiently.

In health care, AI already helps doctors make faster and more accurate diagnoses by analyzing large patient datasets. Medical teams refine AI recommendations with their expertise, ensuring the best possible treatment plans. Robots equipped with AI can [assist surgeons](#) in performing delicate tasks, allowing for greater precision.

In media, AI curates and verifies news from global sources, assisting journalists in fact-checking and uncovering misinformation. This collaboration can strengthen the accuracy and reliability of information in an era of digital media. However, AI can also drive the dissemination of fake news and disinformation. These include deep fake videos of, for example, politicians, which have the potential to affect elections.

In the public sector, AI-powered policy simulations help governments anticipate the impacts of regulations. Crowd-sourced citizen feedback, combined with AI analysis, can give a sense of the public mood.

Environmental protection is another area benefiting from AI-enhanced collective intelligence. AI systems can analyze data patterns on pollution, deforestation, and wildlife movements, guiding human efforts to address environmental challenges more effectively.

As we can see, AI-enhanced collective intelligence is already here, transforming how we approach some of the world's toughest problems. The key is to recognize that AI is a collaborator, not a competitor. When we combine human creativity, intuition, and ethics with AI's data processing power, the possibilities for what we can achieve are substantial.

As we look towards the future, AI's potential becomes even more exciting. From addressing global health challenges like pandemic prevention to [developing solutions](#) to the climate crisis, AI will be at the forefront of tackling issues once thought insurmountable. But this potential comes with responsibility.

It's up to us to guide how this collaboration evolves, ensuring that AI is used responsibly and ethically in ways that enhance human capabilities rather than diminish them. We must engage in shaping policies and frameworks that promote transparency, fairness and inclusivity through [a new sociology of humans and machines](#).

Collaboration across industries, governments, and communities will be crucial to unlocking AI's full potential. Together, we can build a future where AI not only augments human intelligence but also helps solve the challenges of tomorrow, creating a more equitable, sustainable, and prosperous world for all.

More information: Hao Cui et al, AI-enhanced collective intelligence, *Patterns* (2024). DOI: [10.1016/j.patter.2024.101074](https://doi.org/10.1016/j.patter.2024.101074)

Journal information: [Patterns](#)
Provided by [The Conversation](#)

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MARCH 4, 2025

Mind-controlled prosthetic arms could benefit from neural encoding research

by Leila Okahata, [University of Oregon](#)



Credit: Michelle Marneweck Human Physiology research

Picking up a cup of coffee, flipping a light switch or grabbing a door handle don't require much apparent thought. But behind the curtain, the brain performs feats to coordinate these seemingly simple hand-to-target motions.

Using functional MRI brain imaging, University of Oregon researchers have unraveled some of the [neural circuitry](#) behind these kinds of actions.

Their insights, [described in a paper](#) published in the journal *eNeuro*, can potentially be used to improve the design of brain-computer interface technologies, including brain-controlled [prosthetic arms](#) that aim to restore movement in people who have lost it.

"While there are already robotic arms or exoskeletons that take signals from [brain activity](#) to mimic the motions of a human arm, they haven't quite met the gracefulness of how our arms actually move," said study lead author Alejandra Harris Caceres, an undergraduate senior majoring in neuroscience and [human physiology](#).

"We're hoping to figure out how and when the brain integrates different kinds of sensory information to help make this technology better for patients."

For the brain to plan even a simple, goal-directed action, like reaching out and grabbing a cup of coffee on a table, it needs to make lots of calculations, including the direction and distance of one's hand to the object. To get even more accurate, the brain uses multiple "reference frames" to make calculations from multiple perspectives—for example, from the hand to the cup versus from the eyes to the cup.

In this study, the researchers wanted to understand how the brain combines those different bits of sensory information to plan and generate a goal-directed action.

While this has been investigated extensively in [nonhuman primates](#) such as monkeys, this is the first evidence in humans of neural representations of direction and distance in multiple reference frames during reach planning, said study senior author Michelle Marneweck, an assistant professor in human physiology at the UO's College of Arts and Sciences.

"Just like how we use reference frames for navigation, like moving through the woods or driving through fog, we also use it to make the most elementary, everyday actions, such as reaching for a bottle of water," Marneweck said.

"Having a system rich in redundancies allows us to flexibly switch between reference frames, using the most reliable one in the moment, and be good at goal-directed actions, no matter what the environment throws at us."

How the brain plans a reach

As part of the study, [human subjects](#) laid flat on a screening table inside an MRI machine. Over their lap was a table with an electronic task board of lights and buttons. Because the participants couldn't sit up during the scan, they wore a helmet-like setup with a mirror attached, allowing them to see and interact with the button-pushing tablet.

The fMRI scan measured [blood flow](#) in the brain to highlight active areas when subjects were prompted to reach for a button and when they pressed it.

Analyzing the neural activity patterns across key sensory and motor areas, the results showed the human brain prepares for reaching actions by encoding the target direction first, then the distance. The researchers also found that direction and distance are coordinated in multiple, rather than single, reference frames.

That can help improve the design of tools like bionic arms that use brain signals, Harris Caceres said. Neural interface technology that considers the serial processing of direction into distance and incorporates multiple reference frames—and the multitude of regions encoding this information—could add an extra layer of sophistication to the modeling, she suggested.

"It is a really exciting time for brain-computer interface technology, which has advanced rapidly in recent years with the integration of sensory information," Marneweck said.

"One of the overarching goals of our lab is to further optimize these technologies, by figuring out when, where and how the brain integrates sensory information for skilled actions. This experiment was a step in that direction."

Impacts across the lifespan: From peak performance to aging

The researchers are now performing the same set of experiments but on a skilled performance model: human athletes. Marneweck and her team recruited athletes to check if the neural mechanisms of peak physical performers differ from nonathletes. Their preliminary results suggest athletes require less brain power to complete reaching tasks.

In the future, the researchers also plan to investigate how aging and neurodegenerative disorders, like Alzheimer's disease and Parkinson's disease, affect sensory and motor control.

"Topographical disorientation, which colloquially is known as 'getting lost,' is one of the earliest markers of Alzheimer's disease," Marneweck said. "We and others in the scientific community are interested in determining a causal link between cognitive features of Alzheimer's and sensory and motor changes that show up as early as 10 to 12 years before the hallmark clinical signs."

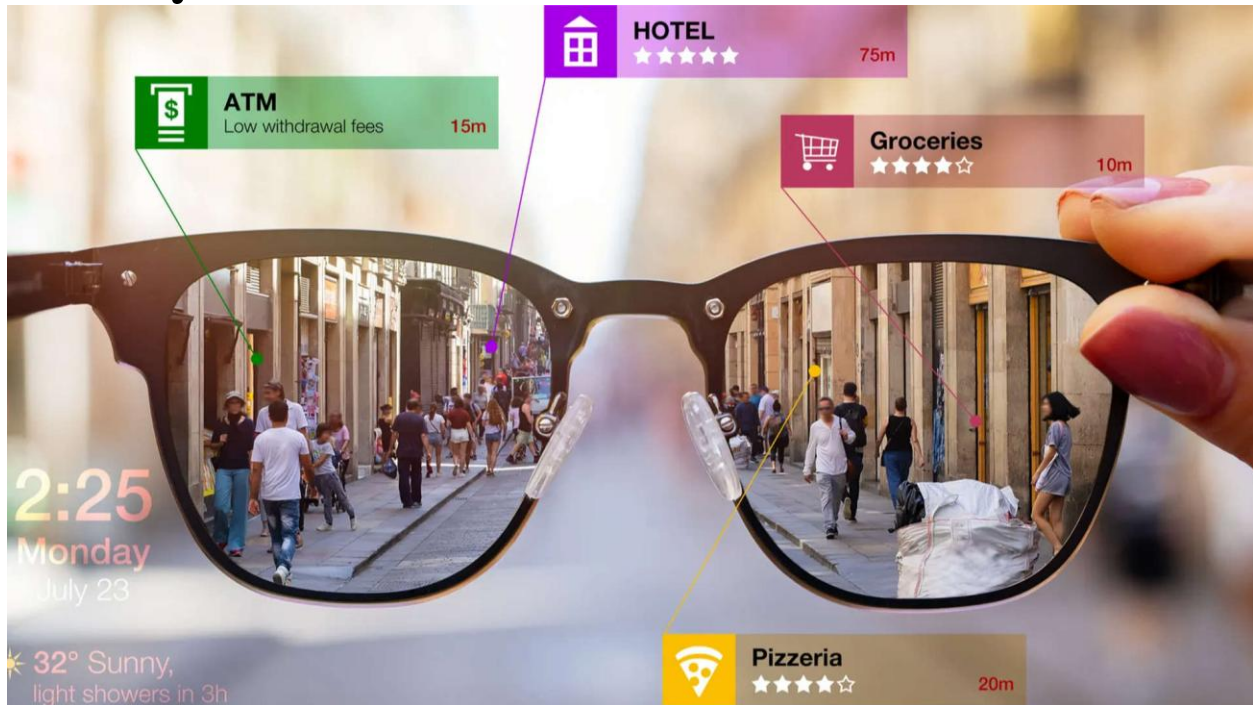
By studying across the spectrum of human health, Marneweck's lab is shedding light on the complex sensory and motor mechanisms that go on in the background unnoticed.

"Reaching and interacting with objects may seem elementary due to the seamless ease with which we perform these actions," Marneweck said, "but they are among the most complex and least understood feats of human behavior."

More information: Alejandra Harris Caceres et al, Neural Encoding of Direction and Distance across Reference Frames in Visually Guided Reaching, *eNeuro* (2024). DOI: [10.1523/ENEURO.0405-24.2024](https://doi.org/10.1523/ENEURO.0405-24.2024)

Journal information: *eNeuro*
Provided by [University of Oregon](#)

Apple's Ambitious Leap into Augmented Reality



The Future of Augmented Reality

Apple might soon wow us with AR glasses featuring cutting-edge MicroLED technology. Imagine sleek glasses that seamlessly blend the digital and real worlds, offering an unmatched visual experience.

Rumors point to a launch as early as 2026, with competitors like Meta gaining ground, so it's no surprise Apple is working hard to push this project forward. These glasses could mark the start of a new era for wearable technology, one that feels both futuristic and practical.

What Makes MicroLED So Special?

MicroLED combines the best features of OLED and LCD screens, offering incredible brightness, deep blacks, and energy efficiency. It's a display technology that promises stunning visuals unlike anything we've seen.

The challenge? It's extremely difficult and expensive to manufacture, especially for small devices.

If Apple can overcome these hurdles, the AR glasses could outshine competitors in both performance and design.

A Long Journey to Innovation

Apple has been exploring MicroLED tech for years, with whispers of it appearing in devices like the Apple Watch Ultra. This technology could deliver groundbreaking improvements in display quality and energy efficiency.

The road hasn't been easy. High production costs and technical difficulties have slowed progress, but Apple seems determined to bring this innovation to life.

Why 2026 Could Be the Year

Leaked reports suggest Apple's AR glasses may enter production in 2026, signaling a shift in focus toward AR devices. While they might not launch that year, production is a big step forward.

This timeline suggests Apple could be prioritizing these glasses over other rumored projects, like a foldable iPhone. It's clear they're committed to making AR a key part of their future.

Competition Is Heating Up

Meta's Orion AR glasses have sparked a surge of interest in augmented reality. Their success with Ray-Ban Meta smart glasses has shown the potential for wearable tech in everyday life.

Apple seems to be watching closely. To stay ahead, they'll need to deliver a product that's not only innovative but also accessible to a wide audience.

How the Vision Pro Fits In

Apple's Vision Pro headset offers powerful mixed-reality features but comes with a bulky design and a hefty price tag. AR glasses could be the streamlined, affordable alternative consumers are hoping for.

The Vision Pro's technology might pave the way for more compact, user-friendly AR glasses. Apple seems poised to shrink this innovation into a wearable form.

Could Apple Solve the Power Problem?

AR glasses require powerful chips that won't quickly drain their battery. While Apple's current chips, like the M2, deliver impressive performance, they're not ideal for compact, wearable devices.

By 2026, Apple could design a more efficient processor specifically for ultra-thin AR glasses. This innovation would ensure a perfect balance between high performance and energy efficiency, making the glasses practical and user-friendly for everyday use.



How AR Glasses Could Enhance Daily Tasks AR glasses have the potential to simplify everyday activities in ways we've only imagined. From displaying step-by-step navigation while walking to providing hands-free updates on appointments and reminders, the possibilities are endless.

They could also change the way we shop, offering virtual previews of products or detailed reviews on the go. By blending digital convenience with real-world interactions, AR glasses could become an indispensable tool for modern life.

Apple's Secret Weapon

Apple's ecosystem is a major strength, and AR glasses could fit seamlessly into it. Imagine them syncing effortlessly with your iPhone, Apple Watch, and MacBook, enhancing daily tasks and creating a unified digital experience.

This deep integration would make the glasses incredibly intuitive and practical, appealing to anyone already invested in Apple's devices. It could turn the AR glasses into a must-have addition for loyal Apple users.

Challenges Ahead The possibilities for AR glasses are limitless. They could transform real-time navigation, enhance video calls, and change how we interact with technology in everyday life.

Gamers, artists, and tech enthusiasts could find new ways to explore creativity and play, while others might use them for more practical tasks. These glasses promise an exciting fusion of the digital and physical worlds, offering something for everyone.

AR Glasses and Everyday Life

The possibilities for AR glasses are limitless. They could transform real-time navigation, enhance video calls, and change how we interact with technology in everyday life.

Gamers, artists, and tech enthusiasts could find new ways to explore creativity and play, while others might use them for more practical tasks. These glasses promise an exciting fusion of the digital and physical worlds, offering something for everyone.

Will They Be Affordable? Apple's Vision Pro, priced at [\\$3,500](#), is beyond the budget of most consumers. AR glasses could bridge the gap, offering advanced features at a more affordable price point.

By introducing a cost-effective option, Apple could appeal to a much broader audience, making AR technology accessible to more people. This move would not only expand Apple's reach but also help establish AR glasses as a mainstream innovation.

How Meta's Orion Glasses Could Influence Apple

Meta's progress in AR could motivate Apple to accelerate its own innovation. Competition often drives companies to push boundaries, and Meta's success may inspire Apple to aim higher.

To truly stand out, Apple will need to offer something revolutionary. AR glasses featuring advanced MicroLED technology could be the unique solution that sets them apart and captures consumer attention in a competitive market.

Looking Beyond 2026

Even if production starts in 2026, a launch might not happen until 2027 or later. This extra time allows Apple to refine its design and create an unforgettable product.

As we wait, advancements like the Vision Pro hint at what Apple might accomplish with AR glasses, offering a glimpse of what's to come.

The Future Is Closer Than You Think

AR glasses have felt like a far-off dream for years, but Apple could bring them to life sooner than we think. The combination of MicroLED and Apple's innovation could redefine wearable tech.

With competition growing and excitement building, one thing is clear: augmented reality glasses are shaping up to be the next big leap in technology.

Apple deepens dive into smart glasses with internal study

Apple has launched a comprehensive study of smart glasses, marking an initial move towards exploring the booming wearable technology category. The project, which insiders have dubbed "Atlas," started last week and aims to assess the user experience and functionality of current smart glasses on the market.

The initiative involves Apple's Product Systems Quality team, which works within Apple's hardware engineering division.

Apple studies the current market for smart glasses

As part of this project, Apple is gathering feedback from its employees on smart glasses available today. This feedback is essential as Apple studies current user expectations, preferences, and challenges associated with existing models. According to sources close to the study, Apple also plans additional focus groups in the coming weeks. These sessions aim to gather in-depth insights, providing data that could influence the design of any future Apple smart glasses, [Bloomberg reported](#).

An [internal email from the hardware team](#) emphasized Apple's commitment to creating products that consumers will value and enjoy. "Testing and developing products that all can come to love is very important to what we do at Apple," stated the email, which invited employees at Apple's Cupertino headquarters to join Apple's study on smart glasses research.

Meta., a notable player in the smart glasses sector, has already entered the space with a partnership with Ray-Ban, launching glasses that allow users to take photos, make calls, and interact with an AI assistant. In contrast, [Apple's study highlights](#) a more cautious approach, suggesting Apple is looking to craft a unique path that could set its product apart from Meta's offerings. The ongoing Apple study smart glasses project indicates the company may prioritize seamless integration with its ecosystem, similar to the appeal of its AirPods.

Apple's vision for lightweight wearables

Apple's recent research initiatives, including an app for tracking blood sugar levels, indicate its interest in health and lifestyle enhancements through wearable technology. However, while the Vision Pro headset introduced earlier this year offers advanced features, its bulk and high price limit mainstream appeal. Apple's current study may be a step toward developing lighter, more accessible smart glasses that could serve as an everyday device.

For now, it remains uncertain when or if [Apple](#) will officially introduce a [smart glasses product](#). However, with fellow [technology](#)-driven competitors like Meta and Snap moving forward, Apple's continued exploration could pave the way for a competitive entry into the smart glasses market in the years to come.

Apple is reportedly asking Sony for help with its Vision Pro problem



The Apple Vision Pro seems to be a disappointment for CEO Tim Cook. Will a Sony handset deal help change that?
ANGELA WEISS/AFP via Getty Images© ANGELA WEISS/AFP via Getty Images

- Apple's Vision Pro headsets went on sale in February. They have not taken the world by storm.
- Apple is reportedly looking to Sony for help via a plan to bring Sony's gaming controllers to Apple's devices.
- But unlike other headsets, the Vision Pro isn't really built for gaming. So, this seems unlikely to solve Apple's long-term Vision Pro problem.

Maybe, one day, the Apple Vision Pro — or a future version of the Apple Vision Pro — will end up being a huge hit for [Apple](#).

Right now, it seems anything but.

As we've noted [multiple times](#), there are several indicators that Apple's "mixed reality" goggles aren't a breakthrough product. Most important: [There doesn't seem to be a killer app that creates a use case for the Vision Pro](#), which starts at \$3,500.

Apple has always positioned the device, which launched in February, as the first step for "[spatial computing](#)" — not the end state. Still, it's hard to imagine it didn't have higher hopes for the initial product.

Now [Bloomberg's Mark Gurman reports](#) that both sales and usage are underwhelming. He says Apple has sold fewer than 500,000 units of the device, and that "a large number of Vision Pro buyers (those who haven't returned it) aren't using the product as much as Apple anticipated, according to internal data gathered by the company."

What could change all of that? Perhaps a [cheaper, lighter version](#), which could hit the market next year. But Apple is also reportedly looking outside the company for help, by integrating third-party controllers for the device.

Gurman reports that Apple is working with Sony on a deal that will let Vision Pro owners use a version of the PlayStation VR2's hand controllers with the device. That's a notable change since, right now, the Vision Pro doesn't use any controllers at all. Instead, users manipulate the gadget using their fingers and eyes.

That's a pretty cool and novel way to use a computer (again, I really urge anyone who hasn't tried Vision Pro to book a free, 30-minute demo at an Apple store). But that choice also means that developers who built something for other augmented/virtual/mixed reality devices — which generally *do* use hand-held controllers — would have a hard time porting their applications to Apple's new device.

Which makes [the killer app problem](#) that much harder to solve.

But even if the Apple-Sony deal does happen soon (I've asked both companies for comment) I don't think it immediately changes the Vision Pro's prospects.

Apple headset rivals like Sony and Meta are positioning their devices as gaming consoles (Meta is bundling a [Batman](#) game with its newest [Quest headsets](#)). But the Vision Pro just seems too expensive and bulky to support video games at scale. This move seems more like an indicator that Apple knows it has a problem. It's not a solution.

Samsung tipped to have smart glasses up its sleeve at Unpacked 2025

What you need to know

- Samsung might finally glimpse the long-rumored smart glasses at the Galaxy S25 series launch.
- It will likely be a sneak peek of the company's first AR glasses in mid-January.
- The smart glasses will reportedly be based on Samsung's Extended Reality (XR) platform.

Samsung might be prepping for its Galaxy S25 series launch, which is anticipated to happen in January 2025. While the trio of handsets are expected, a new report reveals that the company might have a smart glasses launch up its sleeve next month.

According to the Korean news outlet [Yonhapnews](#), spotted by tipster Jukanlosreve on X, has indicated that Samsung might be showcasing a sneak peek of its first augmented reality (AR) glasses at the upcoming [Galaxy S25](#) series Unpacked Event. It could be some sort of short video or an image reveal — likely a similar approach from the company where it showcased the [Galaxy Ring](#) for the first time during its 2024 Unpacked Event.

Just in: Samsung is set to unveil a prototype of its augmented reality (AR) glasses, currently in development, during the Galaxy S25 Unpacked event early next year, likely in the form of videos or images. Additionally, prior to revealing the prototype, Samsung plans to introduce...December 3, 2024

The upcoming smart glasses will likely rival the Meta's [Ray-Ban](#) glasses. They will be built on Samsung's Extended Reality (XR) platform, which is also tipped to be demoed at the upcoming Unpacked event. The Korean outlet further shares that the smart glasses will likely weigh 50 grams, coupled with the ability to make payments with the help of AI, gesture, and face recognition features.

While we might see a glimpse of the first smart glasses at the Unpacked event, which may include a prototype, the product is expected to be released sometime in the third quarter of 2025, notes the Korean publication. It is still unclear whether the alleged smart glasses are the ones that were rumored to be co-developed by Google and Qualcomm.

It's also been a while since we heard about Samsung's smart glasses, which were [trademarked](#) at the Intellectual Property Office in the U.K. last year. The product was then trademarked under the "Virtual reality headsets; Augmented reality headsets; Headphones; Smartphones; Smart glasses" categories.

Meanwhile, an alleged prototype was spotted before the launch of Apple Vision Pro. It included micro OLED displays powered by the Exynos 2200 chip and other highlighting features like eye-tracking cameras. However, it was soon [scrapped](#) after the Vision Pro's launch. Regardless, it is still encouraging to see Samsung still working on its version of smart glasses, which will likely be witnessed first at the Unpacked Event in 2025, which otherwise headlines the much-awaited Galaxy S25 series.

How Samsung could finally unlock smart glasses' true potential

It might not feel like it yet, but the [world of smart glasses](#) is heating up.

On top of new entries from companies like Xreal, Meta took the next steps with its [Ray-Ban smart glasses](#) this year, imbuing them with AI and adding even more potential for future uses down the line. As I've written previously, Meta's Ray-Ban

smart glasses are arguably my favorite (and maybe the most underrated) gadget of the year.

They have great audio capabilities, they make taking pictures and videos easy, and they actually look like normal, Ray-Ban, glasses. When it comes to style and capability, they stand alone in the smart glasses category.

At least for now...

Samsung enters the chat

Looks like Meta might not be alone in the world of fashionable smart glasses much longer.

According to a report this week from Korean outlet *Yonhap News*, [Samsung may be preparing to launch its own pair of smart glasses](#) soon, potentially during January's annual Galaxy Unpacked event where it typically introduces its flagship Galaxy phones.

On one hand, that's to be expected — Meta has already made a clear case that smart glasses with a camera and solid audio are a marketable commodity. On the other hand, it could represent one of the biggest sea changes in smart glasses we've seen yet.

Let me explain.

Meta's glasses are great. They do a lot more than you might expect for a relatively nascent product category and they might do even more in the future thanks to Meta AI which imbues the glasses with a bit of computer vision.

But as solid as they are, they're still lacking something — something that actually has almost nothing to do with the glasses themselves. That something is an ecosystem.



Competitors like Xreal offer more augmented reality but in a bigger form factor. (Image credit: XREAL)

Smart glasses, for all of their surprising use cases, still need to be coupled with a real computer, and in that case, that computer is your phone. Your phone is the only reason that Meta's Ray-Ban glasses are useful and thanks to that synergy they can play music, announce turn-by-turn navigation in your maps apps, take calls, and more.

But for everything Ray-Ban glasses *can* do thanks to your phone, there are just as many things that they can't. That has almost nothing to do with the glasses themselves or their technical limitations, but a lot to do with your phone.

Meta's Ray-Bans just don't have the deep system-level access to your phone to bring them the extra mile. Imagine for a moment a pair of glasses that plays nice with *everything* your phone does — I'm talking text messages, calls, voice assistants, timers, calendars, you name it.

Sounds useful, right? That's exactly what Samsung might have to offer.

A smarter pair of smart glasses

A pair of Samsung smart glasses has no real limitations when it comes to which apps it has access to and which it doesn't, and for that reason, they could unlock the true potential of the category.

Paired with system-level access, Samsung's rumored smart glasses would be a real-functional extension of your phone in the same way that a watch is — maybe even more so since it can capture media as well.

Think about it. A pair of deeply integrated smart glasses could take pictures and videos and send them directly to your photos app; it could take calls; it could send messages through voice; it could integrate with your phone calendar and send you reminders; it could interact with your phone's voice assistant to search the web or, heck, draft an email for you. By borrowing your phone's ecosystem and compute power, I can't think of anything that smart glasses *can't* do.

In short, they could cease on basically all the shortcomings of Meta's Ray-Bans.

This is all hypothetical for now, but when you start to unpack the possibilities, a pair of smart glasses made by a company that also manufactures phones just makes sense. It'd still be pretty far off from the AR future promised by prototypes like Meta's Orion, but it would also easily be the best pair of phone-like smart glasses we've seen yet.

As much as I love Meta's Ray-Ban glasses, favorites are a fleeting thing and if Samsung really pulls the trigger, we may have a new king of smart glasses.

Google patents smart glasses with display, speaker & eye-tracking

Many people would say that the [Google Glass project](#) was ahead of its time, and I'd agree. Well, it's possible [Google](#) will try again, as the company just [patented smart glasses with a built-in display](#), speakers, eye-tracking, and more.

Google could have plans to launch a new pair of smart glasses

This patent surfaced in China, as it was [patented with CNIPA](#) (China's National Intellectual Property Administration), China's certification agency. First and foremost, this patent indicates that these glasses won't be a standalone product. Google allegedly has plans to offload processing to a smartphone, so the glasses will need to be connected to a smartphone.

In addition to a built-in display, speaker, and eye-tracking, these glasses also have a microphone included, and cameras, of course. Based on this patent, these glasses mainly rely on contextual data such as location to provide suggestions or accept commands.

Users can interact with glasses via touch, voice, or gesture input. Something called 'gaze tracking' is also a part of Google's plans. Built-in cameras are included to identify your surroundings, and the displays can provide information and navigation.

Processing will be offloaded to a smartphone

Needless to say, Google's plan to offload processing to smartphones will save battery life. So these glasses could end up excelling in that regard if they ever become a reality. This is just a patent at this point, so don't get your hopes up just yet.

Chances are that Google will come up with such a product sooner or later, though. [Samsung is allegedly working on its XR device and AR glasses](#), while Meta partnered up with Ray-Ban to introduce rather [interesting smart glasses that my colleague fell in love with](#).

Is it time for Google to revive Google Glass... well, kind of? Well, it may be. This could be the ideal time for the company to do just that. Wearing various tech gadgets is normalized, while the technology caught up.

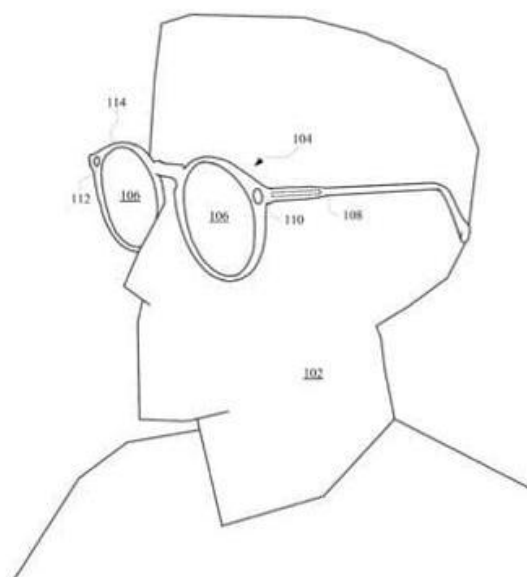
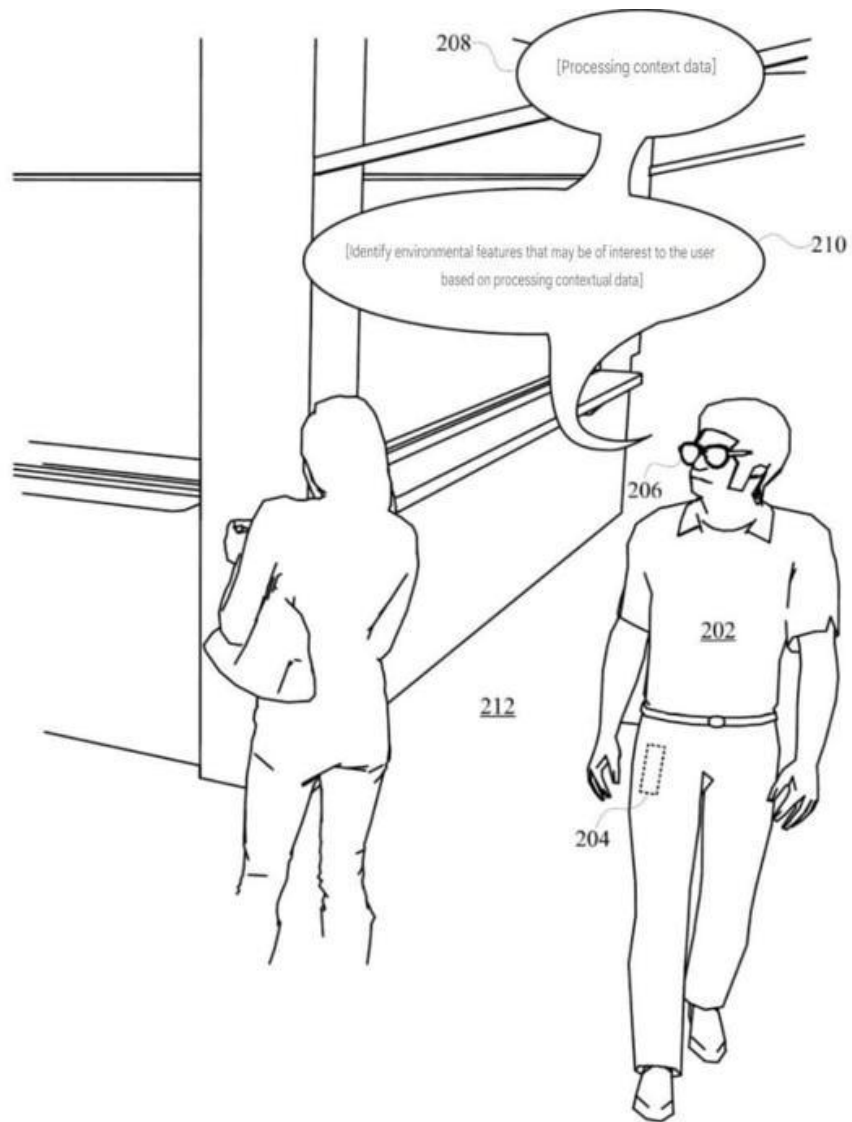
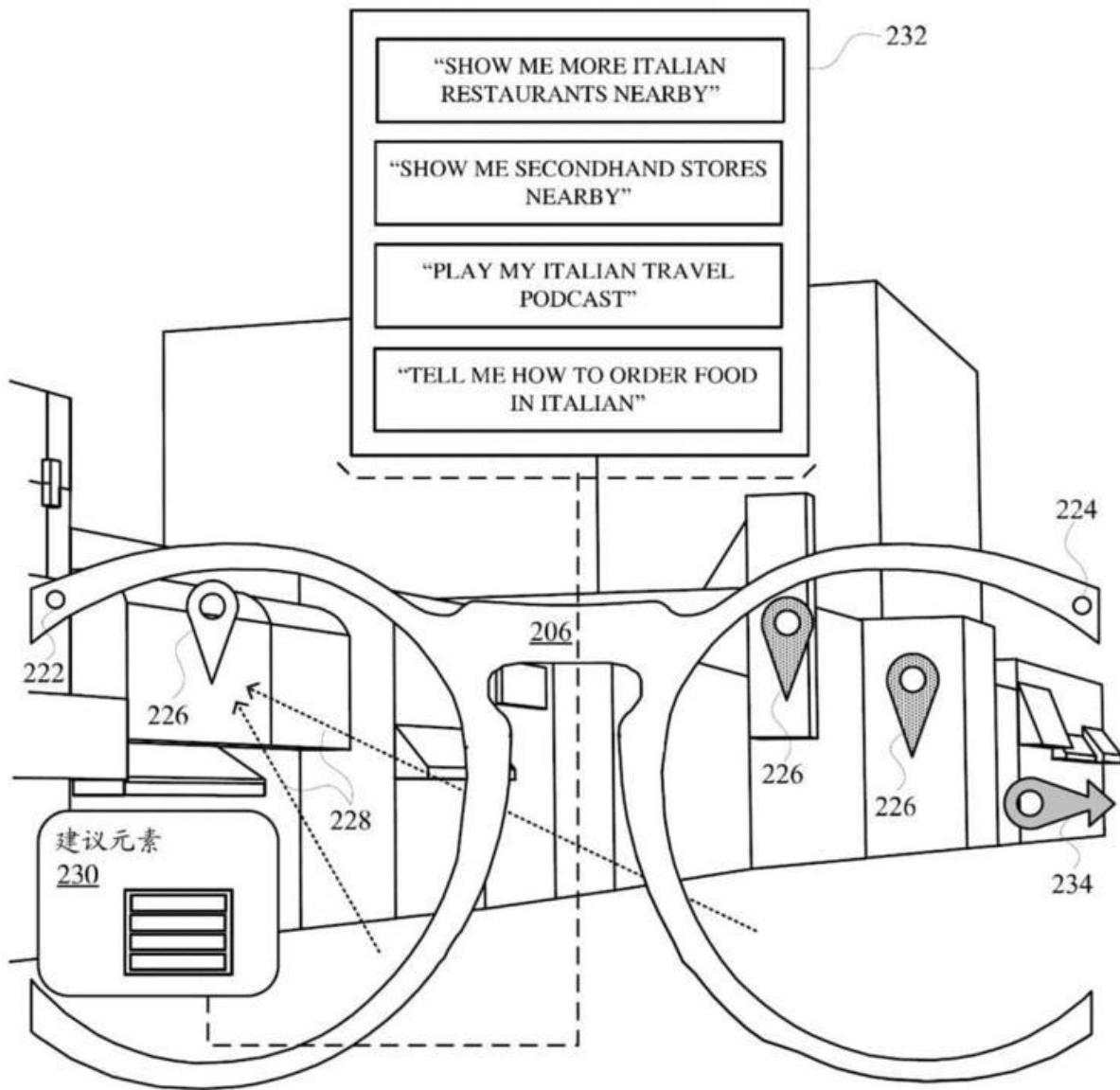
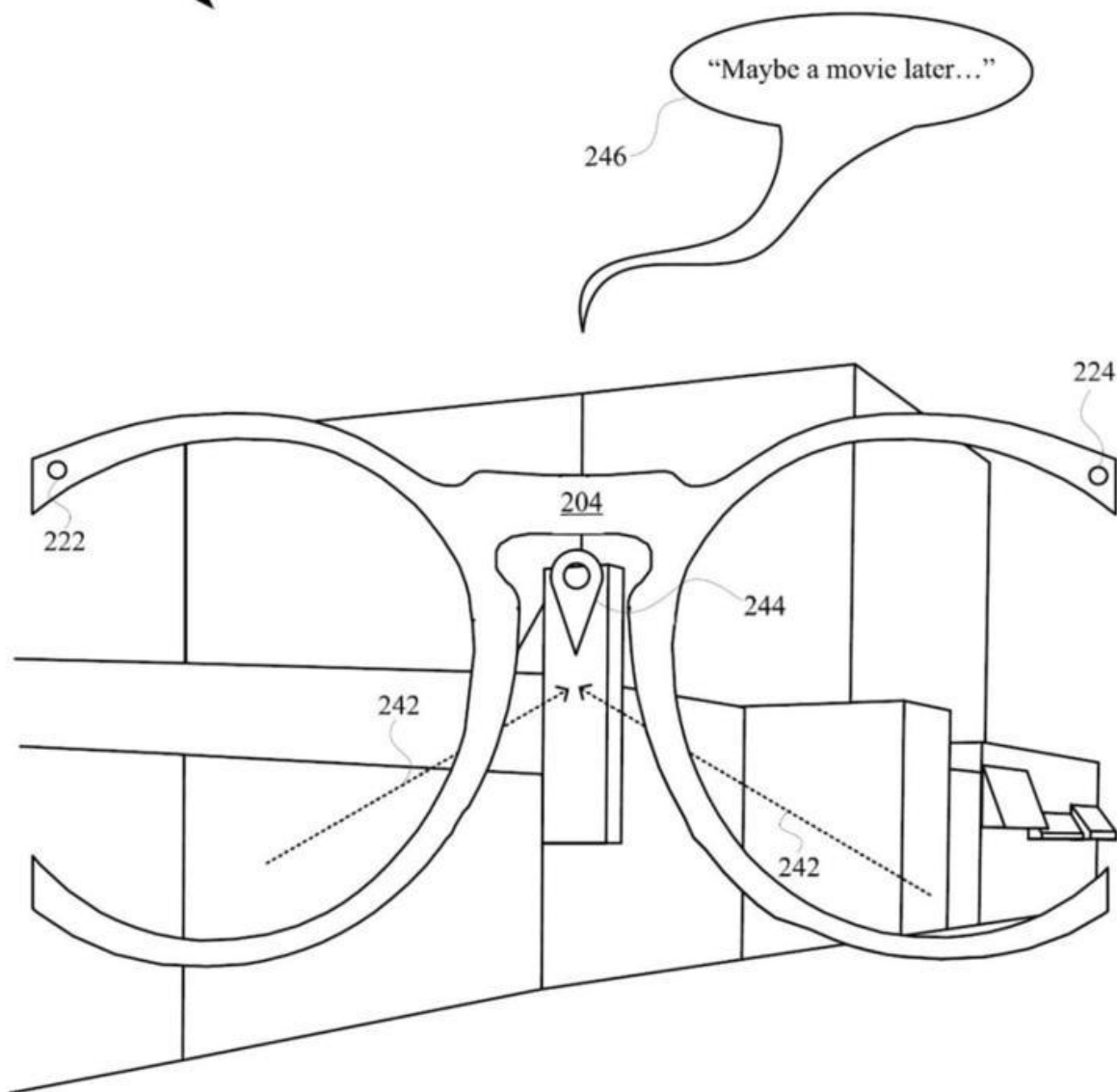


图1







The next Apple Watch Ultra could have satellite texting



Apple enabled [non-emergency satellite messaging from iPhones](#) earlier this year. [According to Bloomberg's Mark Gurman](#), it may do the same for the next Apple Watch Ultra in addition to adding the long-rumored blood-pressure monitoring feature.

Satellite messaging on the [Watch Ultra has been rumored](#) since before we even knew what Apple's XL-sized sporty take on its smartwatch line would be called. According to Gurman's description, it would work like it does on the iPhone, letting you send text messages from the watch without a cellular or Wi-Fi connection.

He also reports that Apple is swapping out Intel modems in the Apple Watch for a component from MediaTek but doesn't have any plans yet to use its upcoming in-house modems for the wearables. The new component included in "at least some models" could also support [RedCap, the 5G service intended for wearables](#)

[and IoT](#) that sacrifices extra antennas and maximum bandwidth to reduce cost and extend battery life.

Adding satellite service could help Apple lure some [Garmin inReach fans](#) who might want to have one less thing to carry even if the inReach's hundreds of hours of battery life still win out for extended hikes. Presumably, service would be provided by Globalstar, Apple's satellite partner for the iPhone that it bought a 20 percent stake in last month.

As for blood-pressure monitoring, Gurman says that it "may arrive as soon as 2025 as well," but he reminds us that the feature has been delayed in the past. Like sleep apnea detection and other health features of the Apple Watch, this feature wouldn't offer specific measurements but could let you know if you seem to be experiencing hypertension.

On my son's behalf, I sought out the smart glasses that 'give sight to the blind'

Like many 4-year-olds, there's nothing my son loves more than cars. Despite my own complete lack of interest in the topic, he can already identify make and model of cars from across the street with uncanny accuracy, spurred on by his growing collection of Matchbox and Hot Wheels.

But as we've had to explain to him, we still don't know if he'll be ever to drive one himself. The brain tumor that he was born with left him with stunted vision, particularly in one eye, with little hope of improvement.

That's why one startup's [CES pitch this year](#) promising a [pair of prototype smart glasses](#) that could [grant "sight for blind people"](#) caught me off guard.

Determined to see if it could really be true, I had a new agenda for my week in Las Vegas; to attempt to reinvigorate my own belief that tech advancements are still capable of transforming lives — and rediscover hope for my son's future.



Our 4-year old son was born with a very rare pituitary brain tumor, known as a craniopharyngioma. When it was discovered at 10 months old, the tumor was pressing up against his optic nerves and choking his pituitary gland. That meant a lack of normal hormone function that controls basic bodily functions like thirst, growth, cortisol production, and thyroid function — as well as a loss of vision.

Our world crashed around us as we attempted to envision the steps ahead, and more importantly, his future. It wasn't a malignant cancer, and it rarely resulted in loss of life. But in terms of quality of life, we'd heard enough horror stories to keep us up at night.

But don't worry — I promised a story about hope, and that's what this is.

My first thoughts upon seeing the company's pitch in my inbox were of my own family — my mother with AMD (Age-related Macular Degeneration) and also my son, who experienced loss of vision from his brain tumor.

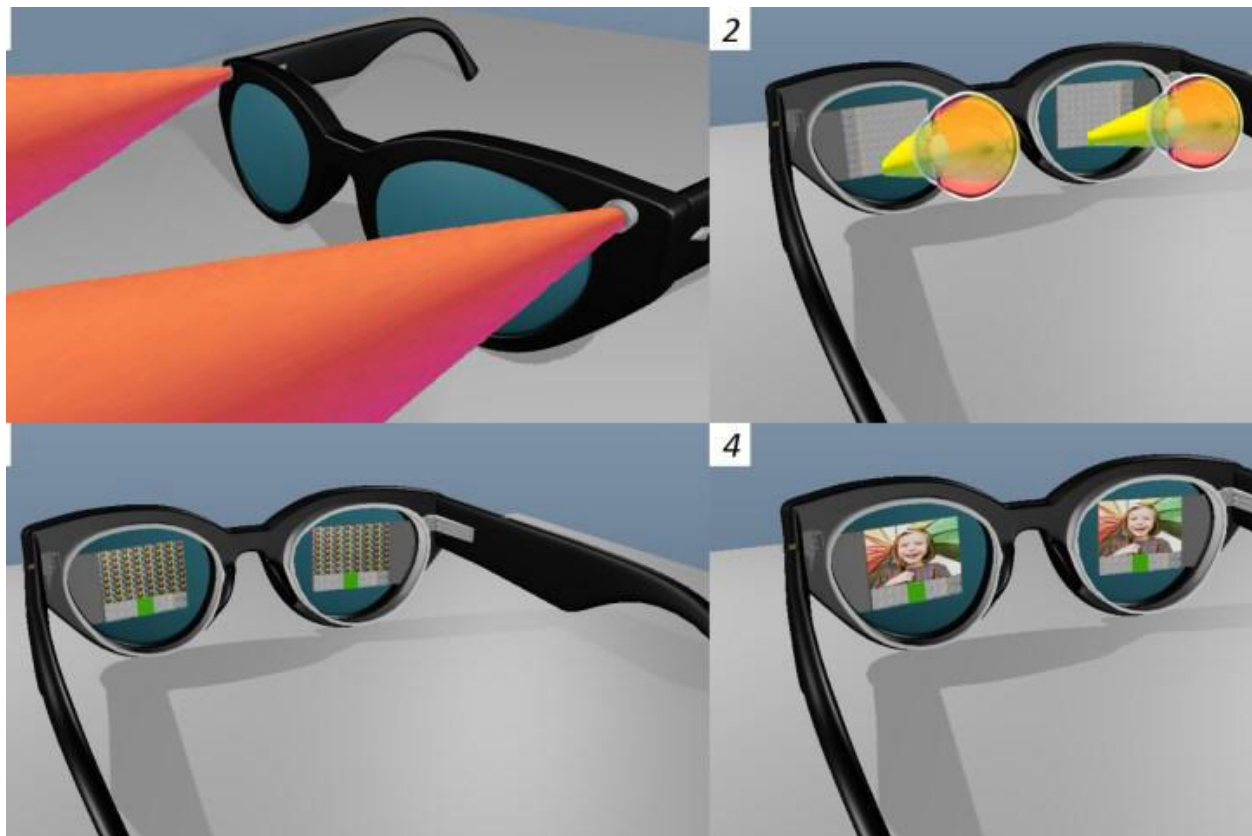
So, there I was, wading through the sea of people in Eureka Park, the Wild West of CES, attempting to find a small booth for a startup that went by the strange name, [Soliddd](#). The company was there showing off its prototype smart glasses, known as Soliddd Vision, a piece of technology that aims to recover sight to people with low-vision conditions, including macular degeneration. The claim is huge: think of it like hearing aids for your eyes. Or, according to its ambitious CEO, Neal Weinstock, "giving sight to the blind."

As a kid, it's poor vision that affects our son's daily life most. Despite being tumor-free since [his miraculous surgery](#) in 2023, he still requires daily supplementary hormone replacements and experiences poor vision in one of his eyes. You'd never know it from his attitude on life, but he's been patching one eye for four hours a day for most of his life, and lack of vision affects lots of daily kid activities, like playing hide-and-seek or being able to spot an airplane in the sky.

But again, hope.

I tried on the delicate pair of prototype glasses. At this stage, they felt less like a pair of glasses and more like a small headset. The technology behind them, though, has the potential to be downright revolutionary. The frames have two

cameras pointing out to capture the world and two pointing in to calibrate to the movement of your eyes.



The feed from the exterior cameras image is then projected into the micro display on the lens — but not just once. The lens actually has an array of displays on it, all showing the same image. What the founder and CEO of the company discovered was that the eye could be tricked into piecing this array of high-resolution images together into a single image.

Weinstock is an engineer with a background in 3D work, and the early prototypes of the Solid Vision were actually an example of autostereoscopic, or glasses-free 3D. But after working with Rich Muller, a physicist at University of California, Berkeley, he came upon the realization that there was an application for restoring vision.

“What the brain makes of these multiple images is something that people in computer science grok better than ophthalmologists,” Weinstock told me. “First of all, the ophthalmologists think that the resolution in these far regions of the eye is so low compared to the fovea. But everyone knows that your iPhone or

Samsung phone are putting together multiple images from separate cameras and constructing better acuity in terms of a person's vision. That's what the brain does."

Phone manufacturers had actually unknowingly mimicked the operation of the brain, and now that understanding is being reverse-engineered. By creating an array of Maxwellian displays, also known as retina-projection displays, Soliddd can aim a pinhole light through the natural lens of the eye without engaging the focusing mechanism, as Weinstock explained.

The brain does what it's always done — take the vision from your left eye and your right eye and add them together to create the single clearest image. With Soliddd Vision, the brain is taking this array of images from the lens and projecting them to the entirety of the retina — and self-selecting to create a perfectly in-focus image.

"We divide the content coming in from the cameras into an array of all the same image, which goes through the lens and delivers to the eye in perfect focus — directly to the retina," the chairman of Soliddd, Derek Myers, explained to me. "Those optic nerves are then capable of reading that and constructing a single image — in perfect focus. Therefore eliminating the areas of the eye that are degenerative."

Although wearing the glasses myself didn't immediately give me perfect vision, I could see what he was saying. Peering through the prism of screens, and after a couple of small adjustments, I was, indeed, seeing them as a single image. And with that, a spark of hope.

Early tests are promising

Soliddd says it's already working with early patients with conditions such as AMD (Age-related Macular Degeneration) and even coronary dystrophy, which can affect much younger people. One early patient is just 19, and after using the prototype glasses, reported fully restored central vision.

The form factor is important, of course, which Soliddd admitted. After all, if a pair of glasses was inconvenient, uncomfortable, or socially obtrusive, people would be far less likely to adopt them into their daily lives. Soliddd says it will be

benefitting from all the advancements happening in the wider industry around compact form factors, which remains one of the biggest hurdles to adoption of smart glasses. We've all seen the success of glasses like the Ray-Ban Meta smart glasses, and much of that has to do with form factor.

I was shown renderings of what the company expects the consumer version of this product to look like, though, and they certainly seemed promising.

The company is considering the entire product package too, including the resolution and image quality — as well as ergonomics, privacy, and security concerns. All things that matter quite a bit when you're augmenting one's vision.

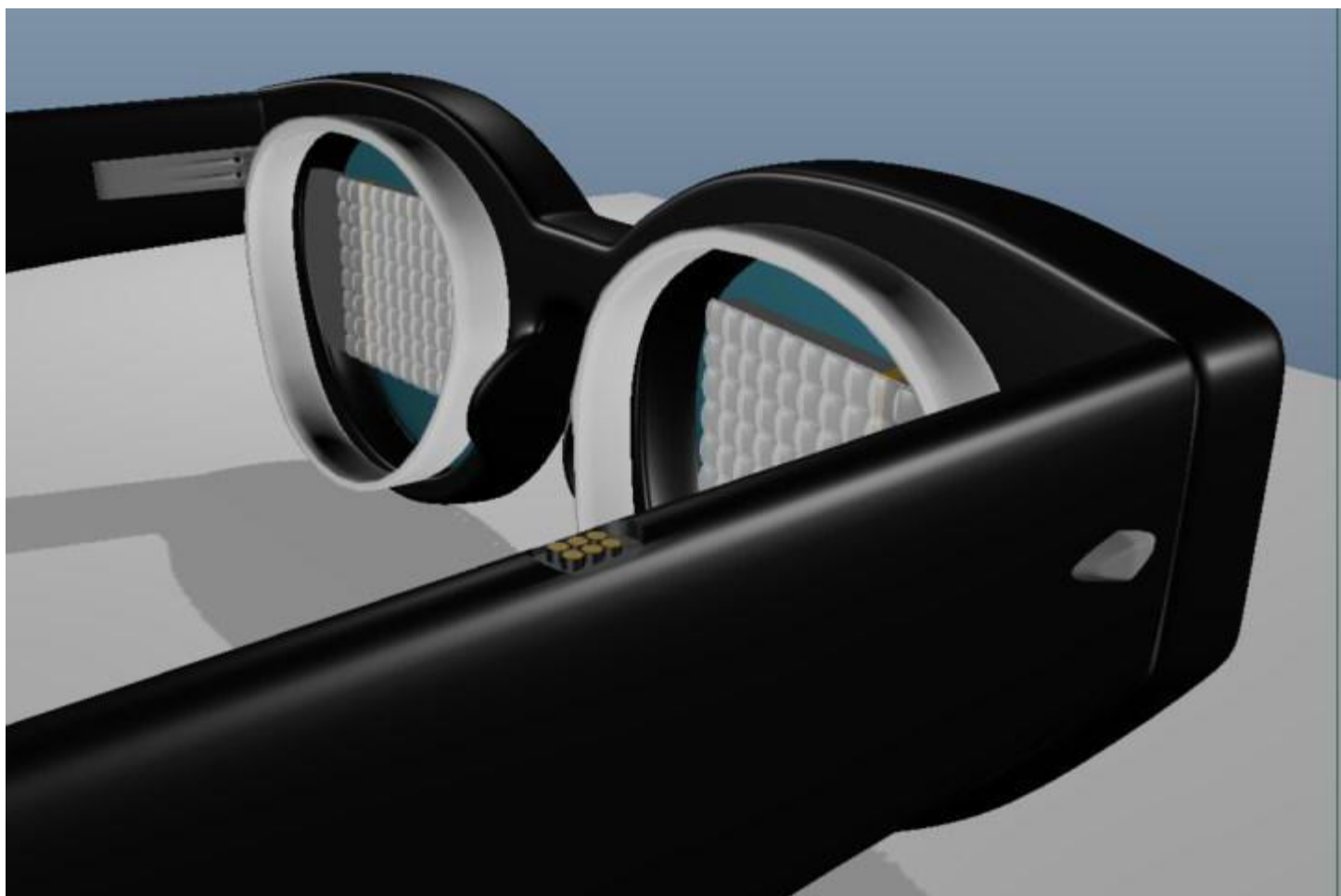
Perhaps even more exciting, though, Myers explained that future updates to the product could include a more fine-tuned solution for the specific mapping of a patient's individual retina. This could be important for someone like our son, who lacks peripheral vision on one side of his eye.

As he explained these things, I couldn't help but think of my son — perhaps in his teens or 20s — and what his life would be like. Don't get me wrong — on the other side of his surgery, I have so much hope and optimism for his future. And yet, what would technology in its infancy today would be fully matured in 10 or 20 years? It'd be disingenuous not to hope, especially since we've benefitted so much from advances in technology that aided in his own treatment.

His brain surgery, which was successfully completed entirely through his nasal cavity, used advanced technology and techniques that never would have been possible a few decades ago. That's because of endoscope cameras and tiny instruments, yes. But the first time the surgery had been done on a child of his age was only four years earlier by the same surgeon, who used a 3D-printed skull and virtual reality to ensure the surgery could be completed.

In our son's case, the result was a clean resection of the tumor with as minimal an impact as possible. On one hand — a tried-and-true miracle. On the other, more proof that advances in technology really do *matter*.

A not-so-distant future



Soliddd

Soliddd is currently fundraising, but it already has plans to put out a consumer product in the near future, as early as the first quarter of next year.

But let me clear: As of now, I don't know for sure that something like Soliddd could help my son's vision. He may have damage to his actual optic nerves from the tumor, which is wholly different from retinal deterioration. Furthermore, this first version of smart glasses may only have a few hours of battery life, designed for limited, at-home use.

But visual deficits that could benefit from such glasses run deep in my family. My mother has AMD, and my nephew may have some form of retinal damage as well. AMD is thought to be a generic condition that can be passed down generation to generation. Who knows — it may even be something I have to experience at some point, and is certainly therefore possible to pass on to our children.

As I described my son's condition to another Soliddd representative, he gave me a knowing grin.

"I can't tell you how many people have said that coming through here. You do the business conversation, and then it's my mom, my dad, my uncle, my grandpa."

As I've seen in my mother's own battle with AMD, there's no easy cure for the disease. It tends to progress over time, and the best treatments we have now can only hope to slow the deterioration of the retina. Technology like Soliddd provides an alternative solution. But for me, it's less that Soliddd's specific solution is the end-all-be-all. It's that CES and the tech world at large are full of ideas just like this. A smart walking cane with GPS and AI built into it for the blind, advanced smart hearing aids, and even an at-home AI stethoscope.

I'm not one to bank all my hope for the future in technological progress, but I walked away from CES this year dropping the skepticism and reigniting my sense of optimism about the potentially life-changing technology that is currently in development — and could be just a few years away.

Maybe someday, it could even mean that our son gets to live his dream of driving a car. I have more hope today than ever.

Your Brain Is Not a Computer. It Is a Transducer

A new theory of how the brain works — neural transduction theory — might upend everything we know about consciousness and the universe itself.



Let's start with my 95-year-old mom. Her memory is unreliable, but she's still lucid, churns out sarcasm like a pro, and plays a lightning-fast game of double solitaire. Today I finally quit after she won seven games in a row, and, yes, I was trying my best.

She also hears music continuously, and it's not the kind of music that drives us nuts when we can't get a tune out of our head. She mainly hears *original* music, and she will sometimes try to hum or sing what she's hearing. She says it's coming from "the neighbors downstairs," and it doesn't bother her, she says, because some of it isn't bad and because it helps her fall asleep. The fact that other people can't hear it doesn't bother her either. She simply smiles slyly and says, "Maybe you should get your hearing checked."

Am I concerned? Well, just a bit — not about the music but about its source. As I told my mom the other day, I would be more comfortable if the inconsiderate neighbors lived *upstairs*. She laughed and said, "I see what you're getting at, but don't worry. I'm *not* going to hell." Very determined, my mom. Was she planning to negotiate the issue with a hand of double solitaire?

Where is all this original music coming from? My mother has never composed music, and she insists she would be incapable of doing so "no matter how much you paid me." That's mom-speak for case *closed*.

In case you haven't noticed, we are surrounded by mysteries like this. Some, in my view, are highly suspect, such as demonic possession and communication with spirits. Others are undeniably real: dreams, daydreams, hallucinations, the *déjà vu* experience, and so on. My staff recently came up with a list of 58 such phenomena. You don't have to look far to find them.

Are we doomed to remain in the dark about these mysteries, or is there a way to peel back the veil? What if spirits, dreams, and my mom's music could all be accounted for by a relatively simple idea about how the brain works — an idea that might even be testable?

The idea, which is quite simple on its face, is that the brain is a bidirectional transducer.

Transduction Is All Around Us

A few inches to the left of the laptop computer on which I am now typing stands an imposing Sennheiser microphone that I use mainly when someone is interviewing me for a radio or TV show. A thick black cable protrudes from the back of the microphone and snakes its way to a boxy analogue-to-digital converter, which links to my computer via a bright red USB cable.

My computer links wirelessly to a router in the next room, and the router connects to AT&T, my internet service provider, through a telephone cable that runs from the router to a wall socket. That cable leads to dozens of other transition points through which crude representations of my voice pass before some semblance of it is finally heard by a talk-show host in, say, London.

If I'm speaking to a host of a BBC radio program, representations of his or her voice are also traveling in the other direction from his or her microphone through dozens of transition points until they finally activate a tiny speaker in my ear bud, through which I hear a semblance of his or her voice. If we're also using video to communicate, cameras are sending images to screens, again through many transition points, and again in both directions.

Representations of these images and sounds might be passing not only through multiple transition points but also through thousands of miles of copper or fiber optic

cables, or are perhaps being transmitted to satellites hundreds of miles above the earth and then re-transmitted to receivers on the ground. Long ago, pathways like this could accommodate only one conversation at a time, with communications running in only one direction at a time, but now such pathways are bidirectional and are often shared simultaneously by thousands of different conversations.

Remarkably, when everything is working smoothly, my conversation with the London host is as seamless as it would be if we were in the same room. Even though I'm 5,500 miles away in San Diego, I can't detect any time gaps between my ramblings and the host's reply. Those gaps exist, but they're so short that neither I nor the host can perceive them.

What's happening here? Is my voice actually traveling 5,500 miles? Definitely not. If you were the proprietor of a 19th century mansion, you might have been able to shout into a speaking tube that snaked its way through your home and carried your voice all the way to the servants' quarters. In that case, the sound of your voice was literally carried to its destination by the air in the tube.

But when I speak into my microphone, the pattern of sound waves produced by my voice — a distinctive, non-random pattern of air pressure waves — is being *converted* by the microphone into a similar pattern of electrical activity. The better the microphone, the more accurately it duplicates the original pattern, and the more I sound like me at the other end.

That conversion process — the shifting of a meaningful, non-random pattern of activity — from one medium (say, the air in front of the microphone) to another medium (say, the wire at the back of a microphone) is called *transduction*.

And transduction is all around us, even in organic processes. Our bodies are completely encased by transducers. Our sense organs — eyes, ears, nose, tongue, and skin — transduce distinctive properties of electromagnetic radiation, air pressure waves, airborne chemicals, liquid-borne chemicals, textures, pressure, and temperature into distinctive patterns of electrical and chemical activity in the brain. Organic compounds can even be used these days to create new kinds of transducers, such as OECTs: [organic electrochemical transistors](#).

Evolution didn't just create millions of new species of organisms, it also created millions of new types of transducers, and engineers are now using both organic and inorganic materials to create thousands more.

To repeat (because this is important): Transduction is all around us — forms of transduction that have evolved over eons and new forms of transduction that humans are inventing right now.

The Ultimate Transducer

What if evolution, at some point, produced a special kind of transducer that could shift signals from the physical world as we know it to a very different kind of world?

Nearly all religions teach that immaterial realms exist that transcend the reality we know. For Christians and Muslims, those realms are Heaven and Hell. One of the simplest and clearest statements of such a concept comes from ancient Greek mythology: As long as the deceased had the required toll in hand — well, actually in mouth — he or she would be transported by the ferryman Charon across the river Styx to Hades, the land of the dead — quite literally, to the *Other Side*. (I'll call it the OS from this point on.) Unfortunately, not everyone was eligible to make the crossing. If no one thought to bury you or to put that coin in your mouth, you were doomed to roam *this* side of the river as a ghost.

The idea of a realm transcending the one we experience directly has taken on many forms over the centuries. George Griffith, England's most prominent and prolific science fiction writer of the late 1800s, published a prescient novel about this realm in 1906: *The Mummy and Miss Nitocris: A Phantasy of the Fourth Dimension*. The book's protagonist, professor Franklin Marmion, is a distinguished mathematician and physicist who anticipates discoveries and concepts that real quantum physicists would eventually propose decades later. Over the course of the story, Marmion not only reluctantly accepts the fact that a higher dimension must exist, he also acquires the power to shift his body there, learning, among other counterintuitive things, that multiple objects can occupy the same space at the same time.

Griffith might have been aware of a contemporary of his, William James, a prominent Harvard philosopher and also arguably America's first psychologist. In 1898, James published a short book entitled *Human Immortality: Two Supposed Objections to the Doctrine*, in which he praised his contemporaries for boldly using scientific methods to investigate "providential leadings [sic] in answer to prayer, instantaneous healings, premonitions, apparitions at time of death, clairvoyant visions or impressions, and the whole range of mediumistic capacities."

James asserted that a universe-wide consciousness beamed human consciousness into our brains "as so many finite rays," just as the sun beams rays of light onto our planet.

Our brains, being limited in their capabilities, he said, generally filter and suppress real consciousness, while sometimes allowing ‘glows of feeling, glimpses of insight, and streams of knowledge’ to shine through. He called this idea ‘transmission-theory.’

Ideas like James’s have been around for thousands of years. In his 2006 book, *Life After Death: The Burden of Proof*, alternative medicine guru Deepak Chopra says that ancient Hindu texts teach that the material world we know is nothing but a projection from the universal consciousness that fills all space. From this perspective, death is not an end; it is a merging of a relatively pathetic human consciousness with that of the dazzling universal one. To add gravitas to this idea, Chopra does what many recent authors have done: he suggests that modern formulations of quantum physics are consistent with his belief in a universal consciousness.

The connection between physics and modern theories of mind and consciousness is **tenuous at best**, but modern physicists do take the idea of parallel universes seriously. They debate the details, but they can hardly ignore the fact that the mathematics of **at least three** of the grand theories at the core of modern physics — inflation theory, quantum theory, and string theory — predict the existence of alternate universes. Some physicists even believe that signals can leak between the universes and that the existence of parallel universes **can be confirmed** through measurements or experiments. In a recent essay, physicist **A. A. Antonov** argues that our inability to detect the vast amount of dark energy that almost certainly exists in our own universe is evidence of the existence of parallel universes, six of which, he speculates, are directly adjacent to our own.

Again, setting the details aside, physicists agree that the three-dimensional space we experience is simply not the whole picture. As theoretical physicist Lee Smolin put it recently, “**Space is dead.**”

Evidence for Transduction?

Hard evidence that supports a neural transduction theory is lacking at the moment, but we are surrounded by odd phenomena that are at least consistent with such a theory. And, no, I’m not talking about the claims that best-selling authors have made over the decades about proof that telepathy, out-of-body experiences, and communication with the dead are real. No such proof exists, in my view, but other well documented phenomena are difficult to brush aside.

When I was a graduate student at Harvard, I noticed a stranger roaming the hallway near my office and offered to assist her. Doris, it turns out, had heard voices for years, and she was hoping she could find someone in the psychology building — William James Hall — to help her eliminate them because they "caused trouble." I didn't have the heart to tell her that Harvard, at the time, had no clinical psychology program and that I was doing behavioral research with pigeons. If her voices had sent her there, they were troublemakers indeed.

When internal perception goes awry, people can be overwhelmed by hallucinations, visions, or distortions of reality so extreme they have to be hospitalized, and Doris had been hospitalized at times.

But is Doris that different from the rest of us? After all, even the healthiest among us hallucinate several times each night — we call it dreaming. And we all have at least two highly disorienting experiences each day called "hypnagogic states" — those eerie, sometimes creative interludes between sleeping and waking.

I have sometimes dreamt intricate full-length movies that seemed as good as any Hollywood film. Alas, most of the time, no matter how hard I try, I can't seem to hold on to even a shred of a dream during the few seconds when I'm staggering from my bed to the bathroom.

Where does all this content come from, and why do we have so little control over it?

In recent years, researchers have explored what they have clumsily labeled "paradoxical lucidity," or, even worse, "*terminal* lucidity." These labels refer to what some of us know as "the last hurrah" — the burst of mental clarity that sometimes occurs shortly before people die, even people for whom such clarity should be impossible.

For more than two centuries, medical journals have published credible reports of highly impaired, uncommunicative people who suddenly became lucid for a few minutes before they died. There are documented cases in which people with dementia, advanced Alzheimer's, schizophrenia, and even severe brain damage — people who have not been able to speak or to recognize their closest relatives for years — suddenly recognized their loved ones and spoke normally.

A 2020 study summarizing the observations of 124 caregivers of dementia patients, concluded that in "more than 80 percent of these cases, complete remission with return of memory, orientation, and responsive verbal ability was reported by observers

of the lucid episode" and that "[the] majority of patients died within hours to days after the episode." The periods of lucidity typically lasted 30 to 60 minutes.

Some of the historical reports of lucid episodes are truly extraordinary.

Here is one of many cases [reported by the German biologist Michael Nahm](#) and his colleagues in 2012:

In a case published in 1822, a boy at the age of 6 had fallen on a nail that penetrated his forehead. He slowly developed increasing headaches and mental disturbances. At the age of 17, he was in constant pain, extremely melancholic, and starting to lose his memory. He fantasized, blinked continuously, and looked for hours at particular objects.... He remained in the hospital in this state for 18 days. On the morning of the 19th day, he suddenly left his bed and appeared very bright, claiming he was free of all pain and feelings of sickness.... A quarter of an hour after the attending physician left him, he fell unconscious and died within a few minutes. The front part of his brain contained two pus-filled tissue bags the size of a hen's egg (Pfeuffer, 1822)....

And another:

Haig (2007) reported the case of a young man dying of lung cancer that had spread to his brain. Toward the end of his life, a brain scan showed little brain tissue left, the metastasized tumors having not simply pushed aside normal brain tissue but actually destroyed and replaced it. In the days before his death, he lost all ability to speak or move. According to a nurse and his wife, however, an hour before he died, he woke up and said good-bye to his family, speaking with them for about five minutes before losing consciousness again and dying.

If the brain is a self-contained information processor, how can we explain the sudden return of lucidity when the brain is severely damaged? For that matter, think about the variability that occurs in your own lucidity over the course of 24 hours, during which you are, at various times, completely unconscious, partially conscious, or fully conscious. If you add drugs and alcohol to the picture, the variability is even greater, and it can be quite bizarre.

The variability problem is addressed in an [intriguing paper](#) published by Jorge Palop and his colleagues in *Nature* in 2006, who note that patients suffering from a variety of neurodegenerative disorders often fluctuate over the course of a single day between states of extreme confusion and relatively normal mental states. Such radical changes,

they note, "cannot be caused by sudden loss or gain of nerve cells." They speculate about changes in neural networks, but that doesn't solve the problem.

What if the variability is not caused by changes in processing power in the brain but rather by transduction effects? By changes occurring not in our local universe but in the OS? Or by minor changes occurring at the point of connection? Or by changes occurring in brain structures that are essential to signal transfers?

I've also been intrigued by what appear to be credible reports about visual experiences that some congenitally-blind people have had when they were near death.

Experiences of this sort were first summarized in a [1997 paper](#) by Kenneth Ring and Sharon Cooper, later expanded into a book called *Mindsight* (1999). The paper and book describe the experiences of 14 people who were blind from birth and who had near-death experiences (NDEs), some of which included content that appeared to be visual in nature. Soon after Vicki U. was in a near-fatal car accident at age 22, she remembered "seeing" a male physician and a woman from above in the emergency room, and she "saw" them working on a body. Said Vicki:

I knew it was me.... I was quite tall and thin at that point. And I recognized at first that it was a body, but I didn't even know that it was mine initially. Then I perceived that I was up on the ceiling, and I thought, "Well, that's kind of weird. What am I doing up here?" I thought, "Well, this must be me. Am I dead?"

Vicki had never had a visual experience before her NDE, and, according to the researchers, did not even "understand the nature of light." While near death, she also claimed to have been flooded with information about math and science. Said Vicki:

I all of a sudden understood intuitively almost [all] things about calculus, and about the way planets were made. And I don't know anything about that.... I felt there was nothing I didn't know.

Several aspects of Vicki's recollections are intriguing, but the most interesting to me are the visual experiences. How can someone who has never had such an experience "No light, no shadows, no nothing, ever," according to Vicki — suddenly have rich and detailed experiences of this sort? Ring and Cooper found others like Vicki — congenitally blind people who not only had visual experiences when near death but whose NDEs were remarkably similar to some common NDEs of sighted people.

Just recently, an Australian woman [made the news](#) worldwide when, post surgery, she woke up with an Irish accent. Her strong Australian accent was completely gone.

Called ‘the foreign accent syndrome’, this sudden switch in accents is rare but real. The shift doesn’t make sense given the framework of reasoning we usually apply to the world, but what if it’s a transduction error?

And why can’t we remember pain? We can remember facts and figures and images, and we can even get choked up remembering strong emotions we’ve felt in the past — but *we can’t remember pain*. Are sensations of pain getting filtered out by transduction pathways? Could that be why our dreams are pain free? That begs a question that is both eerie and obvious: Is the OS a kind of pain-free Heaven?

And have you ever met a stranger who made you feel, almost immediately, that you had known him or her your entire life? And sometimes this stranger has the same feeling about *you*. It’s a strong feeling, almost overwhelming. We can try to explain such feelings with speculations about how a voice or physical characteristics might remind us of someone from our past, but there is another possibility — that in some sense *you had actually known this person your whole life*. If the brain is a bidirectional transducer, that is not a strange idea at all.

In fact, when viewed through the lens of transduction theory, *none* of these odd phenomena — dreams, hallucinations, lucidity that comes and goes, blind vision, and so on — looks mysterious.

And All That Jazz

This brings me, reluctantly, to the recent rise of “postmaterialist” science, or at least postmaterialist psychology. The latter is marked by — or perhaps blemished by — the founding of the journal *Spirituality in Clinical Practice* by the American Psychological Association (APA) in 2014 and the founding of the Association for the Advancement of Postmaterialistic Sciences in 2017. (Disclosure: I have been a full member of the APA since 1983.)

Postmaterialism is all about controlled experiments that have supposedly proved, or at least supported, claims that mediums can communicate with the dead, that ghosts will happily comply when we ask them to climb into little boxes in a laboratory, that people can send their thoughts to strangers in another room telepathically, and that future events can somehow travel backward in time to impact people’s current behavior.

I am so tempted here to start naming names and tearing down reputations, but my musical mom raised me better than that. I will say this: One of the early papers

published in that new APA journal — a paper that was accepted without peer review — demonstrated thinking so shoddy it startled me.

Fortunately, I don't *need* to tear apart shoddy thinking or flawed experiments to advocate for transduction theory. In fact, if this theory proves to be valid, every fantasy of the postmaterialists will be fulfilled — every fantasy except one, that is, and that is *the postmaterialist claim itself*. That's because parallel universes are not wispy, physics-free spiritual entities; according to many mainstream physicists, they are just non-obvious companions of the material universe in which we happen to live.

A Better Brain Theory

Let's set aside both the mundane and the exotic reasons we should take transduction theory seriously and get to the heart of the matter: The main reason we should give serious thought to such a theory has nothing to do with ghosts. It has to do with the sorry state of brain science and its reliance on the computer metaphor. One of my research assistants recently calculated that Beethoven's thirty-two piano sonatas contain a total of 307,756 notes, and that doesn't take into account the hundreds of sections marked with repeat symbols. Beethoven's scores also include more than 100,000 symbols that guide the pianist's hands and feet: time signatures, pedal notations, accent marks, slur and trill marks, key signatures, rests, clefs, dynamic notations, tempo marks, and so on.

Why am I telling you about Beethoven? Because piano virtuoso and conductor Daniel Barenboim memorized *all thirty-two of Beethoven's sonatas by the time he was 17*, and he has since memorized hundreds of other major piano works, as well as dozens of entire symphony scores — *tens of millions* of notes and symbols.

Do you think all this content is somehow *stored* in Barenboim's **ever-changing, ever-shrinking, ever-decaying brain**? Sorry, but if you study his brain for a hundred years, you will never find a single note, a single musical score, a single instruction for how to move his fingers — not even a “representation” of any of those things. The brain is simply *not* a storage device. It is an extraordinary entity for sure, but not because it stores or processes information. (See my Aeon essay, “**The Empty Brain**,” for more of my thinking on this issue, and for a truly great thrill, watch Barenboim play the third movement from Beethoven's 14th piano sonata [here](#).)

Over the centuries — completely baffled by where human intelligence comes from — people have used one metaphor after another to ‘explain’ our extraordinary abilities, beginning, of course, with the divine metaphor millennia ago and progressing – and I

use that word hesitatingly — to the current information-processing metaphor. I am proposing now that we abandon the metaphors and begin to consider substantive ideas we can test.

To be clear: I am *not* offering transduction theory as yet another metaphor. I am suggesting that the brain is truly a bidirectional transducer and that, over time, we will find empirical support for this theory.

Recall that Einstein's Special Theory of Relativity, published in 1905, and then his General Theory of Relativity, published in 1915, received no direct and convincing empirical support for years — first regarding predictions his equations made about the perihelion precession of Mercury's orbit, then about the bending of light around the sun (observed by Sir Arthur Eddington in 1919), and then about the gravitational redshift of light. It took a full century before his predictions about gravity waves were confirmed.

If we can cast some aspects of transduction theory into formal, predictive terms (I'm working on that now and am looking for collaborators), we might be able to make specific predictions about transduction — about subtle variations in reaction times, for example, or about how transduction errors might help us explain schizophrenia. We might also be able to predict quantitative aspects of dreams, daydreams, hallucinations, and more.

Ignore It at Your Peril

If transduction theory has merit, let's think about what happens if we ignore it. If we transported a 17th century scientist to the present day and showed him or her how well we can converse with someone using a cell phone, he or she would almost certainly want to look inside the phone. The remote voice must be *in* the phone, after all. To put this another way, a Renaissance scientist would naively view the phone as a self-contained processing unit, much as today's brain scientists naively view the brain.

But that scientist will never find the remote voice inside the phone, because it is not there to be found.

If we explain to the scientist that the phone is a transducer, however, he or she will now examine the phone in a different way, searching for evidence of transduction, which he or she — aided by appropriate instruments and knowledge — will eventually find.

And here is the problem: If you *never* teach that scientist about transduction, he or she might *never* unravel the mysteries of that phone.

This brings me to the claustrum, a small structure just below the cerebral cortex that is **poorly understood**, although **recent research** is beginning to shed some light. Many areas of the brain connect to the claustrum, but what does it do? If the claustrum turns out to be the place where signals are transduced by the brain, *you will probably never discover this remarkable fact if transduction is not on your list of possibilities*. (If you're a history buff, you might also be aware of another small brain structure — the pineal gland — that could conceivably be a transduction site. In his first book, *Treatise of man*, written in the early 1600s, French philosopher René Descartes identified this gland as the seat of the soul. Remarkably, in the late 1900s, **scientists discovered** that tissue in the pineal gland responds to electromagnetic radiation.)

If modern brain scientists begin to look for evidence that the brain is a transducer, they might find it directly through a new understanding of neural pathways, structures, electro-chemical activity, or brain waves. Or they might find such evidence indirectly by simulating aspects of brain function that appear to be capable of transducing signals. They might even be able to create devices that send signals to a parallel universe, or, of greater interest, that *receive* signals from that universe. Comparative studies of animal brains, which could conceivably have limited connections to the OS, might help move the research along.

Efficient and clear transduction might also prove the key to understanding the emergence of human language and consciousness; here is a possible explanation for what might have been the relatively sudden appearance of such abilities in humans (see Julian Jaynes's 1976 book, *The Origin of Consciousness in the Breakdown of the Bicameral Mind*). Neural transduction might also prove to be the mechanism underlying Carl Jung's concept of the "collective unconscious." Even Noam Chomsky's theory of universal grammar could get a boost from transduction theory; it would hardly be surprising that most or all human languages share certain grammatical rules if languages are all constrained by signals emanating from a common source. And then there's that 'flow' state my friend Mihaly Csikszentmihalyi taught everyone about. When I'm in a hyper-creative mode – now, for example, as I'm writing – I have almost no awareness of this world or of the passage of time. Is the OS the source of our creativity?

It might take decades for us to see significant advances in transduction research, but with vast resources already devoted to the brain sciences, we could conceivably move much faster. And if you're worried that transduction theory is just another one of those

inherently untestable theories — like string theory or theories about parallel universes — think again. With neural transduction theory, we have an enormous advantage: *The transduction device is available for immediate in-depth study.*

Implications and Final Notes

Will transduction theory finally clear up the old consciousness problem? That I doubt, because I don't think there *is* a consciousness problem. Consciousness is just the experience we have when we're observing ourselves or the world. It seems grand simply because we're part of the system we're observing. It's a classic example of how difficult it can be to study a system of which one is an integral part; think of this problem as a kind of Gödel's theorem of the behavioral sciences. (For my whole spiel on this issue, see my 2017 essay, "[Decapitating Consciousness](#).")

If transduction theory proves to be correct, our understanding of the universe and of our place in it will change profoundly. We might not only be able to make sense of dozens of odd aspects of human experience, we might also begin to unravel some of the greatest mysteries in the universe: where our universe came from, what else and who else is out there — even whether there is, in some sense, a God.

If you are as skeptical about flimsy theories as I am, by now you might be thinking: Has Epstein lost his mind (and, if so, where did it go)? Let me assure you that I am as hard-headed as ever. I won't believe in ghosts until Casper himself materializes in front of an audience and pushes me off the stage. But I am also acutely aware of how little we actually know, both about ourselves and our universe. If one simple idea — brain as transducer — might stimulate new kinds of research and might also bring order to what seem to be scores of unrelated, bizarre, and highly persistent human beliefs, I'm all for it.

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Meta's Ray-Bans Can Now Do Real-Time Live AI And Translation



Meta's Ray-Bans are becoming live AI glasses now. Scott Stein/CNET© Provided by CNET

Meta's [camera-equipped Ray-Bans](#) have had a lot of AI features onboard already, but they're getting two more big ones. Always-on continuous AI assistance is arriving onto the glasses starting today for owners who [have early access](#) to Meta's features, as well as onboard translation. Both these features were demoed by Mark Zuckerberg at Meta's Connect developer conference [earlier this year](#).

The features involve continuous audio and camera recording as opposed to specific individual prompts, allowing the Ray-Bans to be used for an extended period of time with the AI features turned on. Saying "Meta, start Live AI" begins the always-on feature. The glasses' LED light stays on when always-on live AI is activated, and Meta keeps a recording of the conversation that can be referred to

throughout the AI session. For translation, it should work automatically while talking, with the translation coming in via the glasses with a slight delay.

The live AI assistance is similar to what [Google just demonstrated](#) on its own prototype glasses this month via Gemini and Android XR, arriving next year.

The always-on AI takes a hit on battery life: expect 30 minutes of use before needing a recharge, according to Meta. But this type of always-on camera-assisted AI is exactly what more tech companies are going to be exploring in the next year. I'll follow up with impressions when I get a chance to test it for myself.

Mark Zuckerberg, Elon Musk, and Sam Altman Announce the End of Smartphones — But Tim Cook Isn't Playing Along

In recent months, a quiet shift has taken shape across **Silicon Valley**. Some of the most powerful voices in **technology** are floating a vision for the future that excludes the very device that has defined the digital era for more than a decade: the **smartphone**. For **Elon Musk**, **Mark Zuckerberg**, **Sam Altman**, and **Bill Gates**, the next wave of innovation doesn't involve a sleeker phone — it replaces it altogether.

Each of them is backing different technologies that promise to [render smartphones obsolete](#). From **brain implants** to digital tattoos and **augmented reality** glasses, their ambitions suggest a world where humans interact with devices not through touchscreens, but directly through thought, vision, or even skin. It is a radical break from the present — one not everyone is ready to embrace.

Neural Links and Digital Tattoos

Elon Musk, the founder of **Neuralink**, is advancing the concept of brain-computer **interfaces**, which allow users to communicate with machines using only their thoughts. According to the company, two human subjects have already received **implants**. The aim is to remove the need for physical interaction with devices entirely — no tapping, no swiping, not even speaking. Instead, thought would drive action.

Bill Gates is championing a different kind of interface. He is backing **Chaotic Moon**, a Texas-based company developing electronic tattoos. These devices, worn directly on the **skin**, are designed to collect and transmit data through nanosensors. Their applications range from **health tracking** to communication and **geolocation**. The tattoos effectively transform the body into a digital platform, without the need for handheld devices.

Vision-First Computing

Meta's chief executive, **Mark Zuckerberg**, is placing his future on **augmented reality glasses**. He predicts that by 2030, these glasses will take over as the primary computing **device**, replacing the smartphone. The concept is to overlay digital content directly onto a user's field of **vision**.

Instead of looking down at a screen, people would experience notifications, navigation tools, and communication features through transparent **displays** worn on their faces. This strategy aligns with **Zuckerberg's broader ambitions in the AR and metaverse space**. The goal, he has said, is to "step beyond screens" and redefine the way people engage with the internet and each other.

Apple's Alternate Path

While competitors set their sights on revolutionary tech, **Apple's** CEO, **Tim Cook**, is sticking with what works. The company recently released the iPhone 16, a device that incorporates advanced **artificial intelligence** to enhance usability but maintains the familiar form factor. Cook continues to emphasize refinement over reinvention, arguing that smartphones remain central to everyday **life**.

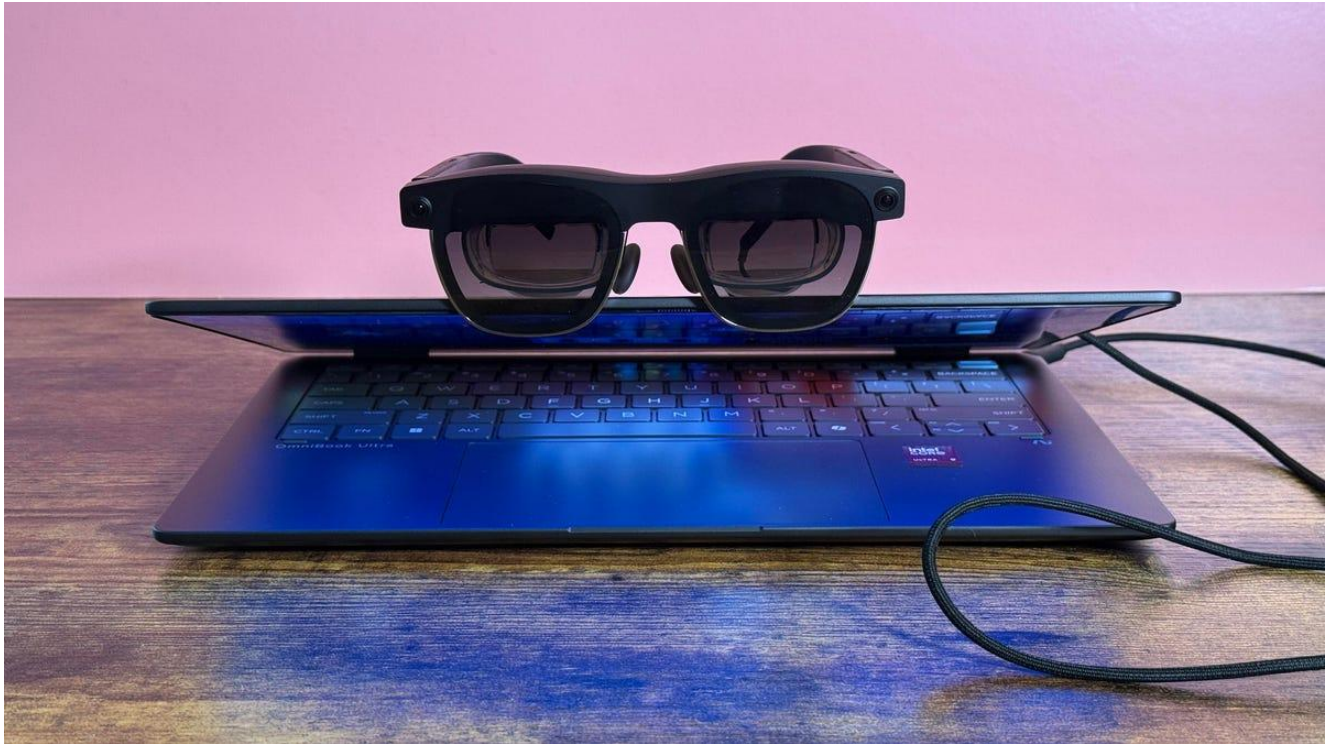
Apple's strategy focuses on incremental **innovation**, improving existing products while introducing new technologies like AR and AI gradually. Cook's philosophy diverges from his peers in that he views the smartphone not as something to be replaced, but as a core **platform** to build upon. "We're committed to improving what people already use," Cook has indicated in public remarks, favoring evolution over disruption.

This growing divide represents more than just product design — it's a split in thinking about how humans should interface with technology. Musk, Zuckerberg, Altman, and Gates are promoting bold **transformations** that embed technology within the body or integrate it seamlessly into our surroundings. Apple, on the other hand, is reinforcing the smartphone's role by adapting it to emerging demands without altering its core.

I Always Dreamed of Expanding My Desktop With Glasses. This Software Made It Real

Spacetop extends Windows laptops to add tons of virtual monitor space with glasses. It should be a preview of how accessories connect with our computers.

May 5, 2025



Spacetop is software that connects display-enabled glasses (Xreal Air 2 Ultra) with certain Windows AI laptops to allow multitasking on a big virtual desktop. This is what I want for all computers.

Scott Stein/CNET

The fantasy is this: I have my laptop -- or tablet, or phone, whatever's nearby -- and by plugging a small pair of display glasses into it, all the things I need can expand on a big virtual display, making seemingly infinite monitor space for myself. Why? To get more space for myself without having to carry anything big. Headphones for your eyes, in a sense.

Display glasses like Xreal's and others already work as plug-in displays for lots of devices, and show a virtual monitor that can feel big and TV-like. But they can't do multi-app multitasking, and that's why my recent test-drive of Spacetop's software got me so intrigued. I can see a future forming here, if other software companies figure out a way to work better with things like glasses.

Spacetop is made by [Sightful](#), a startup that I met with [several years ago](#) when the concept was a display-free laptop keyboard base bonded with tethered Xreal glasses that became the laptop's monitor. That product never happened: instead of using custom-made Chromebook-like laptop bases with Qualcomm processors, the founders pivoted over to using more AI-focused "NPUs" on recent thin AI laptops with processors made by Intel, which Sightful's team says has offered better performance without needing to make a new device to work with glasses.

"The moment we saw [Microsoft's] announcements about AI computers -- that everyone's computers, in the coming few years, are going to be AI computers -- it made perfect sense to say we can enable the audience earlier and faster than if we built our own integrated solution,"

Sightful's founders, Tamir Berliner and Tomer Kahan, told me when Spacetop [transitioned to its new business plan](#) last fall. Instead of a whole new "AR laptop," Spacetop is subscription software that runs on certain Windows laptops and connects with a particular model of [Xreal Air 2 Ultra](#) smart glasses.



I can't shoot photos to show what I saw, but think of it as a larger-size curved space where apps can be laid out from your laptop.

Scott Stein/CNET

The experience: A 180-degree floating desktop

What you get, running this software layer, is a curved desktop space that floats in the air, indicated by small arrays of dots, which you can open Windows apps onto, drag around, and resize as needed. It feels like a desktop for my laptop, but one that's larger and doesn't need my laptop screen at all. Provided you're OK wearing display glasses, this is the way I'd prefer to work: Making my own screens wherever I go and feeling like I've got a larger-scale office without needing to prop open anything else.

Spacetop opens up the conversation around what glasses could be doing when connected with our own computers. That's the part that's missing on most phones and laptops and tablets right now.

Xreal's most recent glasses, the Xreal One, already can fix a curved display in space. Spacetop's software pushes the capabilities more by having more of a handshake with the software on the laptop, which manages what apps will show on-glasses. Qualcomm began working on this type of software [with Spaces](#), which ran on Android phones and interfaced with connected glasses.

Google's [upcoming Android XR software](#) looks like it could possibly do the same down the road. Apple's Vision Pro, which can run a variety of iPad apps and float them anywhere while simultaneously mirroring a Mac monitor, is a bulky device in comparison, and you need both a Vision Pro and a MacBook to float apps around in the way that Spacetop's software enables.



Spacetop's rendering isn't exactly how I saw it, but it's close enough to describe the effective experience (the field of view in-glasses is smaller, but you can turn your head to see apps all around you).

Spacetop

You can't do much more than open individual 2D apps up, though. That's fine for everyday work, and Spacetop's software is aimed at business subscriptions, for people who might want to get more work space beyond their laptop screen while on the road. I could see a use for this in meetings or in situations where you'd want to be looking at something in the real world while floating windows in the air around you. That might sound bizarre, but I used the [Xreal One](#) glasses back in January to take notes on my phone while watching a presentation: my notes app just hovered off to the side of the live speakers I was in the same room with.

Clever details and awkward moments

Spacetop's little software touches are clever. A little toolbar handles app launching, and a duplicate of your laptop display rests on the bottom of the floating desktop, lining up mostly with the actual laptop display that's open. I found that I could glance around at the open floating windows and then go down to the laptop screen and adjust settings if I needed to without feeling strange. My mouse cursor came along with me, either floating in air or appearing back on the laptop screen again as needed, mostly automatically.



The glasses connect via USB-C cable to one of the laptop's Thunderbolt-enabled ports for video and audio to work.

Scott Stein/CNET

That doesn't mean there aren't quirks: I found the pop-up displays sometimes were slow to launch or didn't launch at all, something Sightful suggested I unplug and re-plug the glasses in to fix.

There's also the limited field of view on the glasses to consider. As good as Xreal's glasses are at projecting a quality OLED display in the air, the viewing area is still limited to what feels like a boxed-out rectangle in the middle of your vision. It feels like about the same dimensions as a medium-to-large monitor, and can fit a couple of windows (or one large one) into view easily, but to see the rest of the floating apps around you you'll need to turn your head around to make sure the other parts of the curved desktop come into view. The Xreal Air 2 Ultra glasses can also make your surroundings dimmer like sunglasses, or turn the glasses more transparent as needed, and they have their own speakers.



Prescription inserts are needed for me to use these Xreal Air 2 Ultra glasses, adding an extra layer of thickness. But there are adjustable nose pads.

Scott Stein/CNET

A potential future for glasses (but ideally without a subscription)

The Spacetop subscription is \$200 a year, on top of needing a specific pair of \$699 [Xreal Air 2 Ultra](#) glasses (Sightful is selling the glasses and one year of the software [together for \\$899](#)).

Sightful needs these particular glasses because they have full-room tracking capabilities built in, which can be used in a travel mode to make sure the floating monitor stays centered wherever the laptop is. The software also needs to run, for now, on particular Windows AI laptops with Intel NPUs. I tested on an HP Elitebook.

It's hardly something for the average person right now, but it does show me exactly what I really want: ways for my own laptops and tablets and phones to work better with glasses-as-displays. I think it can happen. Microsoft, Google, and Apple are going to have to wake up and play a better part. In the meantime, Sightful's Spacetop is making some things happen on its own.

Meta is working on a high-tech helmet for the U.S. military



Meta is working on a high-tech helmet for the U.S. military© Anduril/Anduril

Meta founder Mark Zuckerberg became a billionaire by connecting people with their friends to share photos and memories. Now he wants to also connect U.S. soldiers on the battlefield to help them defeat their enemies.

The company announced on Thursday that it will work with defense technology start-up Anduril to offer the U.S. military and its allies technology for soldiers involving augmented reality and artificial intelligence software.

The venture sees a worldwide consumer brand integrated into the lives of billions of users around the globe expand into a line of business that requires picking sides.

The partners aim to "transform how warfighters see, sense, and integrate battlefield information," Anduril [said](#). The companies are already working on a high-tech helmet as part of a project called EagleEye, Anduril founder Palmer Luckey [told](#) the tech podcast "Core Memory."

Meta's new business initiative also reunites Zuckerberg with Luckey, the founder of the virtual reality company Oculus. In 2017, he left a high-profile position at the company then called Facebook, after public outcry over his \$10,000 donation to an anti-Hillary Clinton organization.

Luckey built the foundations of Meta's work on virtual reality following the company's [acquisition](#) of Oculus for \$2 billion in 2014. After leaving the company, he co-founded Anduril, one of the [most prominent](#) companies among a wave of venture-backed start-ups that has emerged as the importance of technology such as drones and AI becomes apparent on the battlefields of Ukraine.

"I am glad to be working with Meta once again," Luckey said in a statement. "My mission has long been to turn warfighters into technomancers, and the products we are building with Meta do just that."

Zuckerberg said in his own statement that Meta was "proud to partner with Anduril to help bring these technologies to the American servicemembers that protect our interests at home and abroad."

Meta's push to serve the military arrives as the company and its founder have attempted to rebrand themselves for President Donald Trump's second term.

Since Trump's reelection, Zuckerberg has sought to [strengthen his relationship](#) with the president with flattering public comments, private meetings and a \$1 million [donation](#) by Meta to the president's inauguration committee.

Meta has also made Republican-friendly [policy changes](#) including scrapping its fact-checking program, overhauling its content moderation strategy to be more permissive, and [ending diversity](#), equity and inclusion initiatives.

While Zuckerberg has remade Meta, his relationship with Luckey has also evolved.

The VR entrepreneur left Facebook during Trump's first term as president, a time when many tech industry workers and their bosses were openly wary or even dismissive of Trump.

News reports about Luckey's donation to a group that ran anti-Hillary Clinton ads sparked backlash among Facebook employees and the wider community of

virtual reality developers. He departed soon after, though neither Luckey nor the company explained why.

Andrew Bosworth, the former leader of Meta's virtual reality efforts, said at the time that politics had nothing to do with Luckey's departure. But Luckey told people he was fired over his political beliefs and support for Trump, the Wall Street Journal has [reported](#).

In September, before Trump's election victory, Luckey returned to Meta on a visit to try out the company's latest augmented-reality-powered glasses, called Orion. Afterward, Bosworth, now Meta's chief technology officer, [publicly apologized](#) to Luckey for his previous comments, saying in a post on X: "I'm grateful for the impact you made at the company and in developing VR overall. Looking forward to showing you more of our work in the future."

Luckey said in an episode of the "Core Memory" podcast released Thursday that Zuckerberg didn't fire him directly and that many of the people who made the decision have left the company.

"When every single person that conspired to get rid of me has been run out of the company, what is there really left to be truly angry at?" he said.

Among the first projects the two companies plan to tackle is the EagleEye helmet for soldiers. Luckey described it as combining an AI assistant with communications and other functions.

It will be an "ever-present companion who can operate systems, who can communicate with others, who you can off-load tasks onto ... that is looking out for you with more eyes than you could ever look out for yourself, right there, right there in your helmet," Luckey said.

Anduril and Meta said they have submitted a joint white paper for an Army contract for augmented reality devices that give U.S. soldiers "increased lethality, mobility, and situational awareness," according to a Defense Department listing for the project.

The EagleEye system will improve soldiers' hearing and vision by helping them detect drones flying miles away or hidden targets, the Journal reported. The project will rely on Anduril's autonomy software and Meta's AI models.

Luckey said that effort will build on Anduril's [work](#) on the Army's Integrated Visual Augmentation System (IVAS) program, in which it has partnered with Microsoft to develop an augmented-reality-powered headset for soldiers.

To aid the collaboration, Meta will draw on its hefty investments in AI models known as Llama and its virtual reality division, Reality Labs. The company has built several iterations of immersive headsets aimed at blending the physical and virtual worlds — a concept known as the metaverse.

Meta's new venture comes after a shift in recent years that has seen Silicon Valley companies once hesitant to work with the military get comfortable with the Pentagon.

In November, Meta [said it would allow](#) U.S. government agencies and contractors working on national security applications to use its AI models. In 2018, Google declined to renew a deal to sell AI technology to the Pentagon after an employee revolt, but it now speaks proudly of military contracts and recently [dropped a pledge](#) not to apply AI to surveillance or weaponry.

Gerrit De Vynck contributed to this report.

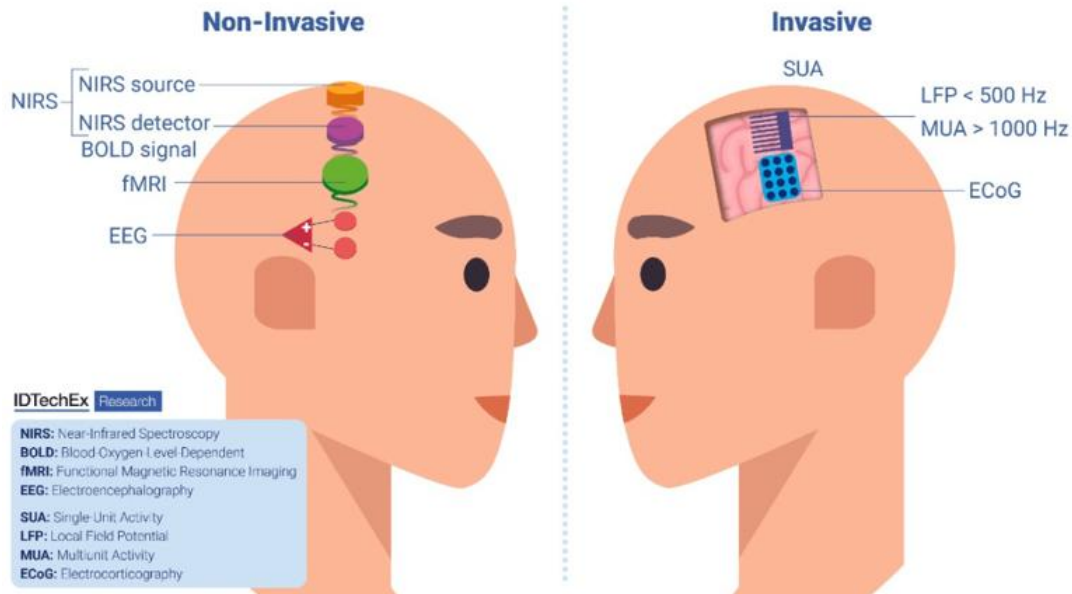


Brain computer interfaces represents an array of technologies that can decode neural signals, writes DR TESS SKYRME, senior technology analyst at IDTechEx.

The brain computer interface market represents an array of technologies which can decode neural signals, or in other words, read minds.

Electrodes or sensors can be placed either on the surface of the head, within the skull, or even within the brain itself to record brain activity. This data can then be used for cursor and keyboard control, speech decoding, and even exo-skeletons.

This technology has the potential to revolutionise the quality of life for people living with spinal cord injury, quadriplegia, and other motor and speech function impairments. IDTechEx predicts in their latest report, [*Brain Computer Interfaces 2025-2045: Technologies, Players, Forecasts*](#), that there will be evolving opportunities for both non-invasive and invasive technologies across the next twenty years, with the overall brain computer interface market forecasted to grow to over US\$1.6-billion by 2045.



Market for mind-reading takes shape

An overview of the major non-invasive and invasive methods of brain-computer interfacing. Source: IDTechEx

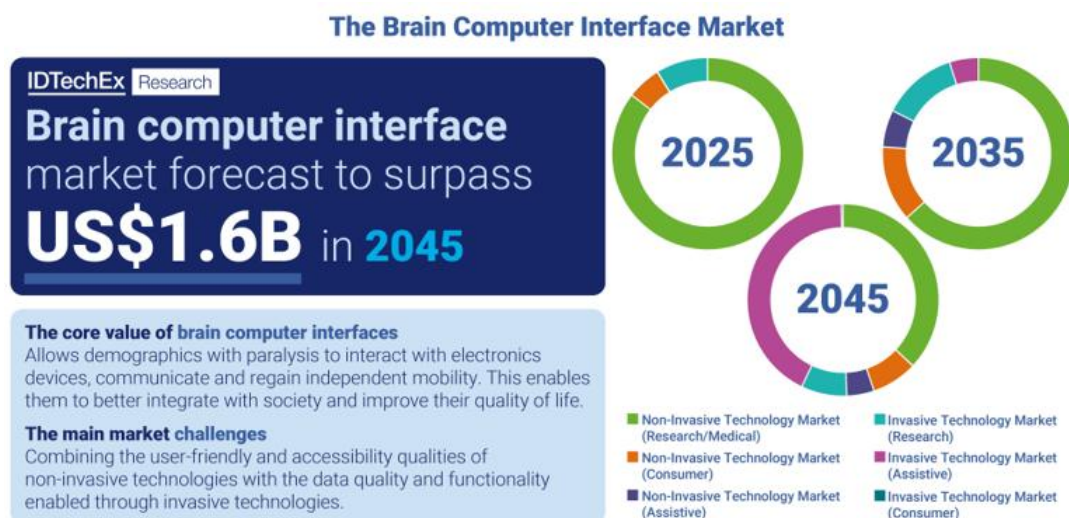
Non-invasive technology – the next generation of consumer HMI?

Non-invasive technology approaches include electroencephalography (EEG), functional near infrared spectroscopy (fNIRS), and now even wearable magnetoencephalography (MEG). While non-invasive devices have an established market for brain monitoring, their potential for brain computer interfacing is yet to be fully realized. However, as the technology continues to improve, so do data processing techniques. This is complemented by an increased consumer acceptance of head-worn [wearables](#) such as hearables and [AR/VR headsets](#).

IDTechEx expects the scale of market opportunity will largely be dictated by the success of other human machine interfacing (HMI) approaches emerging for the next generation of consumer devices. This includes competition from approaches such as electromyography (EMG), eye tracking, and hand tracking. Yet, with more and more demonstrations of non-invasive BCIs being used for 'mind-controlled' gaming, wheelchair control, and speech decoding, this sector is putting pressure on the less accessible invasive sector to perform.

Invasive technology – big names, big promises, big challenges

The hype around invasive brain computer interfaces remains high. High-profile companies such as Neuralink and Blackrock Neurotech have gained more public attention as trials in human patients begin and funding levels dramatically increase. Yet more players are seeking to enter this market than many realize, competing on levels of invasiveness, biocompatibility, system complexity, and time to market. Collectively, this eco-system is making big promises about the revolutionary potential of their technology in becoming assistive tools that can rapidly improve patient quality of life. Yet behind the headlines, there are big challenges ahead for this sector, and the pressure to demonstrate the rewards outweighing the risks is mounting.



Market for mind-reading takes shape

The brain computer interface market. Source: IDTechEx

Market outlook

IDTechEx's latest report, "[Brain Computer Interfaces 2025-2045: Technologies, Players, Forecasts](#)", analyses the major technologies, players, applications, and challenges within the market. It includes coverage across non-invasive and invasive technologies, comparisons across key technical benchmarks, and market forecasts from 2025 to 2045. There is also detailed coverage of supply chain innovations impacting this market, including coverage of [wearable sensors](#) such as dry-electrodes, photo-detectors, and magnetic field sensors, including [quantum sensors](#).

Picture this: In a world where smartphones are as ubiquitous as wristwatches, we're standing on the precipice of a monumental shift. The same devices that revolutionized how we communicate, work, and play are now hinting at their own obsolescence.

As we hold our sleek, feature-packed smartphones, we can't help but wonder: What could possibly come next? What new invention is lurking around the corner, ready to make these indispensable gadgets a relic of the past?

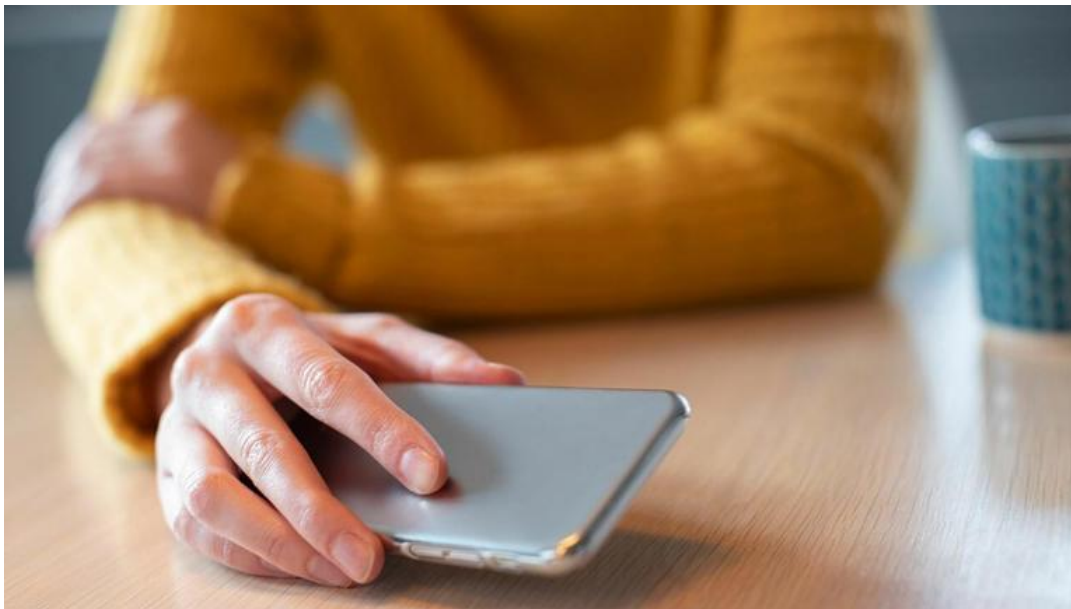


Image Credit: Daisy Daisy/Shutterstock.© Provided by Viral Chatter

The answer lies in the subtle cues and emerging trends that are quietly shaping the future of personal technology. From the corridors of Silicon Valley to the latest tech expos around the globe, whispers of the next big thing are growing louder.

It's not just about more pixels or faster processors; it's a fundamental shift in how we interact with technology.

As you ponder the future of your smartphone, consider this: The clues to its successor are already here, woven into the fabric of our daily tech use. The end of

the smartphone era is near, and what's coming next is not just an upgrade – it's a transformation.

The Smartphone Revolution



Image Credit: 19 STUDIO/Shutterstock.© Provided by Viral Chatter

In 2007 ^(ref), the world witnessed the launch of Apple's iPhone, a device that didn't just upgrade existing technology but revolutionized it.

With each iteration, from the iPhone 5s to the current iPhone 14, we've seen enhancements in power, camera quality, and functionality. However, the fundamental design and user interface have remained surprisingly consistent.

This brings us to a critical question: Have we reached the pinnacle of smartphone innovation?

Peak Smartphone: The Crossroads of Technological Evolution

Today, we stand at a crossroads in the evolution of communication technology. We face two possibilities: either smartphones have reached their final form, with only incremental upgrades in the future, or a new, disruptive technology is on the horizon, ready to replace smartphones as we know them.

The pressure is immense on the world's wealthiest companies to innovate and lead us into the next era of communication technology.

The Future of Communication

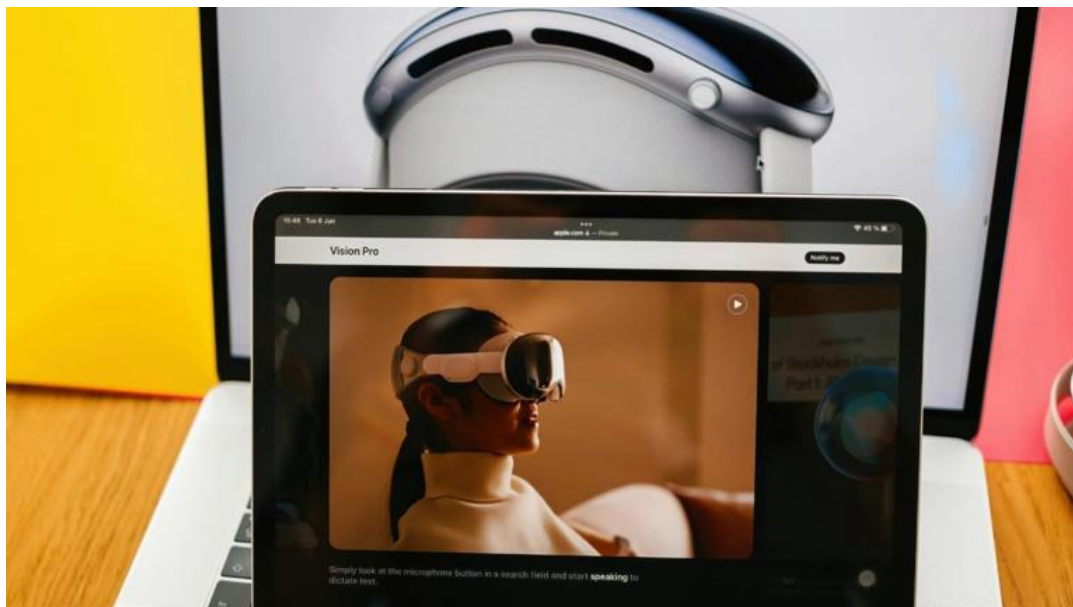


Image Credit: Hadrian/Shutterstock. © Provided by Viral Chatter

The future seems to be gravitating towards augmented reality (AR) and artificial intelligence (AI).

Apple's Vision Pro ^(ref) and Meta's Quest ^(ref) are examples of how technology is moving towards more immersive experiences. These devices aim to integrate digital information seamlessly into our physical world, potentially replacing the traditional smartphone screen with a more dynamic, interactive interface.

AI Pin: A Step Towards Invisible Technology

Companies like Humane Inc are exploring new frontiers with devices like the AI Pin. This wearable device acts as a personal assistant, blending into the background of our lives.

It offers a hands-free experience, projecting information onto surfaces like your hand, and is controlled by voice and gestures.

Representing a shift towards making technology less intrusive and more integrated into our daily experiences.

The Future is Now: Embracing the Next Wave of Tech Innovations

As we ponder over the next big leap in communication technology, it's clear that the future holds exciting possibilities.

Be it smart glasses, AI assistants, or yet-to-be-invented devices, the way we interact with technology is poised for a significant transformation. These innovations promise to make our interaction with technology more natural and integrated, marking another milestone in the ever-evolving journey of communication technology.



Solos© Provided by Digital Trends

Solos, the company behind the [AirGo 3 smart glasses](#), continues to add new functionality to the cutting-edge wearable. The latest update is a live search feature where you can ask the AI-powered smart glasses a series of questions following a tap of the frame to wake the system up. Because it understands context, you can phrase your questions naturally.

The Solos smart glasses come in several different styles and are audio smart glasses, unlike [Ray-Ban Meta](#) smart glasses, which incorporate a camera. What makes them stand out in comparison is that the “smart” technology is built into the arms, allowing you to change the face and lenses at will. This allows you to use the AirGo3 glasses for everyday, sport, or casual wear without losing functionality.

The Live search update uses Solos’s own SolosChat software and AI services like ChatGPT. Solos suggests use cases, including searching for prices and information on products when out shopping or as a tour guide in a new location. The smart glasses will follow the conversation without you having to repeat or specifically phrase questions to get an answer.



Solos© Provided by Digital Trends

Kenneth Fan, co-founder at Solos, said:

“By adding live search to smart glasses, we’re allowing people to have the power of an AI assistant and teach engine instantly available anytime with just a natural voice interface. Our open and modular technology architecture enable Solos to integrate the latest innovations in artificial intelligence and software services.”

Live Search joins other AI software features, including live translation, text-to-speech support for messages, and access to an AI assistant to help with organization and work. Live Search will be added through an over-the-air software update that will be delivered to the smart glasses starting today. Solos AirGo 3 smart glasses start at \$199 and are available in several different styles and colors, with the option to add prescription lenses.

An [AI assistant](#) is available for the Ray-Ban Meta smart glasses in the U.S. It makes use of the camera to provide more information on your surroundings. Ray-Ban Meta smart glasses also come in different styles and colors, with or without prescription lenses, and start at \$299.



Tiny startup bets that you will spend \$2000 on a work 'laptop' with no screen — Spacetop G1 uses AR glasses to deliver a virtual 100-inch display but it runs on Google ChromeOS© Sightful

After nearly three years in development, Sightful has unveiled Spacetop G1, the world's first Augmented Reality laptop which uses AR glasses to deliver a virtual 100-inch display and runs on Chrome OS.

Currently priced at \$1700 (it usually retails at \$1900), the Spacetop G1 is [available to reserve for a \\$100 refundable deposit](#) and is expected to start shipping in October 2024. It's US-only for now.

Developed by a team of over 60 spatial computing experts, including veterans from Apple, Microsoft, and Magic Leap, Spacetop offers a private, virtual workspace. The laptop form factor houses customized hardware and a proprietary spatial environment, allowing users to design and customize their workspace wherever they are.

Tethered AR glasses

The Spacetop G1 measures 0.51 inches tall, 2.44 inches wide, 11.81 inches deep, and weighs 3.08 lbs. It runs on the Qualcomm Snapdragon QCS8550 platform

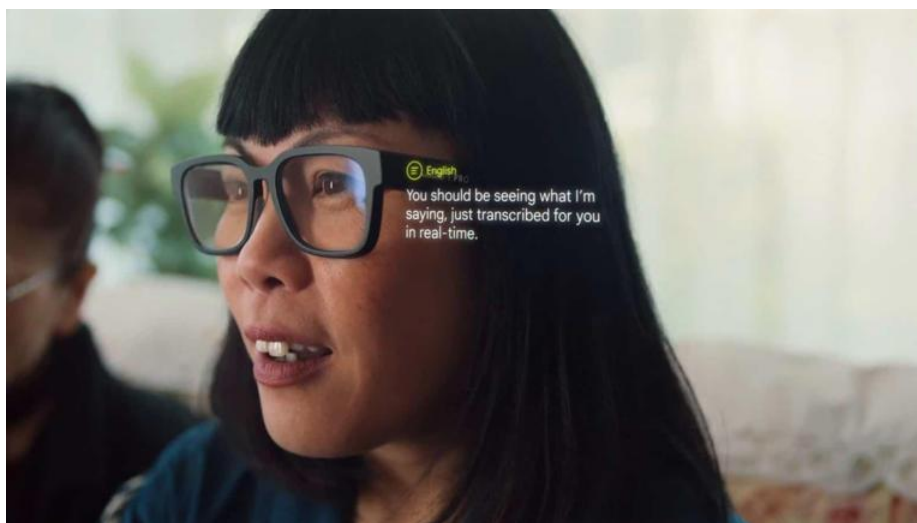
with a KRYO CPU and Adreno 740 graphics, and comes with 16GB LPDDR5 memory and 128GB UFS3.1 storage.

The G1 features two USB-C ports and connectivity options include Wi-Fi 7, 5G (there's support for a Nano-SIM and eSIM) and Bluetooth 5.3. The 60Wh battery promises up to 8 hours of life, or a "full day's work" as the company puts it.

The G1 integrates NReal glasses with the proprietary Spacetop environment, providing clear, high-resolution AR windows overlaid onto the real world. The glasses, which attach to the laptop, weigh 0.18 lbs and come with two OLED display panels (1920x1080 pixels per eye) with a 90Hz refresh rate and a 50° diagonal field of view. Custom prescription lenses are available from -8.00D to +6.00D.

It will be interesting to see if businesses are ready to embrace the concept of a screenless AR laptop like the Spacetop G1, especially given its high price point.

"Laptops are essential to our daily working lives, yet the technology hasn't evolved to match the modern 'work from anywhere' mentality," said Tamir Berliner, CEO and co-founder of Sightful. "Meanwhile, Augmented Reality holds promise but lacks a daily use case. Spacetop G1 is the first step towards a new paradigm."



Google IO 2022 smart glasses prototype© Provided by Android Headlines

Science fiction has been the cradle of multiple ideas that today are reality, while others seem much more possible than before. Until relatively recently, a decent VR experience was impossible or very cumbersome to enjoy. Another advanced technology that seems more viable today is AR glasses that replace your phone, and [Apple](#) would be looking for it.

According to Bloomberg, Apple is [restarting](#) a project to develop advanced AR glasses. These would be much [lighter](#) than the [Apple Vision Pro](#), whose ergonomics are not its best virtue. However, the company would like you to be able to use the glasses all day, so they would have fairly contained dimensions. Its format would be similar to that of the [Google Glass](#) project from years ago.

Apple's AR glasses could fully replace your iPhone

Apple already boasts of having a lot of experience in AR-based UX thanks to the development of the Vision Pro. According to the report, some of the Vision Pro technologies would be implemented in the lightweight AR glasses. Internally, a release date of 2027 has even been discussed. However, the source adds that even the development team sees that deadline as unlikely.

Why Apple is Quietly Buying AI Companies

Apple has yet to decide whether to invest in everything that a project of this magnitude requires. The company must study the profitability that AR glasses capable of replacing iPhones would bring. So, they must consider key items such as development cost, public interest, and price for the user, among others. The company will surely be quite cautious after the [failure in sales](#) of its Vision Pro.

Apple has yet to decide on the viability of the project

Vision Products Group is the team in charge of all the company's "Vision" projects. Recent reports suggest that they are focusing on a more [affordable](#)

[Vision headset](#). Bloomberg claims that the team will decide on the viability of AR glasses as they work on other things.

In its day, the Google Glass project had many factors that influenced [its failure](#). Probably the most important factor was the starting price of \$1,500. However, there were also serious regulatory challenges due to its video recording capabilities. It will be interesting to see if potential Apple AR glasses manage to overcome these challenges in the future.

Scientists have created an "exceptionally bright" light source that can generate quantum-entangled photons (particles of light) which could be used to securely transmit data in a future high-speed quantum communications network.

A future quantum internet could transmit information using pairs of [entangled photons](#) — meaning the particles share information over time and space regardless of distance. Based on the weird laws of [quantum mechanics](#), information encoded into these entangled photons can be transferred at high speeds while their "quantum coherence" — a state in which the particles are entangled — ensures the data cannot be intercepted.

But one of the key challenges in building a quantum internet has been that the strength of these photons can fade the further they travel; the light sources have not been bright enough. To build a successful quantum internet that can send data over vast distances, photons must be strong enough to prevent "decoherence" — where entanglement is lost and the information they contain disappears.

Quantum mechanics is our fundamental framework for understanding the physics.

Paul Explains: Quantum Mechanics

In research published 24 July in the journal [eLight](#), scientists from Europe, Asia and South America created a new type of quantum signal source using existing technologies that achieves extremely high brightness.

They achieved this by combining a photon dot emitter (a generator of single photons, or a particle of light) with a quantum resonator (a device to strengthen the quantum signature) to create the powerful new quantum signal.

What makes the recent research especially interesting is that the individual technologies have been independently proven in laboratories, but they had only been tested separately. This study is the first time they have been used in conjunction with each other.

Researchers combined the photon dot emitter with a circular Bragg resonator (a reflector used to guide electromagnetic waves) on a piezoelectric actuator (a device that generates electricity when heat or stress is applied). Together they created an enhanced form of photon emitter, which can fine-tune the emitted photons for maximum polarized entanglement. This was controlled by using the piezoelectric actuator.

Photon pairs generated by the device had a high entanglement fidelity and extraction efficiency — meaning that each photon is bright enough to be useful and holds its "quantum signature" (a useful quantum property) well. It was previously hard to achieve both a useful level of brightness and a high entanglement fidelity at the same time, because each aspect required a different technology and these were difficult to combine in a scalable manner.

This is a significant step forward in developing practical quantum technologies, demonstrating how they can be combined together to create a more powerful and viable light source.

Unfortunately, we should not expect a quantum internet any time soon, as the various technologies remain in the experimental and development phase. Making the photon emitter used in the study also required toxic raw materials, including arsenic, which required specialist handling. There are also safety concerns around the use of gallium arsenide, which the photon dot emitter was made from. [Fisher Scientific](#), a supplier of laboratory equipment and chemicals for scientific research, [lists](#) gallium arsenide as hazardous for several reasons, including its carcinogenic properties.

The safety concerns relating to the use of these materials could limit the scalability of the methodology outlined. Viable alternative materials may

therefore need to be identified in generating bright, entangled photons for future quantum communications network

The next stage in the development process will be to integrate a diode-like structure onto the piezoelectric actuator. This would allow an electric field to be generated across the quantum dots, in order to counteract decoherence and therefore boost the degree of entanglement.

Although there are many further steps to take in developing a quantum internet, successfully combining a photon emitter and a resonator to achieve photons with high brightness and entanglement is nonetheless a significant step forward, the scientists said.

From [Google Glass](#) to [Magic Leap](#) to [Oculus Rift](#), there have been numerous attempts to get wearable computers in front of your eyes. But none have changed how we interact with technology in the way their promoters imagined. Qualcomm CEO Cristiano Amon has hinted that technology heavyweights aren't done trying, though. Amon says his firm is working with Samsung and Google on mysterious new mixed reality smart glasses—but don't expect an Apple Vision Pro competitor.

In an interview with CNBC, Amon noted that the companies had agreed to work together to develop smart glasses that he describes as "mixed reality" as opposed to virtual reality. That suggests it will superimpose data and visuals on top of the real world rather than enclosing users in a virtual environment with optional passthrough video. That's the approach currently in use at Apple and Meta, which makes the most popular wearable computers.

Meta and Apple have designed their headsets with powerful processors and sharp integrated displays, which make the hardware expensive and heavy but capable of standalone operation. Amon says its unnamed smart glasses project will take a different approach, acting as an accessory for your phone.

"It's going to be a new product, it's going to be new experiences," [said](#) Amon. "But what I really expect to come out of this partnership, I want everyone that has a phone to go buy companion glasses to go along with it."

Qualcomm CEO discusses AI on the 'edge'

Those "new experiences" will have to be compelling, though. Truly useful smart glasses have been slow to arrive. It's difficult to balance performance and battery life in wearable devices, particularly gadgets that are supposed to remain perched on your face all day. The simpler approach hasn't been great, either. The [Meta Ray-Ban smart glasses](#) barely do anything other than play music and take grainy photos—there isn't even a display.



Snapdragon AR2

Qualcomm has already developed chips for smart glasses. Credit: Qualcomm Amon says AI will be a key aspect of the glasses, and Google is investing heavily in that technology and developing the Android operating system for phones that the glasses will have to talk to. Samsung, meanwhile, is the largest manufacturer of Android phones and a major producer of OLED panels and similar display tech that will be essential for such a product. And then there's Qualcomm, which produces some of the most efficient mobile chipsets, including the Snapdragon AR2 Gen 1 for smart glasses.

Neither Google nor Samsung have commented directly on Amon's statements. Still, Samsung mobile chief TM Roh did mention several months ago his firm would announce a new mixed-reality platform within a year. There's no guarantee this partnership will bear fruit—we may never hear about it again, or the eventual product could be a mere blip on the radar. However, this group of companies theoretically has the expertise to make a go of it.

Of everything we've seen in 2024, smart glasses are proving to be a genuine hot property. While wearables such as Samsung's Galaxy Ring are making headlines and bringing the smart ring into the limelight, smart glasses — [a wearable wonderkid a decade in the making](#) — are also beginning to come into focus.

But how do you know that a product is likely to force its way into the mainstream and become one of the next must-have devices for years to come? Well, there's market speculation from well-established analysts or a growing buzz among tech outlets. However, there's also potentially the biggest nod towards the success of any given device, the news that Apple is making one too.

Apple once sneered and derided its competitor's initial efforts at bringing smart glasses to the consumer market, but, ten years removed from the ill-fated [Google Glass](#), the company is currently committed to releasing its own smart glasses, and it could lead to the mainstream moment this wearable has been waiting for.

Apple smart glasses: What we know

While Apple is a company well known for having any number of irons in the fire at one time, we can never say for certain that its behind-closed-curtains collection of in-the-works projects will materialize into anything that lands on store shelves.

However, when it comes to smart glasses, things are looking ever more likely to progress with *Bloomberg's* resident Apple auteur Mark Gurman highlighting Apple's commitment to the project in his latest [Power On newsletter](#).

iPhone 14 and Planned Obsolescence

The long-standing "Apple Glass" rumors will seemingly take their first steps into realization as Apple's Vision group continues to expand on the company's new face-worn focus that kickstarted with this year's release of the Vision Pro.

However, while the Vision Pro immediately dove into the deep end of high-tech headsets, offering one of the most premium experiences we've seen so far, Apple's first venture into smart glasses could be a much more modest matter.

Apple smart glasses: What to expect

While it's long been the rumor that Apple is looking towards developing a pair of "true" AR smart glasses, Gurman states that "true augmented reality glasses has been tabled due to technical challenges," the company's first pair of smart glasses could more clearly resemble the [Meta Ray-Ban Smart Glasses](#), which released in October last year.

Meta's frames refine the smart glass experience by offering a Bluetooth and Wi-Fi-enabled pair of Ray-Ban's iconic Wayfarer sunglasses that offer touch capacitive controls for handling calls and music playback through open-ear speakers, housed directly within the temples of the frames.

If Apple hopes to emulate Meta's success in this market, then it's more than capable of providing a similar, if not superior, experience.

Taking this another step further, the Meta Ray-Ban smart glasses also feature a built-in ultrawide 12-megapixel camera and multi-mic system for image and video capture from the first-person perspective.

However, the cherry on top of Meta's smart glasses came with the arrival of Meta AI, which allowed hands-free access to the company's premier multi-modal AI chatbot. Wearers can interact with Meta AI through natural language prompts in a similar way to smart home assistants. Simply saying "Hey Meta..." activates the onboard assistant allowing wearers to engage with the AI.

The AI can also [access the glasses' camera to comment and respond based on real-world visual inputs](#) such as translating foreign languages, helping to choose outfits, and giving you more information on landmarks or works of art.

If Apple hopes to emulate Meta's success in this market, then it's more than capable of providing a similar, if not superior, experience.

Apple's smart glasses could draw upon the tech housed a wide range of Apple products to emulate any number of features the Ray-Ban Meta Smart Glasses offer to complete one of the most well-rounded smart glasses offerings we've seen to date.



A concept image of Apple-branded "true" AR glasses imagines how the company's smart glasses ambitions could eventually be realized. (Image credit: Apple)

Apple smart glasses: What we'd like to see

The first generation of Apple smart glasses would do well to draw inspiration from the audio excellence of the AirPods together with the iPhone's quality camera offerings while making great use of the company's all-new [Apple Intelligence](#) AI — not to mention the long-awaited AI Siri overhaul [expected to release next year](#).

Where Apple could go one further is to double up the camera offerings, allowing wearers to capture spatial images and video in full 3D, something already implemented into [iPhone 15](#) models.

Smart glasses also allow for various health and lifestyle tracking capabilities like those features in the [Solos AirGo 3](#), which offers step tracking, posture reminders and correction from its built-in gyroscope, and even an optical heart rate sensor hidden inside one of its temples.

With health and fitness tracking becoming one of Apple's major focuses with the Apple Watch, it's likely that we could see the company adopt a similar approach for its smart glasses.

This would not only expand on what its smart glasses could offer wearers but also help to set the foundations of a future "all-in-one" wearable that could viably replace the iPhone once Apple figures out how best to implement displays into this product.

Will Apple smart glasses replace the iPhone?

It was 2007 when Steve Jobs took to the stage to reveal the iPhone to the world for the first time. Since then, we've seen Apple's smartphone refined, reformed, and redesigned countless times through innovation and invention.

However, over fifteen years on from this landmark announcement, we're finally staring down the barrel of a product that could eventually see the smartphone dethroned as the everyday computing companion.

Likely, this first generation of Apple smart glasses won't be the one to complete such a Herculean task, but the company's "true" AR glasses could well be the ones that pave a new path ahead for personal tech.

Even Meta CEO Mark Zuckerberg believes the eventual release of "true" AR glasses is a ["Holy grail" moment in tech](#), and that's something he and his company are being [heavily linked with showcasing as early as later this year](#).

That being said, Apple's first-generation smart glasses may include a cellular and Wi-Fi option, similar to its iPad and Apple Watch offerings. Thanks to the sleuths at *Patently Apple*, we already know that Tim Cook and Co. are exploring how best to [outfit its future glasses with cellular antennas](#).

While it's unlikely that anyone will be ditching their iPhone for this first-generation device, it seems highly likely that it will be available as a stand-alone device of its own, and not brought to market as an accessory that is iPhone dependent. As for how future iterations are adopted, especially "true" AR glasses, that remains to be seen.

When can we expect them?

With so much potential to be found in Apple's upcoming smart glasses, it's only natural to want to know when we can expect them to release.

While we can't say for certain they will, insiders and analysts believe they're on their way, with the reputable [Ming-Chu Kuo believing that a 2026 release date](#) is possible, with Metalens production likely allowing for Apple to chase its "true" AR glasses dream further down the line.

An even more positive prediction comes again from *Blomberg's* Mark Gurman, who believes we could see Apple's smart glasses [arrive by the end of 2025](#).

Of course, these dates should be taken with a healthy amount of salt, as Apple is no stranger to abandoning projects or delaying them until they're completely satisfied with the end result.

However, with a more stripped-back approach to its smart glasses on the cards, leaving AR out of the equation for the time being, it's very likely that Apple can follow through on its ambitions in a faster manner and capitalize on the growing popularity that this form of wearable has to offer.

What are smart glasses? Yesteryear's 'next big thing' is finally finding an audience

published July 10, 2024

An eyewear revolution you don't want to miss out on



(Image credit: Laptop Mag / Rael Hornby)

Wearable tech has become commonplace in the digital age as everything from watches to rings receive 'smart' overhauls that unlock a slew of new functions for familiar forms, from tracking health metrics to more conveniently interacting with other devices. However, while we can all recognize an [Apple](#) Watch, we may be less familiar with other forms of wearable — particularly, smart glasses.

There's good reason for such oversight too. On their initial release into the wilds of the commercial market, smart glasses were more prone to jeers and jibes than shock and awe.

As a glasses wearer, it's plainly obvious to me that my regular frames are bursting with untapped potential.

While the tech was impressive, they were often seen as little more than an expensive status symbol for the tech-obsessed, and a genuine threat to the privacy of anyone not positioned behind their lenses. However, as times have changed, so too have attitudes, and a smart glasses renaissance could be primed to explode in popularity in the very near future.

What makes smart glasses important? Well, when it comes to finding a wearable that can do it all, the answer for many of us is right in front of our faces. Literally. While glasses have helped correct vision for centuries, their form and position on the body make them ideal for providing visual and audio feedback in the most unobtrusive and accessible way possible.

I'm a huge proponent of smart glasses and have been for some time now. As a glasses wearer, it's plainly obvious to me that my regular frames are bursting with untapped potential — and several of my experiments with smart glasses have shown me that they're more than capable of housing all kinds of wonderful tech too.

So, let's take a deeper look at what smart glasses are and some of the frames we'd recommend you become familiar with.



Smart glasses like the XREAL Air 2 AR Glasses are face-worn displays that can project 100-inch virtual screens in front of users. (Image credit: Laptop Mag / Rael Hornby)

What are smart glasses?

Smart glasses, like regular glasses, are face-worn eyewear that can not only help correct vision but also offer additional functionality. They can interact with your other smart devices and computers or work stand-alone to provide media playback, activity tracking, and more.

Although they've been around since 2004, they're only truly beginning to make their presence known in the mainstream.

Why check your phone for notifications when you can be alerted through a heads-up display (HUD)? Why rely on physical screens when you can project content directly in front of your eyes and all around you with augmented reality (AR)? And why let a phone call interrupt you when you can use your smart glasses to receive calls completely hands-free?

Smart glasses offer a new way of being connected to your favorite tech. Although [they've been around since 2004](#), they're only truly beginning to make their presence known in the mainstream. While Google tried its hand at the format in 2014, a generally negative reaction to its camera-adorning frames set the consumer viability of these devices back for some time.

However, consumer attitudes have started to shift. Despite several high-profile flops, wearables are now commonplace (remember, Google Glass was unveiled even before the very first Apple Watch launched), smart glasses sales are [currently predicted to double year-over-year](#), Meta's latest smart glasses have [proven to be a surprise success](#), and the growing popularity of AR and AI has given the [smart glasses form factor rejuvenated use cases](#) — even [Apple is pondering making pair of smart glasses](#) of its own according to one *Bloomberg* report.

The market is now more welcoming than ever to wearables of this sort, with smart glasses morphing into a much more attractive prospect due to the many useful features and capabilities they can offer.



Ray-Ban Meta's smart glasses are better suited to media capture and audio playback, syncing with a smartphone instead of housing its own display. (Image credit: Future)

What types of smart glasses are there?

While smart glasses aren't exactly commonplace, there are a considerable number of manufacturers dedicated to designing frames that offer all kinds of advanced functions.

Because of this, there's no universal example of what a pair of smart glasses must include to be considered as such. However, a majority of smart glasses fall within one or more of the following categories:

- **Smart glasses for media capture:** Mirroring the spy glasses of espionage novels, but hopefully not abused for creepshot potential, some devices like the [Ray-Ban Meta smart glasses](#) use built-in microphones and cameras to capture images and video from a first-person point of view.

These frames are great for those looking to capture some social media snaps, though you'll need a mirror handy if you're interested in taking the perfect selfie.

- **Smart glasses for communication:** One of the more basic smart glasses variants are those designed to replace hands-free headsets for inbound and outbound phone calls.

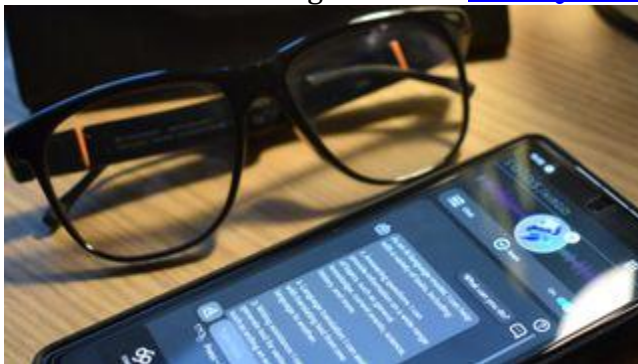
While they lack any of the more fancy display or AR/XR capabilities of premium models, these smart glasses are generally much more affordable and offer built-in microphones and open-ear audio for music playback and call handling.

- **Smart glasses for AI:** Tech's latest craze is undoubtedly AI, and there's a push to infuse large language models (LLMs) into just about every product there is. However, when it comes to smart glasses, there may be no better home for a super-intelligent assistant.

With multi-modal AI models now fairly common, smart glasses like the [Solos AirGo 3](#) and [AirGo Vision](#) offer unique ways to use AI to interact with the world around you using contextual voice, text, and visual information.

- **Smart glasses for AR/XR:** Augmented (or mixed) reality glasses are among the more expensive options on the market. They provide a virtual display for mobile and desktop devices.

AR smart glasses like the [XREAL Air 2](#) and [VITURE Pro XR](#) are also equipped with head tracking sensors capable of providing 3DoF (Three Degrees of Freedom) to floating AR windows. With the right accessories, glasses like these can also offer 6DoF tracking similar to [Meta Quest 3](#) and [Apple Vision Pro](#) headsets.



Frames like the Solos AirGo3 Smart Glasses allow for instant access to ChatGPT via a discrete action button linked to a mobile app. (Image credit: Laptop Mag / Rael Hornby)

Outlook: Are smart glasses the future?

Call me biased, but as I sit here wearing a pair of smart glasses myself, I can say with certainty that these devices are incredibly useful and packed with potential. A pair of

lightweight AR glasses can turn a simple laptop into a multi-screen workstation, while others give you instant access to some of the most powerful [AI](#) models for real-time assistance.

While several of the more popular AR models [excel](#) at delivering compelling entertainment experiences in 2D and 3D media, the potential of smart glasses isn't limited to the living room.

Call me biased, but as I sit here wearing a pair of smart glasses myself, I can say with certainty that these devices are incredibly useful and packed with potential.

As the display tech evolves and software improves, smart glasses will offer more compelling visual aids for navigation, offer real-time visual translation of languages, and adopt hand tracking for more advanced interactions with richer interfaces and AR elements. We're already seeing the latter take shape with [XREAL's latest Air 2 Ultra glasses](#). The potential for this tech is unrivaled among its wearable contemporaries, and we're even beginning to see screenless [AR laptops outfitted with smart glasses](#) enter the market — fully banking on the future of spatial computing.

Are smart glasses a guarantee to take the tech world by storm? Well, that's not so easy to say. Sometimes, even the best ideas don't catch on. However, as the buzz around these devices grows, along with their capabilities and performance, I'd personally say that spatial computing in all of its forms is here to stay, and smart glasses are the best and most obvious way for it to thrive.

Google Glass 2.0: A smart glasses comeback that's long overdue

published May 16, 2024

Is Google reviving a cult Classic?



(Image credit: Google)

Remember Google Glass? It's OK if you don't. Despite promising to be the dawn of augmented reality and a grand leap forward for wearable tech, Google's smart

glasses went out of fashion faster than the Vuvuzela (you'll likely have to Google that one).

However, Google's dream of delivering [AR smart glasses](#) to market might not be as dead in the water as we once thought — and the recently revealed Project Astra may be our best look to date at how it's looking to make that dream a reality. A video released by Google to coincide with Google I/O titled [Project Astra: Our vision for the future of AI assistants](#), showcases an [AI](#) agent, powered by Google's multimodal Gemini AI model, running on both a Pixel phone and a similar pair of prototype smart glasses to the ones last seen in a 2022 [YouTube](#) video titled [Breaking down language barriers with augmented reality](#).

As a genuine backer of smart glasses, and someone who has been lucky enough to review several pairs of the best options on the market, my heart leapt into my mouth when this was revealed. Is there still hope for a Google Glass revival?

The untimely demise of Google Glass

The world of tech is a very strange place. As an industry ceaselessly in the process of invention, innovation, and something else beginning with "i" to follow the rule of three, the tech landscape is in a never-ending state of evolution.

New ideas are constantly being toyed with and tested behind closed doors, and sometimes, not often, but sometimes, a company will eagerly show the world what it's been hard at work on, only to find out that the world was not equipped to deal with what it had to show or was proposing.

Such a thing happened in 2013, and so begins the story of Google Glass.

While not the first to develop a pair of consumer smart glasses, Google's were among the most ambitious — offering hands-free control of a voice-activated augmented reality display for the startling price of \$1,500 (~\$2,000 in today's money adjusted for inflation).



Google Glass was so ahead of its time that I'm amazed the simple folk of 2013 didn't burn Google at the stake for witchcraft. (Image credit: Google)

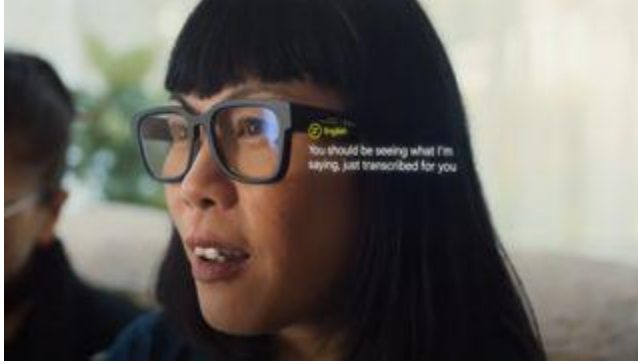
However, in a move that seems incredibly hard to fathom after adjusting to life in 2024, the quaint folk of 2013 were outraged over the fact that Google Glass was outfitted with a built-in camera. Many feared for their privacy (a fear we seem to have completely grown out of just over a decade later), believing it could be used to secretly record them. It was even banned from use in certain public spaces.

The outrage spawned the term "[Glassholes](#)," a pejorative used against anyone rude enough to wear Google's smart glasses out in public spaces. They were mercilessly shamed for adopting this tech, as was Google, who eventually pulled their futuristic frames from public sale in 2015 and repositioned them as enterprise devices until shutting up shop altogether [last year](#).

Google Glass: A long-rumored return

Of course, within that time, humanity collectively stopped caring about its privacy. Now we're mostly a collective of extroverted lens lovers who wouldn't blink twice at an IRL streamer wandering the streets, waving their camera around with reckless abandon.

Even still, Google was once bitten and twice shy when potentially stepping back into the consumer market. The following years were a constant back and forth of will-they-won't-they rumors anticipating a Google Glass 2.0 follow-up — especially when more companies went down the smart glasses route without so much as a mild murmur in their direction.



When we saw Google Glass next, it was primarily showcased as a translation tool. (Image credit: Google)

It was 2022 before we saw anything concrete surrounding [Google's continued smart glasses intentions](#) with our first look at a prototype pair of next-gen smart glasses. But even then they'd dropped the built-in camera for an audio-only approach to its wearable. Then, after [Apple](#) announced the Vision Pro in June 2023 Google reportedly [ditched its Glass plans again](#).

Even Google's Senior Director of Engineering for XR and AR projects at the time walked from the project and the company, [taking to Twitter \(now X\) to state his key reasons for leaving](#) being "recent changes in AR leadership and Google's unstable commitment and vision have weighed heavily on my decision."

At this stage, it was seemingly all over (again). That is, until October 2023, when code was spotted within the Google app for [Android](#) that pointed towards "Iris," one of the project names believed to be associated with a Google Glass follow-up. This brings us right the way around to this year's Google I/O, and Project Astra.

Project Astra: The Glass is half full

So what are the chances that Google is giving us a hint at things to come with its Astra video? Well, not zero.

While there have been reports that Google was planning to focus solely on software, developing an AR platform for OEMs to make use of in their own hardware (something desperately needed for current smart glasses manufacturers to take the next step toward the mainstream) Google I/O did see [co-founder Sergey Brin hinting at augmented-reality glasses making a return](#) with the help of AI, which is exactly what the Project Astra video showcased.

Whether or not this means Google is officially back in the smart glasses business remains to be seen. But it does leave the doors wide open if it should decide to do so. As the now-dormant [Google Glass website](#) states: "The journey doesn't end here."

AR Smart glasses are everything the Vision Pro should have been

By [Rael Hornby](#)

published April 23, 2024

Mark my words, smart glasses are the future

When you purchase through links on our site, we may earn an affiliate commission. [Here's how it works.](#)



(Image credit: Laptop Mag / Rael Hornby)

[Apple's](#) Vision Pro was supposed to be a game changer, a harbinger of spatial computing. It housed the most cutting-edge tech, was made from the most premium of materials, and was designed to operate in total harmony with the wider Apple ecosystem. That's why it was such an overwhelming success, and, to this day, hailed as one of Apple's most successful product launches of all time.

Except it wasn't.

Apple Vision Pro: A fate sealed with a K.I.S.S.

Keep it simple, stupid (KISS) is a design principle and acronym that pushes for products and systems to avoid complexity wherever possible. This is an especially good design mentality to have when you want to introduce something new to a larger audience, as it gives them far less to have to adapt to.

Apple managed this pretty well for devices like the iPod, [iPhone](#), and iPad. To use them, you simply turn them on and tap. Sure, further features require a little more know-how and these systems evolved in complexity over time, but the general usage is simple. Seeking to introduce a new type of product to a wider audience, Apple designed its Vision Pro with the same ease of use in mind. Subtle finger gestures allow you to interact with the "spatial computing" environment around you, with the very direction of your pupils serving as a pointer of sorts.



The Apple Vision Pro's weight proved to be an issue for many users post-release. If only they'd have listened well in advance... (Image credit: Laptop Mag / Rael Hornby)

That's pretty simple and pretty intuitive. However, tack onto this the need to scan your face to build a digital clone of yourself, calibrate your own fingers to engage in awkward zero-feedback interactions, control everything via gesticulation that leaves you looking like you're attending the most low-energy rave mankind ever bore witness to, and then having to [head on over to Reddit for medical opinions on how to strengthen your neck muscles](#) enough to wear this behemoth without developing scoliosis, and you're beginning to push at the boundaries of how simple and intuitive things really are.

It's just a lot to throw at somebody at once. It's a whole new medium, method of interaction, and an entirely different type of wearable (that isn't all that wearable). By the time you get to the Vision Pro's weak selection of proprietary apps and its \$3,500 price tag, it's very hard not to see this thing as a supremely over-specced stereoscopic View-Master.

Sadly, we're just a little too early on into this tech's life cycle and there's nothing else out there to provide a simpler, affordable, and more comfortable all-day AR experience.

Except there is.

Enter, eyewear 2.0: The smart glasses revolution you aren't paying attention to

If you haven't heard, smart glasses are the next big thing. Says who? Says me, dear reader. That's who. What do I know? Well, actually, a fair bit.

I've been wearing smart glasses of various forms for over six months now. While I can confirm I'm basically as cognitively defunct as I was before putting them on, I can say there's genuine promise when it comes to eyewear 2.0 technology.

They're lightweight, easy to use, stay completely cool, and (generally speaking) completely unobtrusive. Plus, you don't have to walk around with a pair of digital googly eyes plastered to the front of your face.

While many people were slowly coming to grips with the fact that I was right when I said that [there's no way anyone is wearing the Vision Pro for a full day's work](#), I was busy saying my farewells to the flat screen and [using AR Glasses to replace my monitors](#).



Solos' AirGo3 Smart Glasses have ChatGPT built-in, giving you one touch access to the world's most popular AI chatbot. (Image credit: Laptop Mag / Rael Hornby)

I even switched out my regular eyewear for a pair of [Solos AirGo 3 Smart Glasses](#), and by switched out, I mean I've yet to return to my regular old spectacles 1.0 lifestyle. And why would I? Thanks to Solos' smart glasses I now have the power of [ChatGPT](#) perched atop my face at all times. I'm practically a demigod.

When it comes to entertainment I can always [switch](#) over to AR glasses, enjoying a 120-inch projection of a display anywhere at any time with impressive open-ear audio for more natural immersion. Typically all this requires is connecting a cable and I'm good to go.

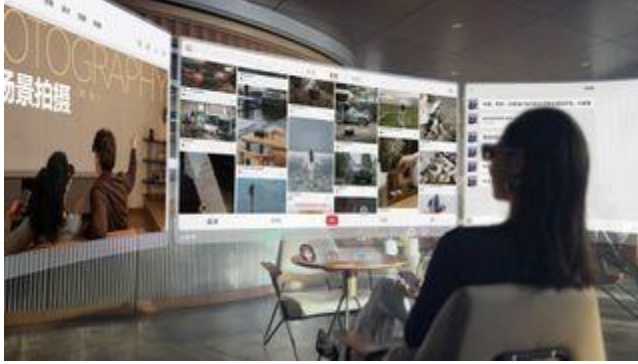
While I might have eventually returned to monitors, I did so begrudgingly and only because I needed to perform a lot of multitasking that the software powering these augmented eyeglasses wasn't quite capable of yet. Sadly, this goes to show that even your favorite tech has its limitations, and I'm forced to twiddle my thumbs while I wait for a more ideal solution to present itself.

Except it has.

Rokid's AR Lite spatial computing suite: The smart glasses combo you didn't know you needed

I'll forgive Rokid for adopting the spatial computing Apple marketing slang, but only because it has just announced the smart glasses product I've been banking on.

Rokid's AR Lite is a bundle of two new products: the ultra-lightweight Rokid Max 2 AR smart glasses and the Rokid Station 2 host unit—an easy to operate touch interface that uses the proprietary YodaOS-Master spatial operating system to power expanded AR functions.



The Rokid AR Lite Suite offers multiscreen multitasking all in augmented reality across virtual screens up to 300-inches in size. (Image credit: Rokid)

It's those AR improvements that change everything for the Rokid Max 2, with the new AR lite suite combining to provide **multi-screen support for AR [windows](#)** up to **300-inches** in size, **picture stabilization** for use while on the go or in a moving vehicle, **wireless multi-platform screen casting** to spatial [windows](#), and **expanded Bluetooth connectivity** for external peripherals alongside **100GB of free cloud storage** that unshackles you from the confines of your dreary desk throughout your 9-to-5 misery—especially when taking into account the host unit's **5,000mAh battery**.

Not only that, those "spatial computing" capabilities are backed by the Rokid Max 2 smart glasses already impressive features like **non-destructive Diopter adjustment** (0.00D to -6.00D), which sounds fancy, but is actually a set of in-frame dials to tune-in the display to suit near-sighted users without the need for prescription lenses.

The AR Lite Suite's Rokid Station 2 host unit can be controlled through simple touch gestures, or held in the hand and used as a controller-like pointer device. (Image credit: Rokid)

As a stand-alone set of smart glasses the lightweight (just 75 grams) Rokid Max 2 can also deliver a **300-inch, FHD, TÜV Rheinland-approved eye-friendly display** at **600 nits** of peak brightness, at 1200p resolution with a **90Hz refresh rate**. Then there's the built-in **HiFi-level open-ear audio** that leaves you free to engage with the environment around you in complete comfort without skipping out on immersion for your chosen media.

Outlook

As one of the latest and more promising wearable options, smart glasses are becoming better and better all of the time. Rokid's AR Lite Suite is just the most recent example of this, and highly unlikely to be the last.

This tech is destined for big things, and you can bet your bottom dollar that Apple, [Meta](#), and more all have their sights set on condensing VR/AR headsets into this form factor as soon as it's humanly possible to do so.

In the meantime, Rokid's AR Lite Suite will be available direct from the [Rokid website](#) following the coming launch of its Kickstarter.

AI glasses could be the next big trend

AI glasses are expected to be the next big hit shortly with almost everyone wishing to own a pair of the set on the back of their abilities, reports say.

Combining capabilities ranging from AI voice assistant with AR holographic visuals and other features and functionalities of Bluetooth earbuds, having a pair of these glasses, according to Compute World, will make one feel special, like they know everything and are constantly aided by AI.

AI glasses to bring Sci-Fi to reality

In one of his movies, Mission Impossible Dead Reckoning 1, Tom Cruise, who plays the character of Ethan Hunt, wears augmented AI-powered glasses to aid his fight against the bad guys.

If global technology giants' plans materialize, similar devices may be part of our daily lives, as there is an emerging race of companies rushing to capture the AI-powered glasses market.

According to reports, Snap Incorporated, an American company that manufactures futuristic eyewear, and Meta, one of the biggest investors in the metaverse, are both preparing to launch AI-powered glasses soon.

Although both companies have kept any insights into the products under lock and key, it is suspected that these products may be a few weeks away and expected to be a hit.

Meta is expected to unveil their *Orion* glasses at the Connect Conference, scheduled for September 25 and 26.

Today, Snap, the parent company of Snapchat, one of the most popular social-media apps for teenage users, is announcing a new computer that you wear directly on your face. The latest in its Spectacles line of smart glasses, which the company has been working on for about a decade, shows you interactive imagery through its lenses, placing plants or imaginary pets or even a golf-putting range into the real world around you.

So-called augmented reality (or AR) is nothing new, and neither is wearable tech. Meta makes a pair of smart glasses in partnership with Ray-Ban, and claims they're so popular that the company can't make them fast enough. Amazon sells an Alexa-infused version of the famous Carrera frames, which make you look like a mob boss with access to an AI assistant (*Alexa, where's the best place to hide a body?*). Apple launched its Vision Pro headset—which includes an AR mode, along with a fully immersive virtual-reality one—last year. And who could forget Google Glass? Consumers have sometimes been cool on the face computers, if not outright hostile toward them, but tech companies just can't seem to quit the idea. From that perspective, it makes sense that Snap's new Spectacles are more a demonstration of intent than an actual product: They're targeted to developers who will apply and pay \$99 a month to use them.

But this is also, arguably, what makes them interesting. In an interview last week, Snap CEO Evan Spiegel told me that he sees smart glasses as an opportunity to "reshape what a computer is, to make it something that actually keeps us grounded in the real world rather than behind a screen." The company hasn't accomplished this so far, of course, but the new Spectacles—and all those other smart glasses and AR headsets—are not being released into a void. They're arriving at a moment when people are feeling pretty turned off by phones. People are angsty about how much time they spend looking down at small screens rather than engaging with the world around them. Parents are concerned that phones are driving a teen mental-health crisis. Smartphone sales have

slowed, and even the latest iPhone *isn't doing great*. Companies are trying to get people excited about technology again, by pitching all sorts of new hardware ideas that break the bounds of that rectangular screen, such as lapel pins or *glorified walkie-talkies* that work with AI assistants. I had this moment in mind as I wore the new Spectacles earlier this month, batting colorful digital blobs away while Paramore's "Misery Business" played in the background.

Among all the new glasses options, the Spectacles are distinct. They are oriented less toward utility—say, asking Alexa to set a timer—and more toward fun. In doing so, they offer a very specific formulation for the future of computing: that it should be amusing and connective. "If we look at the history of computers, they've actually always kept us indoors, taken us away from people that we love," Spiegel told me. Growing up, he explained, he loved computers, but he had to go to the computer lab to use them, which meant forgoing the opportunity to hang out with friends during recess. He thinks smart glasses are an opportunity to reinvent screens by integrating computers more naturally into one's life.

But Spectacles are still far from perfect. For starters, they are notably heavy. When I tried the glasses, they got warm to the touch after use, despite Snap's assurances that it had invested in a state-of-the-art cooling system. They support up to 45 minutes of continuous usage, which isn't very long. They reminded me of snorkeling goggles. You absolutely could not wear them in daily life without someone asking you what exactly you've got on your head. Their lenses can be dimmed to look like sunglasses, or made clear so people can still see your eyes. The glasses are controlled by your hands, held out in front of you. You pinch your index finger and your thumb together to "click." (The onboarding process involves practicing by popping bubbles floating a few feet from your face.)

Mostly, they're fun. Snapchat is famously popular with young people, and the glasses feel like a piece of hardware designed for this audience—closer to a Nintendo Switch than a Google Glass. In one game developed in partnership with Lego, you can project virtual bricks onto your kitchen table and move them around to build different creations. Ask it for an additional small blue brick, and one appears before you. In collaboration with Niantic, the company behind *Pokémon Go*, Snap is also launching a game called *Peridot Beyond* that lets you care for virtual pets.

Perhaps most important, at least when it comes to Spiegel's bigger vision, the Spectacles can sync together, so that multiple people can see the same digital creations at once. In one experience, called *Imagine Together*, users can shout words to create cartoons that then appear in little bubbles on the screen. "Imagine a fox!" you might say, and then a small fox appears, floating in a bubble in midair between you and your friend.

Spiegel, who has four children, dreams that someday he'll see his kids playing together in augmented reality. I asked him what he might say to parents who would be nervous about their children adding an additional level of computing into their daily life. (Parents are already plenty concerned about screen time as is, without the screens being barely an inch from their teens' faces.) What would he say to the parents who just want their kids to go outside? Spiegel countered that he is a go-outside-and-play parent himself—but argued that the glasses could make playing together outside more fun.

At times, I found the Spectacles genuinely amusing, in a way the current Meta and Alexa glasses aren't. And yet, they still don't feel essential. Any device that's hoping to disrupt the smartphone will have to be extremely good. Whether smart glasses are indeed the future of computing will depend on whether someone can make a pair that's useful in day-to-day life. Spectacles aren't there yet; they're more novelty than utility. But the philosophical argument they make is a provocative one, even if it's just that right now—an argument. Like the imaginary pet I saw while wearing them, it technically exists, but just barely.

Snap's fifth generation of its Spectacles glasses is here, and they're big. Snap© Snap

- Snap unveiled its new Spectacles AR glasses at the Snap Partner Summit on Tuesday.
- CEO Evan Spiegel highlighted Spectacles' portability and lighter weight compared to competitors
- New Spectacles feature see-through lenses, an AI-powered 3D image generator, and a cordless design.

They may not hide your eyes, but Snap's new Spectacles won't pass as regular glasses.

At the end of Tuesday's [Snap Partner Summit keynote](#), CEO [Evan Spiegel](#) introduced a major upgrade to the company's augmented reality glasses.

He also didn't miss the opportunity to point out how much more portable and lighter the [Spectacles](#) are than the headsets offered by competitors.

"VR headsets, they feel like you've got a laptop taped to your face, and they're isolating," Spiegel said.

He added, "AR glasses have see-through lenses. They allow you to share experiences together with your friends in the real world, and they're lightweight and wearable."

That may be true, but Spotify's Spectacles still look like a tech gadget straight out of a 1980s futuristic science-fiction movie.

Spiegel said Snap worked to fit about 150 pounds worth of tech into a pair of AR glasses that weigh 226 grams — less than some [iPhone models](#).

For comparison, [Apple's Vision Pro headset](#) weighs between 600 and 650 grams, and Meta's Quest 3 is about 515 grams.

Shots of the Spectacles in action show how they fit on people's heads. Snap© Snap

Although Spiegel threw shade at headset rivals, Snap will have a lot to prove in the smart glasses space. Even a high-powered company like Meta is still finding its footing in the [AR market](#), as demonstrated by results at its Reality Labs unit.

"We have seen the losses on Reality Labs grow quarter by quarter, and investors have indulged this because Meta is making enough profit from its advertising business," Leo Gebbie, a principal analyst and director at CCS Insight, told [CNBC](#).

He added, "Snap is hugely more constrained. It's in a position where to meaningfully compete on hardware is going to be incredibly challenging."

The glasses Snap unveiled are cordless, unlike the Vision Pro headset. The [Quest 3](#) completely covers the eyes, but Spiegel said Spectacles have see-through lenses that become tinted in sunlight.

Still, the new Spectacles look bulky enough to prompt some double-takes in public at least, but that didn't stop Snap from taking one last jab at competitors with a skit.

In the video, people walked around wildly gesturing while wearing cartoonishly big headsets. The scene wasn't too far from the reality of the clickbait that came after the [Vision Pro launch](#) in February.

Spectacles users in the video wore sleeker black glasses that looked more like sunglasses than science fiction gadgets, but that doesn't mean they won't stand out in real life.

In the demonstrations, users could draw, play games, and use an AI-powered 3D image generator with the new glasses. They could even connect with other Spectacles owners to share their AR experiences.

The fifth-generation Spectacles are available to developers for \$99 a month with a 12-month guarantee, but it's unclear if the public will have access to this new version of the tech.

The first pair of Spectacles was launched in 2016. Although they looked more like sunglasses than their successors, the original pair came with a fraction of the tech capabilities.

Snap may have successfully made a pair of AR glasses that weigh less than an iPhone, but it still needs to convince investors that the public will line up for Spectacles 5.

1000 laptops on your pinkie — DNA storage and compute breakthrough could one day help store petabytes of data, but we're not there yet© Shutterstock / FlashMovie

[Cicret Bracelet] Update 2020/06/23 - After over 1/2 a decade of promising a projection bracelet, no finished products have been shipped and their websites are down. "COULD HAVE MADE A FORTUNE"

Project Update

For our newer users, the "Cicret" bracelet was a crowdfunder that was meant to produce a projection bracelet, similar to the Ritot. It debut in 2014, and made claims that users could have a phone interface projected onto their skin. One could use navigation, press buttons, zoom in/out, etc. very seamlessly, and it was also waterproof. Their pitch video is here: <https://www.youtube.com/watch?v=9J7GpVQCfms>

As time went on, a lot of questions were asked about how exactly this device would work, considering the Cicret team promised quite a lot in a very small package. The YouTuber Captain Disillusion put out [this video](#) in 2016 showing how Cicret's original pitch video was faked, and how the technology they promised either didn't exist or was poorly conceived.

Since Captain Disillusion's video, Cicret produced a [video of their own](#) that showcased their "progress", amounting to a very close-up shot of an extremely skewed projection on someone's arm. Many people speculated that this was an off-the-shelf pico projector encased within a simple 3D-Printed housing. Captain Disillusion also made a video about this update, and he breaks down the *many* issues here: <https://www.youtube.com/watch?v=Cw7g8ixbomU>

The Cicret team also published about a dozen "weekly" blog posts on their website starting in 2017 (wayback machine archive link of their most recent post **from 2018** here: <https://web.archive.org/web/20190130020417/https://cicret.com/wordpress/?p=49281>). Their most recent post's tl;dr is that they'll post something when they have it.

And since that blog post? Nothing. No videos, no publications, no new photos of updates. There was a random pitch photo of an older Cicret variant on Facebook posted in March 2020, but otherwise there was nothing substantial. I think it is safe to say that the Cicret is out - the campaign is dead.

Links for posterity's sake:

- The Cicret Facebook: <https://www.facebook.com/cicrets/>
- Cicret Bracelet Website (down): <https://cicret.com>
- Newer website (via their Facebook page - also down): <http://www.cicret.biz/>

. The Cicret Smart Bracelet puts a touch-controlled projector on your arm. Move over Google Glass

Published Oct 22, 2014



The Cicret Smart Bracelet, which appeared on Indiegogo not long ago, has now finished its campaign for funding. The result should be a bracelet wearable that can project a touch-controlled screen onto your arm. The Cicret uses a Pico projector to throw your mobile's screen into your arm. It also features eight proximity sensors which the bracelet uses to detect your finger position so as to feedback controls. This means you can use your phone as you would normally, but all right there on your arm while the device itself sits in your pocket or bag.

Unlike other wearables this could offer the most comprehensive use of your phone without taking it out. The Cicret features its own processor, storage, vibration feedback, Wi-Fi and Bluetooth connectivity as well as the sensors and projector. We have to wonder how long the battery on a device like this will actually last though.

The campaign for the bracelet finished on Indiegogo where it was going for \$400, which is about £250. The campaign has now gone from the site along with the video where it says the company is "actually modifying a few things... so [will] be back soon." The final product should sell for around \$600 to \$700 which is about £375 to £435.

Cicret Bracelet

Wearable technology branded the 'Cicret bracelet' claims to project your smartphone directly onto your forearm.

Published Jan. 12, 2015



Claim:

The Cicret bracelet and app can project your smartphone onto your arm.

On 30 October 2014, the YouTube account Cicret App & Bracelet published a video titled "The Cicret Bracelet: Like a tablet ... but on your skin." The video's description outlined Cicret's functionality thusly:

With the Cicret Bracelet, you can make your skin your new touchscreen. Read your mails, play your favorite games, answer your calls, check the weather, find your way ... Do whatever you want on your arm.

The clip showcased some impressive technology that eliminates a number of inconveniences experienced by smartphone users: The Cicret Bracelet enables submersion in water (as evidenced by a portion of the video's taking place in a bathtub) and, as described by [ZDNet](#), allows users to enjoy device functionality even when their handsets are out of reach: It will use a tiny 'pico projector' and eight miniature proximity sensors to replicate an image of your device screen on to your arm.

Low energy Bluetooth will communicate with your mobile device. A Wi-Fi component will connect you to the network. It will have a vibrate function and a micro USB charging port. Touching your arm with your finger will interrupt one of the sensors and return the instruction back to the processor — the Cicret bracelet. Flicking your wrist will initiate the display on your arm. The Cicret bracelet will be water resistant and durable. Flick, swipe, pinch and zoom functionality will be supported along with tap to text. You will even be able to answer the phone with a flick of your wrist.

The Cicret App and Bracelet was lauded by tech bloggers as the next stage of smartphone connectivity, and videos and articles about it were widely shared on social media sites. But if your first impression was the device looked like something out of science fiction, you weren't entirely wrong. A number of skeptical users had some pointed questions about the Cicret claims, and among the more logical queries (such as how the device might work for people with dark skin or abundant arm hair) was a far more central mystery: does the Cicret bracelet actually exist?

Viewers of the video were quick to notice the device as shown appeared to have been cobbled together from recognizable existing products. Some observed extant advances don't allow for such capabilities to be contained within a device as small as the one depicted, and others noted the projection quality seemed remarkably high.

As it turned out, the Cicret bracelet did not actually exist, and no working prototype of it had yet produced. In a 5 December 2014 report from Washington television station WTOP, Cicret co-creator Guillaume Pommier reluctantly **confirmed** the impressive video produced was a mockup not representative of any functional prototype device:

"The video we put online is an illustration of what our Cicret Bracelet could allow users to do," says Pommier.

Pommier says he and three partners are trying to raise money on their own, through PayPal instead of standard crowdfunding vehicles such as Kickstarter.

"We need someone who'd put up some money to allow us to finish a prototype," says Pommier.

That report highlighted additional areas of concern about the project, specifically a lack of transparency and the anonymity of its creators:

The site contains a brief "About Us" description of the principals, with no descriptions of their previous projects. The website site lists no street address or phone number for the company — only a Gmail address.

Asked about the lack of information on the company's website, Pommier has an answer: "To be honest it's because 3 members of 4 on our team are actually working for another company. Obviously we don't want to be fired because of this second professional activity!"

Cicret has since addressed some of those concerns, adding a physical address and a [listing](#) of their team member's names, photos, job titles, and e-mail addresses to their web site, and producing a video that purports to show a (decidedly less visually impressive) functioning prototype of their virtual bracelet that works with all skin colors:

Although the Cicret bracelet and app may not be impossible to develop with current technology, it's also not a device that actually exists at this stage. While an eventual working Cicret could one day be real, it's also possible the concept will graduate to the realm of vaporware.

The Cicret Bracelet: Wearable Technology That Makes Your Skin Function As A Touchscreen

December 4, 2014



In this article

No headings were found on this page.

Remember all those cool futuristic gadgets we used to see in some of the [Sci-Fi](#) movies(like Minority Report for example)? Not to get too philosophical, but

just judging by the [gadgets](#) and [technology](#) that keeps popping up like mushrooms around us these days, it's becoming more apparent that 'The Future Is Now'. There has been many recent additions to the wearable technology market. I have to say, this one is by far the most unique one yet.

[The Cicret Bracelet](#) can project a [touchscreen](#) onto your arm, making it possible for you to easily access and work your apps without having to take out your phone. This product is still in its prototype phase and has not officially been launched yet. The creators of The Cicret have built a [website](#) to explain the details of their vision and have uploaded a video for us to get a bigger picture too.

The Cicret Bracelet uses a [Pico projector](#) to project your phone's screen onto your arm, and it's equipped with eight proximity sensors which makes it possible for the bracelet to detect your finger position whilst you control the device.

This futuristic gadget that will be available in 10 colours also features its own processor, storage, vibration feedback, Wi-Fi, Bluetooth connectivity, and of course the earlier mentioned sensors and projector. Who would have ever thought a little bracelet no wider than 10mm would be able to carry all those components? The developers of The Cicret Bracelet have taken to their website asking for donations to help make their dream come true. Their target is to gain up to 700,000 Euros in order to finish their first prototype. [All donors will be listed on their page](#) in their attempt to proof the authenticity of their efforts. As of this morning (December 3, 2014) they have 2,010 donors and have reached 14% of their goal.

Personally, I am truly excited about the possibility of this product. It would be so much easier being able to walk around without having to carry my big chunky [smartphone](#) (which is honestly the size of a brick) along with me. I can just leave it in my bag, and get all I need to get done via the Cicret Bracelet.

For ladies, we won't have to worry about 'missing a call because our phone was on silent and in the bag' or having to take out our laptops or phones every time we need to send an email or a message. It would all be right there on our wrist, at our convenience.

However, not everyone feels the same way about it.

Neil Louis from [Subang Jaya](#) said, “It seems like a great idea, but will it cause our skin any damage in the long run? I know we won’t be on it the whole day, but if the projector is that bright wouldn’t it cause damage to the skin?”

A few others were curious about how long the battery life would actually hold up, expressing how they have had bad experiences with small gadgets that cost a fortune but don’t last that long due to lack of durability and weak battery life.

The younger generation expressed mainly one genuine concern, “So will everyone be able to see what I do online? It looks like it’s hard to hide if you want to type a message in private!” said 14-year-old Dhanya Lim from Sunway International School.

The creators of the Cicret Bracelet are also in the process of developing the Cicret App.

[The Cicret App](#), in a nutshell, is a simple messaging service that gives you a free and secure chat solution, for those who want to chat, share, and exchange safely without being traceable. This technology provides anonymity and full control on all contents you have shared, even after you have sent them. Meaning, all your messages can be edited even after you have sent it. So now, pressing that ‘Send’ button won’t be as stressful as it used to be!

The public can also contribute donations for the creation of this app at the Cicret website. For this technology, they need 300,00 Euros to develop the app across all platforms.

If you feel like this is something you can’t wait to get your hands on, then jump onto their [donations page](#) to help them at reaching their goal.

WEARABLES

Cicret wristband turns your arm into a touch screen

December 08, 2014



The Cicret Bracelet will project a tablet interface onto the user's arm
With wearables gaining some traction, smartphones and tablets are by no means the only mobile devices around nowadays. Now, though, Cicret is looking to take things a step farther and turn your arm into a smartphone.

Conceived 12 months ago and designed over the course of 6 months, the Cicret Bracelet is a small wristband that looks similar to the [Jawbone Up](#).

The Cicret Bracelet's proximity sensors work out where the user's finger is and allows them to interact with the display like any other touchscreen

The Bracelet comprises a pico projector and a row of eight proximity sensors that point towards the user's forearm. It operates as a standalone device and,

when activated with a twist of the wrist, projects an Android interface onto the users arm, much like Chris Harrison's [Skinput research](#). The proximity sensors detect where the user's finger or fingers are and allow them to interact with the interface as they would any other Android device.

There are potential advantages to turning ordinary objects (or, in this case, limbs) into mobile devices, but projected touch screens typically lack the responsiveness and visual clarity of the glass screens we're used to. This [projected keyboard](#), for example, delivered a poor typing experience.

It should be interesting to see if the Cicret Bracelet can improve on the technology, to make something we'd actually want to use. *The Cicret Bracelet will be available on 10 different colors*. Elsewhere, the Cicret Bracelet features an accelerometer and a vibration module, along with an LED for notifications. Connectivity is provided by way of WiFi, Bluetooth and a Micro USB port. It is expected to be made available in 16 GB and 32 GB models.

The device will allow users to send and receive emails, browse the web and play games. It will also be possible for users to pair it with an existing smartphone, answer incoming phone calls and activate the speakerphone functionality on the their smartphone. Cicret is in the process of raising funds for the further development and production of the Bracelet, but Pommier says he expects the device to reach the mass market within a year and a half. The device could cost up to \$400, he says, based on what the company's research suggests people would be willing to pay (sounds like a hard sell to us).

Cicret co-founder Guillaume Pommier tells Gizmag that the first prototype is due for completion in about three weeks time. The video below provides an introduction to the Cicret Bracelet.

Update (January 7, 2015): In response to queries about the project's progress, Pommier says that "we do have a working prototype now and are working on it to 'upgrade' it." We'll keep you posted.

Update (February 4, 2015): Pommier has now released a short video showing the first working prototype of the bracelet in action. The [video page](#) also includes a progress update from the Cicret Team.

Ritot is a unique smart band concept with a built-in pico projector

July 14th, 2014, 16:11 by [Peter72](#) [comments](#)

You may have seen [projection clocks](#), but what if you could wear one of those on your hand? That's what the makers of Ritot are campaigning for on IndieGoGo – a smart band that uses a projector to cast a big, readable notifications on your wrist.



It has to be said the prototypes look much better than regular smart bands – an aluminum ring covered in leather, the Ritot can pass for a fashion accessory.

Touch the button or shake your wrist however and the built-in pico projector will activate and display messages, reminders, Facebook and Twitter messages, weather alerts and notifications from apps. The smart band will work with Android, iOS and Windows Phone smartphones.

It's waterproof as well so you can take it jogging or swimming, there is even a dedicated sport version in the works (covered in plastic and rubber instead of metal and leather). However, neither version seems to work as even a simple step counter, let alone more advanced features like a heart rate monitor.



The battery is enough to last 150 hours in projection mode and 1 month in standby mode. It's recharged wirelessly using the dedicated pad. The pad also displays the time and has a built-in alarm clock. It can also adjust the settings of the Ritot – you can pick between 20 projection colors, pick left or right-handed use. The Ritot IndieGoGo campaign has passed its funding goal (it's at 280% funded at the time of this writing). The finished product should ship in late January or February next year. You can back Ritot for \$120 if you want one, \$200 for two. The planned retail price after the campaign is \$160 per unit.

<https://www.youtube.com/watch?v=OfmRe031grA>

As with all such crowd-funded campaigns you should keep in mind there's a possibility of delays and even bigger issues (just ask Pressy backers).

Researchers from North Carolina State University and Johns Hopkins

University have developed a DNA-based technology capable of storing, retrieving, computing, erasing, and rewriting data.

This new advancement marks the first time all these tasks have been combined in a DNA storage system, with the potential to transform how data is stored in the future.

The project, led by Albert Keung, a professor at NC State, represents a leap forward for DNA computing. While DNA has long been seen as a potential solution for long-term data storage, it had not previously been capable of handling multiple operations like modern electronic systems. The team's new system, however, has changed that.

Real-time data manipulation

The breakthrough was made possible through the creation of dendricolloids, a polymer structure that allows DNA to be stored densely without sacrificing capacity. "You could store the data of a thousand laptops in a DNA structure the size of a pencil eraser," Keung noted. This storage solution could be vital as global data demands continue to rise, particularly in areas such as AI, cloud computing, and large-scale data management.

In addition to storing data, the system allows for real-time data manipulation, including copying, erasing, and rewriting DNA sequences. Kevin Lin, the paper's lead author, explained, "We can perform many of the same tasks as with electronic devices - like deleting and rewriting data on the same surface."

The system has also demonstrated computational abilities, solving simple problems such as Sudoku puzzles and chess problems. The research team believes that this development could pave the way for molecular computing, potentially storing petabytes of data in very small spaces.

Although the technology is still in its early stages, the researchers hope it will lead to practical applications in the future. The study was published in [Nature Nanotechnology](#) and supported by the National Science Foundation.

Credit: Pixabay.© ZME Science

For billions of years, DNA has quietly carried the [blueprints for all life](#) on Earth, encoding instructions for everything from the simplest bacteria to the most complex mammals. Relative to this timeline, the discovery of DNA's double helix in 1953 happened only an instant ago. But now, in a clever move, scientists are harnessing DNA not just to record life's instructions, but as a powerful biological computer.

Researchers at North Carolina State University and Johns Hopkins University have developed a technology that, for the first time, enables DNA to perform the full suite of computing functions — storing, retrieving, erasing, and rewriting data — just like a traditional computer. In early tests, this DNA computer even solved puzzles, like simplified versions of sudoku and chess.

DNA: The Future of Data Storage?

DNA is nature's ultimate [data storage](#) medium, capable of storing vast amounts of information in the tiniest volume. Each cell in the human body contains approximately 800 MB of data, according to scientists' estimates. But, despite its potential, synthetic systems have struggled to match the versatility of electronic devices when it comes to managing data.

Until now.

This new technology, described as a "primordial DNA store and compute engine," promises to change that. Researchers have demonstrated that DNA-based systems can not only store data, but also perform complex tasks like computing, rewriting, and moving information.

The key to this breakthrough lies in a soft polymer scaffold known as a dendricolloid. These tiny, tree-like structures offer a stable environment for DNA, holding the delicate molecules securely while still allowing them to perform complex tasks. By using this material, the researchers were able to achieve what was once thought impossible: a DNA system that can manage data reliably, even after repeated use.

“We’ve demonstrated that these DNA-based technologies *are* viable, because we’ve made one,” says Albert Keung, a molecular biologist and co-lead of the study.

Solving Sudoku with DNA

In experiments, the system was able to process basic calculations, including solving small puzzles such as 3×3 chess grids and sudoku. The researchers hope that their work will spark a new era of molecular computing, one that goes beyond simple storage and into the realm of full-fledged biological machines.

What makes this system remarkable compared to previous DNA-based computers is its flexibility. By using enzymes to copy and rewrite data without harming the original DNA, the researchers were able to simulate file deletion and retrieval — the DNA equivalent of erasing a hard drive and filling it with new files. This opens the door for DNA systems that can handle complex, evolving data sets.

“We wanted to develop something that would inspire the field of molecular computing,” says Keung. “And we hope what we’ve done here is a step in that direction.”

The advantages of DNA storage are staggering. With DNA’s incredible data density, a sugar-cube-sized amount could store 10 million gigabytes (GB) of data. That’s the equivalent of thousands of laptops crammed into an object smaller than a pencil eraser. And the stability of the system is remarkable — researchers believe it could last for millennia under the right conditions.

This makes DNA an ideal candidate for long-term, archival storage. If you're imagining vast data centers shrinking to the size of a closet, you're not far off the mark. You could store this data for thousands or even millions of years in frozen DNA. Moreover, the team's material can withstand more than 170 cycles of dehydration and rehydration — compared to just 60 cycles with DNA stored in simpler solutions — making it incredibly robust for long-term use.

"The ability to distinguish DNA information from the nanofibers it's stored on allows us to perform many of the same functions you can do with electronic devices," the researchers wrote in their study. This includes copying data without damaging the original, and erasing and rewriting specific pieces of information.

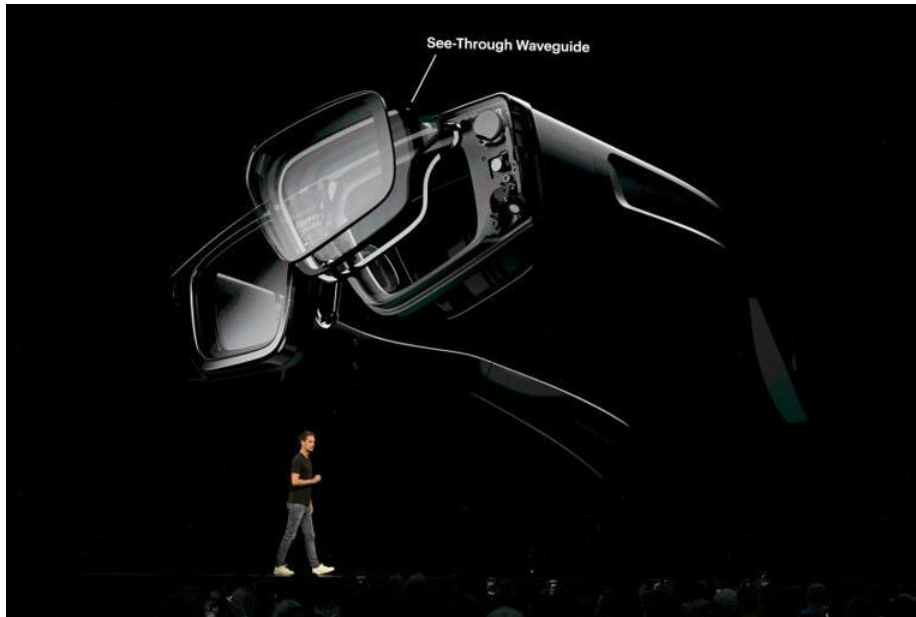
What Does This Mean for the Future?

Although the current system is far from rivaling supercomputers in speed or power, the long-term vision is compelling. A DNA-based archive that stores the sum of all human knowledge that could survive the rise and fall of civilizations. Researchers also see potential applications in fields like medicine, where biological data could be processed in real-time within living organisms.

For now, the research is still in its early stages. But by solving these foundational challenges, scientists like Keung hope to inspire a new wave of molecular computing. "We wanted to develop something that would inspire the field," he says. "And we hope what we've done here is a step in that direction."

While the road to a DNA-based future is still long, this latest breakthrough signals a fascinating new frontier in computing.

The findings appeared in the journal [*Nature Nanotechnology*](#).



Evan Spiegel, chief executive of Snap Inc., speaks onstage during the Snap Partner Summit 2024 on Tuesday in Santa Monica. ((Charley Gallay / Getty Images for Snap Inc.))

In its relentless search for ways to weave digital products into people's lives, Big Tech has achieved some big wins. Smart phones are ubiquitous. Apple Watch users talk to their wrists. Artificial intelligence-powered assistants are everywhere. But convincing people to wear computers on their faces has been a dud. So far, at least.

Augmented reality glasses overlay digital images onto a person's view of the physical world. They're different from virtual reality headsets that fully immerse people into a computer-generated environment.

Tech giants have been focused in the last decade on developing eye glasses that project digital screens in front of a user's eyes. The fact that they have so far failed to convince people to wear smart glasses daily hasn't deterred Google and other companies from pouring money into the effort as they pursue a belief the hardware could one day reshape how people socialize, work and learn.

While dwarfed by the Silicon Valley behemoths to the north, Snap, the Los Angeles-based company behind the disappearing messaging app Snapchat is

competing in this smart glasses arms race. The company, which unveiled its fifth version of AR glasses at its annual conference Tuesday, hopes improving the device will drive mass consumer adoption.

"Making augmented reality glasses is really hard. And we know that the industry is littered with companies that have tried and we've been working for a really long time on these," Snap's Chief Executive Evan Spiegel said Tuesday from the stage at the conference as he unveiled the glasses.

Other industry giants including [Google and Samsung](#) are also working on smart glasses, and [Apple](#) is exploring the idea. The competition raises the stakes for the publicly traded Snap as it looks to new products to help reassert itself in the tech world as rivals such as Instagram and TikTok have surged past it to capture eyeballs and market dominance.

But a future in which augmented reality glasses are a part of our daily lives hasn't arrive yet and a long road still remains ahead, experts say. The future of smart glasses is still murky.

"This is a marathon. It's not a sprint," said Tuong Huy Nguyen, an analyst at Gartner who is part of a team that researches immersive technologies including AR. "We need an ecosystem of not just hardware and software but content to work together to create seamless experiences."

Snap first released [smart glasses](#) that could record video in 2016, selling them in vending machines in Los Angeles before making them available online. The company reported selling 150,000 pairs, but most people stopped [using them](#) after a month and underwhelming [demand for the gadget](#) resulted in hundreds of thousands of unsold pairs.

Named Spectacles, Snap's latest eyewear overlays computer-generated images onto a person's view of the physical world. The new device builds on the first AR glasses Snap released to software developers in 2021. Snap isn't selling to them to the public, but is making them available to software developers in hopes they'll design experiences for the platform.

What people can do with AR glasses remain limited. Snap's glasses can track a person's hands, allowing users to pick up and assemble virtual Legos, swing a phantom golf club, draw with friends and punch numbers in a digital calculator. It

also incorporates some artificial intelligence features that allows users to get answers to questions and conjure an image with a voice command.

In an attempt to drum up interest, Snap has been leaning into whimsical applications and gaming experiences that it knows users are used to, said Ben Bjarin, chief executive and principal analyst at Creative Strategies, a consulting firm that works with tech companies.

But Snap is still treading cautiously as it releases new AR glasses.

"What we can't predict is consumer adoption and so that's why we're taking this more thoughtful approach to how we're releasing this version," said Sophia Dominguez, Snap's director of AR Platform. "It could change at any time, and if it does change ... we're ready to go."

Dominguez said the company envisions AR glasses one day becoming the primary way people access the digital world. Instead of computer or phone screens, AR glasses, she said, will allow people to keep one foot in each world simultaneously, making it "easy for you to interact with technology in the same way that you interact with the real world."

Skepticism whether AR glasses will make this possible runs high.

Donning AR glasses could interfere with how people socialize in the physical world, making them feel less present, said Jeremy Bailenson, a Stanford University professor who founded the college's virtual human interaction lab.

"Wearing glasses that connect you to digital content, whether it's AR or VR should be done sparingly for special experiences," he said. "I am not an advocate of blocking your perceptual system, sight and sound for constant surveillance."

Bailenson and other [Stanford researchers](#) tested out the Meta Quest 3, a "mixed reality" headset that lets people blend physical and virtual worlds. While the headset is different from AR glasses, the gadget can display real-time video of a user's surroundings in the physical world.

Researchers, who were accompanied by a chaperone for safety reasons, wore Meta's headsets while chatting with people, walking around campus and cooking food. They reported that people in the physical world felt less real, as if they were watching television rather than interacting with someone face-to-face.

People wearing AR glasses will also see a different view of the world than people not wearing the devices and losing that “common ground” will likely impact the way people socialize, Bailenson said.

Previous attempts at integrating smart glasses into people's lives have not gone well. When Google released smart glasses in 2013 that could shoot photos, videos, they sparked privacy and safety concerns from consumers, lawmakers and business owners. People started calling [Google Glass owners](#) who used the smart glasses in ways that were socially unacceptable “glassholes.” Among the social no-nos: Surreptitiously recording others and reading on the device while seeming to ignore others.

And while AR glasses have the potential to be helpful in several arenas, including training, education, shopping and gaming, industry analysts said it will be difficult convincing consumers to embrace the devices.

"Our eyes are very precious real estate," said Bajarin, who tried out Snap's AR glasses ahead of their conference. "Consumers are going to guard that very, very heavily."

Keeping the price low enough to entice people to buy will also be a challenge. Meta, which partnered with Ray Ban on a pair of smart glasses that allows people to capture photos, listen to music and take video calls with the help of an AI assistant, sells its device for around \$300. Snap has not said what it will charge for its latest glasses should they become available to the public.

Snap's glasses remain a work in progress. They're heavier than regular glasses, heat up to an uncomfortable degree after extended use and the battery life is under an hour. They require foreign hand movements, such as reaching out to pinch digital objects in the air and tapping the front and back of one's hand to adjust the volume or launch a menu.

The device is powered by Snap's own operating system, giving the company more control over the experience. During a recent preview of the AR glasses held in a San Francisco home, a Times reporter used voice commands to create images that appeared almost instantly — a robot dog, Elsa from Frozen and the San Francisco skyline.

In another activity, a wide-eyed, yellow creature appeared before making its way outside to a real San Francisco patio with a stunning view of the city. Niantic, the maker of AR game Pokemon Go, created the experience "Peridot Beyond" for Snap's AR glasses.

Asim Ahmed, who leads global marketing at Niantic, said AR glasses gives the company the opportunity to experiment and design a "new kind of paradigm of gameplay." What works in a game played on a mobile phone might not work on AR glasses, which offer a wider field of view and don't rely so heavily on hands to play. Niantic also had to think about safety issues, including making sure the virtual pet doesn't get too close to their owner and blocks their view.

With an array of challenges, including figuring out how to jam processing power and other computing hardware into a device that is smaller than a smartphone, analysts predict it will take several years at least before smart glasses gain mainstream adoption, if they ever do.

In the first quarter of 2024, shipments of VR and AR headsets dropped 67.4% year-over-year but are expected to improve as consumers transition to new types of devices, according to market intelligence firm [IDC](#). Meta led the market, followed by ByteDance, Xreal and HTC.

With companies still testing out AR glasses or developing them, a clear front-runner hasn't emerged yet, analysts said.

Jacob Bourne, an analyst at eMarketer, said Snap's rivals, including Meta and Google, have more money to invest in research and development of AR glasses. Meta, which owns Facebook, Instagram and WhatsApp, has 3.27 billion people using one of their apps every day. Snapchat has 432 million daily active users.

"I would probably put my money more on Meta as having the key to the [research and development] capabilities to really get that to market," Bourne said. "But I wouldn't rule Snap out at all."

Snap's AR glasses are big and thick, but they can do mixed reality and hand tracking. They also have auto-dimming lenses. Scott Stein/CNET

At a hotel in New York, I stood on a terrace on a warm September day, leaning over and petting an adorable pet that wasn't there. The virtual Peridot buddy jumped around and followed me. It's much like other virtual pets I've tried on phones [and even headsets](#) such as the Meta Quest 3. This time, I saw it projected through see-through lenses that auto-dimmed like sunglasses to make sure the virtual experience was clearly seen in bright daylight. All I wore was this pair of chunky but standalone glasses: Snap's new AR Spectacles. Are these the future of something I might wear someday? If so, how long will it take until that happens?

I saw plenty of viral videos earlier this year of people wearing [Apple's Vision Pro](#) headset outside, for skiing, skating, in the park... wherever. The Vision Pro and Quest 3 headsets [aren't made for everyday outdoor use](#), but Snap's AR Spectacles are. Announced at the company's developer conference in Los Angeles, they're the latest iteration of Spectacles Snap's made for years. Snap first created standalone AR glasses back in 2021; [I tried those out](#) in my backyard during the pandemic. The new Spectacles are larger, but they're also more powerful. They have hand gestures like the Vision Pro and Quest 3, and also a whole Snap OS that can run a browser, launch different apps and connect with nearby phones.

These Snap glasses aren't even made for everyday people. They're developer hardware that's being offered on subscription, for \$99 a month as part of Snap's developer kit. That's a sign that Snap knows the world isn't ready for AR glasses yet, and neither is consumer technology. Snap is getting a foot in the door a little ahead of competitors.

Companies like Meta -- and likely Google and Apple -- are trying to get to smaller AR glasses that can overcome the chunkier limitations of mixed reality VR goggles. [I've seen attempts](#) to make glasses like these, but they usually have to tether to phones, computers or external processors of some sort to work and keep the glasses small.

Snap's AR Spectacles put all the processing and battery right on the glasses -- nothing else is needed. That means they could be worn easily without any extra cables, but the Spectacles in their current form are chunky and much odder than

any glasses I'd ever put on my face. The frames are thick, and the lenses still have rainbow-like patches in the middle where waveguides reflect virtual images projected from side-mounted LCOS miniprojectors.



The new Spectacles have thick arms that contain the processors, projectors and batteries. Scott Stein/CNET

The battery life is also extremely limited. At around 45 minutes, these are far from anything for all-day use. Although, like the 2021 version of Snap's AR glasses, these are still designed for developers. According to Snap's CTO and co-founder Bobby Murphy, these are exploratory devices to see how Snap's existing AR-enabled lenses on the Snapchat phone app can make a useful leap into glasses form.

This is the exact same approach Snap took back in 2021 but with a boost in processing power. Onboard are twin Qualcomm processors (I wasn't told which ones) that delivered some pretty crisp, if sometimes stuttery, graphics. The glasses only have a 46-degree viewing angle, which is OK for AR glasses but much less than VR headsets. It felt like I was watching mixed reality through a tall narrow window about the dimensions of a large phone screen.

One big difference between my 2021 demo and now is prescription lens inserts. I had to wear contacts last time, but snap-on lenses similar to what Meta and Apple already offer will work for these Spectacles. Unfortunately, Snap didn't have my prescription during the demo, so my AR morning was a bit fuzzy. It was good enough to see experiences.

An image from Snap of how group-shared experiences with hand tracking can work. In-glasses, the field of view is narrower than my own vision. Snap

Hand tracking, but no eye tracking

Snap's Spectacles use external cameras to track the world but add hand tracking like the Apple Vision Pro and Meta Quest headsets. I was able to tap virtual buttons, pet virtual creatures, paint in the air or pinch things at a distance. Snap OS has a dashboard of apps that floats in the air, plus virtual buttons that appear over my hand when I flip it over.

The Spectacles do not have eye tracking, so selecting objects takes a little more effort than Apple's glance-to-select Vision Pro. Phones can connect with the glasses too, offering another way to interact.

An extension for phones

One thing that's different about Snap's approach compared to Meta or even Apple right now is it's interconnected with phones. I tried several demos where I used a nearby phone to control AR experiences on the glasses. I used a phone like a remote to fly an AR helicopter around the room, using on-screen buttons for controls. I also held a phone like a golf club and swung to tee off in an AR golf course that looked like it was half-teleporting into the hotel room I was in.

Snap's Snapchat phone app will manage the glasses and also allow anyone else to connect and view the AR experiences I'm seeing on the glasses. According to Snap, the longer-term goal is to have phones using Snapchat interact with these glasses.

"We definitely think there's a lot of open space to continue to explore that connection between phones and Spectacles," Snap's Murphy says to me.



Snap's phone app works as an optional control dashboard for the glasses, and can become a controller too. Scott Stein/CNET

In the short term, the glasses are only made to work with other AR Spectacles wearers, and probably with good reason: Phone OSes don't play well with AR glasses yet. Both Apple and Google haven't made moves to make headsets and glasses feel truly integrated, and until they do, other companies are facing a compatibility bottleneck unless they use dedicated phone apps or, [like Xreal](#), build their own custom phone-like hardware. Even then, the connectivity isn't ideal.

Snap already [has a deep range of AR tools](#) on its Snapchat phone app, from world-scanning collaborative experiences to [location-specific AR](#). Snap's AR chops have improved since 2021, and these new glasses could take advantage of that.

Working with groups

One thing I tried was collaborative painting. I used my fingers to draw in the air while one of Snap's team drew alongside me, wearing another pair of Spectacles. The glasses can recognize another nearby wearer and share an experience or even collaborate to scan a room with the four onboard cameras into a mesh for mixed reality.

Connecting in the hotel room wasn't always instant, but that glasses-to-glasses collaboration is a big part of the pitch here. Snap aims to have multiplayer

experiences with groups happen in outdoor areas, maybe even museums or art shows, to test out how well these can work for live immersive activations. A Lego brick-building experience was simple, but it showed possibilities if a bunch of people could make a site-specific sculpture together.

These glasses, made to be worn outdoors, have auto-dimming lenses similar to the tech on [Magic Leap 2](#). The Magic Leap 2 has a large external clip-on processor.

Some of the early partners Snap is working with include Niantic -- best known for [Pokémon Go](#) and a company that's also been exploring a future of [outdoor AR glasses](#) for years. Another partner, ILM Immersive, already made [Star Wars](#) and [Marvel experiences](#) on VR and mixed reality headsets.



Spectacles with prescription lenses inside. I tried to match my own vision as best I could for the demo. Scott Stein/CNET

Are these a doorway for more AI wearables, and AI AR?

Snap's also partnering with OpenAI, a move that hardly seems surprising for 2024. This spring, a wave of camera-equipped AI wearables, including [Meta's](#)

[Ray-Bans](#) and the [Humane AI Pin](#), tried to show promises of "multimodal" generative AI that could access cameras and audio inputs together for assistance or for generative AI creative apps. Mixed reality headsets like the Meta Quest 3 and Apple Vision Pro haven't tapped into camera-enabled AI yet because camera permissions have been more locked down for developers.

Snap's opening up its camera access more: OpenAI hook-ins can use the glasses' cameras and microphones for generative AI lens apps similar to what's available now on Snapchat's phone app. (Snap's also enabling camera access for AR apps, but online access is locked down for those apps, while camera access is open online for OpenAI connections.)

"Where people may want to use external services, we'll exercise more caution and control and work potentially with developers or third-party service providers to build those kinds of safeguards," Murphy says. On the Snapchat phone app, there already are [generative AI tools](#) that use the camera. We may finally see some of these make the move to glasses now, too.

I tried generating some 3D emoji using Snap's generative AI, as well as navigating an educational solar system lens app that took my requests using my voice. I found responses during my demos were laggy, and the glasses didn't always understand what I was saying (although that was potentially the connection in the hotel room, or something else). Snap's opening up of camera access to AI-infused AR feels a step ahead of where Meta and Apple are currently. That could change soon, though: Meta is imminently expected to showcase new AI and AR updates, while Apple could introduce [Apple Intelligence features on Vision Pro](#) next year.

Qualcomm, Google, and Samsung Join Forces for Mixed-Reality Smart Glasses

Qualcomm CEO Cristiano Amon revealed that the company is working with Samsung and Google to develop mixed-reality smart glasses connected to smartphones. This marks a distinct approach compared to Apple, which launched a bulkier mixed-reality headset, the Vision Pro. The collaboration is aimed at delivering more portable and convenient devices to the market.

Last year, the three companies [formed a partnership](#) to explore mixed-reality technology, which merges augmented and virtual reality by overlaying digital images on real-world environments. Amon's comments provide one of the first insights into this partnership. He expressed hopes that consumers with smartphones will also adopt companion smart glasses as part of the experience.

The mixed-reality glasses project remains in its early stages, with details still limited. Samsung and Google were unavailable for comment. However, Amon mentioned that this initiative is expected to introduce new products and experiences, with Qualcomm positioning itself at the forefront of this market through its Snapdragon AR1 Gen 1 chip, designed specifically for smart glasses. Qualcomm has been promoting the integration of AI in devices like smartphones and PCs, highlighting how AI can run on the device itself instead of relying on cloud processing.

The demand for AR and VR headsets, though growing, is still small compared to smartphones. According to the International Data Corporation, 9.7 million headsets are expected to ship this year, significantly lower than the forecast of 1.23 billion smartphones. A common complaint with current AR and VR devices is their large, uncomfortable design. Amon suggested that creating glasses resembling regular eyewear could address this issue and attract a wider audience.

Ray-Ban Meta smart glasses are powered by a Qualcomm chip. Qualcomm, Samsung and Google are working on smart glasses, according to Qualcomm CEO Cristiano Amon. Nurphoto | Nurphoto | Getty Images|Ray-Ban Meta smart glasses are powered by a Qualcomm chip. Qualcomm, Samsung and Google are working on smart glasses, according to Qualcomm CEO Cristiano Amon. Nurphoto | Nurphoto | Getty Images|Ray-Ban Meta smart glasses are powered by a Qualcomm chip. Qualcomm, Samsung and Google are working on smart glasses, according to Qualcomm CEO Cristiano Amon. Nurphoto | Nurphoto | Getty Images

Samsung, Google, and Qualcomm's smart glasses aim to deliver a different experience from [Apple's Vision Pro](#) headset, which is controlled through hand gestures and worn on the user's head. Although details about the product are still scarce, TM Roh, head of Samsung's mobile division, mentioned in an earlier interview with CNBC that Samsung is working on a new "mixed-reality platform," expected to be announced later this year. This platform will likely focus on software.

Meta Quest VR/AR headsets are provably popular options for users seeking to embrace standalone and PCVR gaming without breaking the bank.

Affordability is one of the key reasons that the Meta Quest 3 fared so well against the ultra-specced (and ultra-priced) Apple Vision Pro, and such a level of accessibility could be a key reason that the company is said to have [ditched its plans for a high-end Meta Quest Pro follow-up](#).

However, the very same product roadmap review meeting that saw the cancellation of Meta's Quest Pro 2 headset reportedly saw the company greenlight a new project codenamed 'Puffin,' and it sounds incredibly similar to the Vision Pro that Apple may have initially wanted to create and outright uncanny when compared to one of the leading AR smart glasses options on the market already.

It's [widely reported](#) that frames like this were Tim Cook and Jony Ive's original idea for the Vision Pro (and [a concept Apple appears to be returning to](#)), though it was a concept eventually abandoned due to the belief that available technology simply wasn't ready to bring the idea to life.

On the other hand, Meta believes it is. Or, at the very least, that it will be — with Project Puffin said to be targeting the same 2027 release as the now-canceled Quest Pro 2.

The best of both worlds?

Puffin will reportedly offer an opaque viewing experience through twin pancake lenses, with your only undeterred vision of the space around you coming from a set of passthrough cameras (potentially positioned similarly to the Ray-Ban Meta's camera and recording indicators).

This new Quest-like device is also said to tip the scales at just 110 grams, somewhere around the average weight of a deck of cards and roughly a fifth of the Meta Quest 3. It's also a little over twice the weight of the company's [Ray-Ban Meta Smart Glasses](#), which house open-ear speakers, a built-in camera, and battery.



((Image credit: Meta))

A wired workaround

One of the primary drawbacks of Meta's Ray-Ban Smart Glasses is battery life, with its paltry 154 mAh Lithium-ion battery not offering much in the way of longevity when it comes to continuous audio playback, media capture, or live streaming.

However, this new Quest-like wearable seeks to avoid battery issues like this by taking a page from Apple's Vision Pro playbook, relying on an external, pocketable, wired puck to house the battery and computing elements of the frames.

The external puck should be able to supply the frames with a far larger power bank and reduce any concerns about heat levels when engaging with AR or VR content.

Meta Connect 2024 recap: Mark Zuckerberg reveals 'Orion' smart glasses, new AI features, transparent Ray-Bans, and an affordable Quest 3S©Meta

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[Mark Zuckerberg](#) knocked it out of the park during Meta's big day.

The [Meta](#) CEO took the stage on Wednesday to announce a slew of new AI and hardware products — including a teaser of the company's long-awaited fully holographic glasses, Orion.

The Orion glasses were the news of the day, and in a surprising turn for AR glasses, they looked ... pretty slick!

The smart glasses integrate visuals into the glasses lenses, the company's first "true AR" glasses. Notably, they appeared sleeker than the new [Snap Spectacles](#) that Snap CEO Evan Spiegel showed off last week. Zuckerberg ran a sizzle reel of famous names in tech reacting positively to the glasses, from Nvidia CEO Jensen Huang to Reddit CEO Steve Huffman.

But you'll have to wait a while to get your hands on them. The current prototype isn't launching to consumers, although Zuckerberg said some external developers will be able to get them. It'll be the next version, however, that the company eventually launches to the public.

But beyond "Orion," Zuckerberg also announced a limited-edition frame of Meta's Ray-Ban glasses and a slew of updates to the sleeper hit, along with new celebrity voices for its Meta AI chatbots as well as multi-modal features.

Zuck covered some of the big names behind Meta AI's voices, demonstrated some impressive real-time assistance tools, and debuted a new entry-level Quest 3S that costs \$299.

It was a chance for Zuckerberg to outline his vision of the future — and Meta's role in shaping what could be the next big computing platform.

Wall Street seemed impressed. Meta's stock was up more than 2% as Zuckerberg exited the stage.

Scroll on to get the full recap of his intro at Meta Connect 2024.

[See more](#)

Meta Ray-Bans. Meta© Meta

- Meta's Ray-Ban smart glasses are getting an upgrade with new AI features and memory retention.
- The glasses can scan QR codes, give live assistance in the moment, and offer live translations.
- Mark Zuckerberg touted the new functions at Meta Connect 2024.

Meta's smart glasses are getting an upgrade.

Mark Zuckerberg, the CEO of the tech behemoth, shared the updates to Meta's Ray-Bans during the company's annual show-and-tell conference, [Meta Connect 2024](#).

"We can start to see how the future of computing and the future of human connection are going to look, and it's pretty awesome," Zuckerberg said, touting Meta's smart glasses, mixed reality, and AI. "People love their Ray-Ban Meta glasses so much so that for a little while, we were struggling to keep up with the demand."

The updated glasses will retain memories of what users see and remind them about it later, helping them remember things like what they need to buy, Zuckerberg said.

"If you're heading somewhere, no more forgetting where you parked. Your glasses have you covered, and they can also remind you to pick up some avocados at the store," he said.

The glasses will also be able to scan QR codes, include video functionality with Meta AI for better in-the-moment assistance, and have live language translations between English and French, Italian, and Spanish using AI automatic dubbing.

"We are also adding multimodal video AI, so Meta AI is now going to be able to give you real-time help as you are doing things, like trying to figure out what outfit you want to wear for a party you are going to," Zuckerberg said. "There's a lot to build out over this to make it more useful over time, but this is gonna be a big platform."

The glasses will also include a new array of Transitions lenses from Ray-Ban maker EssilorLuxottica. The Ray-Ban Meta Wayfarer with polarized lenses costs

\$329, while the Transitions options are \$379, according to Meta's website. There's also a limited edition transparent-framed pair of glasses available for \$429 for customers who want to "appreciate what makes them special" instead of hiding the tech within, Zuckerberg said.

"They're also just good-looking glasses. The reality is that most of the time, you're not using smart functionality," Zuckerberg said. "People want to have something on their face that they're proud of, that looks good, that's designed in a very nice way."

The existing models of [Ray-Ban Meta glasses](#) let customers capture photos and videos, live stream on Instagram, and accept video calls. The glasses have an LED light that emits a flash when a photo or video is taken to inform others nearby that they could be recorded. Still, users have figured out how to [tape over the light to record](#) surreptitiously. Meta has said this is a violation of its terms.

Last September, the tech giant announced it was adding Meta AI to its smart glasses for US-based customers, letting them use the virtual assistant AI with the command, "Hey Meta." Zuckerberg touted this feature in an Instagram video where he used the AI to walk him through [braiding his daughter's hair](#).

Business Insider's Jordan Hart [tried out the smart glasses](#) at the time and noted that the photo capture function is reminiscent of using a disposable camera thanks to the LED flash. Photos turned out dark in low-light settings and blurry even with better lighting. The lenses don't have an AR display, so images have to be reviewed using the Meta View app on a smartphone.

Meta isn't redesigning its increasingly popular [Ray-Ban Meta Smart Glasses](#), but it is pouring attention on them in the form of new colors, faster transition lenses, and a lot more Meta AI capabilities.

At Meta Connect 2024 at the Meta Headquarters in Menlo Park, California, I got a chance to try out the smart glasses' latest capabilities, and it's clear to me that this little brain transplant will help raise Ray-Ban Meta's wearable companion capabilities.

Most of my experiences were in a sample Ray-Ban Meta Pop-up store, the first of which will soon appear in Los Angeles. It's a place where you can experience all of the smart glasses' various features, including Meta AI-powered ones, buy glasses, and even get them personalized with a custom engraving.

Some of Meta AI's updated capabilities are thanks to better third-party app integrations. Meta AI can now play Spotify Music, and the requests can be based on artists, tracks, or even moods.

Sing a song

I donned a tortoiseshell pair of Ray-Ban Metas and asked Meta AI to play me a happy song by Taylor Swift. Granted, that was a bit of a fumbled request, so I guess I wasn't surprised when Meta started playing the Happy Birthday song through the smart glasses' speakers, which are positioned in the stems and near my ears.

I regrouped and asked for a Taylor Swift song (I know, shockingly not *Hot to Go* by Chappell Roan), and after a second delay, it played Shake It Off.

Meta AI now has vision capabilities, so there were places throughout the demo store where I could look at things and ask Meta AI what I was looking at.

There was an LA city street diorama in the middle of the store. I looked at it and asked Meta AI using the prompt, "Hey, Meta" what I was looking at. It took a few moments for Meta AI to reply, and I thought it didn't hear me, but then it finally said, "You're looking at a diorama featuring various cars and palm trees," which was accurate.

With Meta AI, Ray-Ban Meta Smart Glasses also have some basic translation capabilities. I looked at a Spanish-language sign in the pop-up store and ask Meta AI to "translate this sign." I heard the smart glasses take a picture (it sounds like a camera shutter), and then Meta AI said, "Flower market, Mercado De Flores." I thought the Spanish pronunciation at the end was a nice touch.

You can also use Meta AI to set visual reminders, though it's a kind of clumsy process where you look at something and then tell Meta AI to remind you to do something later. I asked it to remind me to buy a book in five minutes. It might be just as quick to take out your phone and put in a reminder, but if you're in the habit of doing this a lot, using Ray-Ban Meta and Meta AI might be a time saver.

We also used Meta AI to read a QR code and send the link to a phone, and I spotted some people in the corner of the room getting their glasses engraved. One cool little demo was Ray Ban Meta's improved transition lenses. I watched as a Meta employee used a blue light to turn lenses a nice, dark shade quickly. I didn't even know blue light could do that.



((Image credit: Future))

Ray-Ban Meta Wayfarer Smart Glasses still start at \$329. Remember that not all of Meta AI's features (like Vision) are available worldwide, so check before you buy this wearable companion.

Look Ma, all hands!

Meta is reportedly gearing up to announce a cheaper version of its [Meta Quest 3](#) headset at next month's Meta Connect event: the [Meta Quest 3S](#). The Quest 3S is said to be a similarly specced headset with a mix and match of Quest 3 performance and Quest 2-like style and build.

However, to keep the headset's price down, [Meta is reportedly looking to ship the device without any controllers](#), trusting that its hand-tracking tech will be enough for most users to get by.

According to The Information, Puffin will likely follow suit, adopting eye and hand-tracking to interact with VR/AR elements similar to that found within Apple's Vision Pro.

Smart glasses are already here: Why wait for 2027?

As impressive as Meta's proposed Puffin headset/smart glasses hybrid sounds, what's more impressive is the fact that a similar experience already exists in [XREAL's Air 2 Ultra AR smart glasses](#).

While it may not have the pancake lenses of Meta's Puffin, the Air 2 Ultra provides fairly expansive AR viewports via a micro-OLED projection, reflected off of a secondary lens (with a 52-degree field of vision) which delivers full 3D, 1080p augmented reality displays.

Better still, this model of XREAL's impressive Air 2 AR glasses also features hand and head tracking with spatial anchoring for a full six degrees of freedom, depth mesh, plane detection, and image tracking to further the frame's AR potential.

XREAL's AR smart glasses are also tethered, typically connecting to any DisplayPort over USB-C compatible smartphone, tablet, or laptop. However, the company has recently released its [second-generation Beam Pro](#), which is a smartphone-esque device that offers a pocket-sized spatial computing experience while providing a decent level of battery to keep the frames running for longer.

Unfortunately, where XREAL's high-spec spectacle falls short is in their target audience, which is developers seeking to find use for this impressively outfitted wearable. However, given a year or two, we could see a plethora of software designed to unlock the potential of these smart glasses and showcase exactly what is possible in this form factor.

Outlook

Meta's ambitions for VR and AR stretch far beyond the bulky headsets we have available to us today. The success of the company's Ray-Ban Meta Smart Glasses was a surprise to many who saw Google Glass crash and burn a decade ago.

However, smart glasses are making a strong comeback, and brands like XREAL, VITURE, RayNeo, and more have been pushing the boundaries of what can be achieved in this form factor for some time now.

While one of Meta's biggest reveals during next month's Connect event could undoubtedly be the rumored "Orion" AR glasses, that's a project not expected to make its way to market for much of the remaining decade.

Project Puffin is a clear stepping stone towards that end goal and could be Meta's opening gambit in its efforts to compact the technology of its Quest headsets and expand on the potential of its smart glasses success.

Meta Connect 2024 recap: Mark Zuckerberg reveals Orion smart glasses, new AI features, transparent Ray-Bans, and an affordable Quest 3S

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The smart glasses integrate visuals into the lenses, making them the company's first "true AR" glasses. Notably, they appeared sleeker than the new [Snap Spectacles](#) that Snap CEO Evan Spiegel showed off last week. Of course, they still have a ways to go until they truly blend in like Meta's Ray-Ban smart glasses.

Zuckerberg ran a sizzle reel of famous names in tech reacting positively to the Orion glasses, from Nvidia CEO Jensen Huang to Reddit CEO Steve Huffman praising them as a leap forward.

Business Insider's chief correspondent, Peter Kafka, also got an [early demo of Orion](#) and wrote that he'd "buy them in a heartbeat." But people will have to wait a while to get their hands on the AR glasses.

The current Orion prototype isn't launching to consumers, although Zuckerberg said some external developers will be able to get them. It'll be the next version, however, that the company eventually launches to the public.

Zuckerberg's other announcements were more tangible. He showed off limited-edition frames of Meta's Ray-Ban glasses and a slew of feature updates to the sleeper hit, along with new celebrity voices for its Meta AI chatbots and multi-modal voice and vision features.

The CEO covered some of the big names behind the new Meta AI voices, which range from John Cena to Awkwafina, and he demonstrated some impressive real-time assistance tools and debuted a new entry-level Quest 3S mixed-reality headset that costs \$299.

The keynote was a chance for Zuckerberg to outline his vision of the future — and Meta's role in shaping what could be the next big computing platform.

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Scroll on to get the full recap of Zuckerberg's Meta Connect keynote.

That's a wrap! Zuckerberg closes out his keynote with a glimpse into the AI future.

Zuckerberg has been all about the future of tech, and the conclusion of his keynote is no different.

His segment of the Connect keynote concluded with a skit about how the Orion smart glasses could one day transform how humans communicate today.

We're seeing what his vision is when the technology catches up, with holographic conversations with others that make it feel like your friend is in the room with you.

Filmmaker Matthew Vaughn also briefly takes the stage to say how impressed he was by Orion.

And that's it for Zuck's 2024 Meta Connect keynote!

Zuckerberg says the public will have to wait to get their hands on full holographic glasses.

Zuckerberg said that the Orion holographic glasses aren't quite ready to hit the shelves for consumers, but they'll be available for some external developers.

In the meantime, Zuckerberg said Meta is working on lowering the retail price for the glasses and work on manufacturing challenges.

So it'll be the next version of the glasses that Meta will eventually launch as a consumer pair — release date TBD.

Nvidia CEO Jensen Huang was among those who tested out the 'Orion' glasses early.

Zuckerberg says that early testers of the Orion glasses were left "giddy" by what the device could do.

He rolls a video of various big names in tech and Silicon Valley trying them out early.

Nvidia CEO Jensen Huang was among the tech CEOs, media personalities, and Olympians who praised Orion — calling its 100-gram weight "a big deal" and praising the visuals and field of view.

Zuck's vision for the AI future includes a "neural interface."

"I think that you need a device that allows you to send a signal from your brain to the device," Zuckerberg said.

As such, the glasses come with a bracelet that makes that possible.

Zuckerberg says Orion will be used as a "dev kit" — so don't expect to be able to buy it anytime soon.

We're getting our first look at Orion, the "full holographic" glasses prototype.

There's a bit of theatrics to introduce the bulky eyewear — they're brought in under lock and key in a briefcase.

Zuckerberg shows off "Orion," fully holographic glasses that he says are the most advanced device of their kind.

Zuck drops limited-edition Ray-Ban glasses.

To top off the new updates to Meta's Ray-Ban glasses, Zuckerberg said the tech giant would launch a pair of limited-edition clear-frame glasses.

The smart glasses will also be a real-time translator.

©Meta

Zuckerberg said that Meta AI will be able to translate conversations live for those wearing their smart Ray-Ban glasses, and he demonstrated as much by carrying out a conversation in Spanish onstage with Brandon Moreno.

The glasses will translate in your ear what someone is saying, and your responses can be translated via the companion app.

Now here's what's new with Meta's Ray-Ban smart glasses.

Meta's Ray-Ban smart glasses are getting more conversational, and they'll have a better memory of what you've seen, Zuckerberg said.

They will also be outfitted with multi-modal AI that has the power to assist users in real time.

We're seeing some upcoming features, like the AI offering fashion advice based on what it sees you grabbing to put on as you get ready for a night out.

The next demo is a bit uncanny.

Meta is expanding its AI creator tools.

Technologist Don Allen Stevenson III joined Zuckerberg onstage to demonstrate a video calling feature during which he spoke to an AI version of Stevenson.

An AI avatar who looked and sounded like Stevenson answered questions about his creative process.

In another demonstration, creators speaking in one language could use AI to dub their videos in a new language.

Natural voices are the 'biggest AI' announcement of the day.

According to Zuck, interacting with AI using your voice will be a better way to interact with AI than text.

To demonstrate, Zuckerberg quickly asked a Meta AI assistant a question, and the chatbot responded with the voice of actor Awkwafina.

Meta is adding a bunch of celeb voices to its AI models that you can choose from, including Dame Judi Dench, John Cena, Keegan Michael Key, and Kristen Bell.

Here's some new Quest features.

Zuck mentions a partnership with Microsoft to allow seamless use of a Windows PC while on the Quest.

And in the Metaverse, avatars have gotten a makeover and portals that allow users to jump around worlds will be available.

Hyperscape is another new feature for Quest users. It allows users to create photo-realistic spaces to virtually explore with photos.

He jumps "right in" with a demo in the crowd.

We're getting a quick demo right away to test out the improved pass-through abilities found on the Meta Quest 3S, which Zuckerberg says will make mixed-reality better.

We're seeing a lot of Apple Vision Pro-like examples of someone with floating panels of content in front of them, hovering in the air. You can also stick the virtual panels to the nearby wall.

Zuckerberg starts off the keynote with a new Quest 3S headset.

"It's been a busy year. It's been an exciting year," Zuckerberg said.

He then jumped right in with a new \$299 Quest 3S, an entry-level mixed-reality headset.

CTO Andrew Bosworth is pulling up to Meta Connect in style.

Meta CTO Andrew Bosworth, also known as Boz, is expected to be among the main speakers at the Connect keynote on Wednesday afternoon.

Less than an hour before the event kicks off, Bosworth shared an Instagram story sharing that he was headed to the event. From a mirror inside his futuristic Mercedes-Benz, we can see that he captured the video using Meta's Ray-Ban smart glasses.

"On my way to Meta Connect," Bosworth said in the caption.

There's been a lot of chatter around Meta's 'Orion' AR glasses.

©REUTERS/Carlos Barria/File Photo

Business Insider first reported in February that [Meta was aiming to show off and demo its first true AR glasses](#) in the fall at Connect and that the prototype was referred to internally as "Orion."

Publicly, Zuckerberg hasn't held back from teasing that a new pair of AR glasses are in the works. A February photo on [Threads](#) was called out this summer for having a pair of mystery glasses in the background.

The Meta CEO responded to the question about the glasses with, "Will be ready to share more later this year."

The Connect keynote could be the time to officially introduce the public to these glasses, which are reportedly separate from the Meta Ray-Ban's, which don't feature a screen in the lenses, and the bulkier Quest headset, which is all about the VR screens and AR passthrough cameras. The "Orion" AR glasses, which are expected to integrate visuals into the lenses, aren't expected to go on sale in the near term — but seeing them demoed would offer an interesting glimpse into where Meta envisions the future of AR glasses is headed.

Zuckerberg said in an interview earlier this year that the Orion glasses won't be as stylish and slim as the Meta Ray-Ban product.

I tried Meta's Orion computer glasses, and they are very cool. Meta

- Mark Zuckerberg has unveiled Orion, Meta's new augmented-reality glasses.
- Lots of people think these kinds of glasses could be the future of computing — as powerful as an iPhone, but something you can wear on your head.
- But Meta says these are too expensive for the mass market. It will take years to make them smaller and cheaper.

Here is what you need to know about Orion, the new computer-on-your-face [nerd](#) glasses [Mark Zuckerberg](#) showed off today:

1. You can't buy them. And you won't be able to anytime soon. It's possible you never will.

Each pair of glasses reportedly costs [Meta](#) \$10,000 to make, and the company says it needs time to get them to a price that makes them plausible — think something in the \$1,000-ish range, like a laptop or high-end phone. (That \$10,000 number [comes from The Verge's Alex Heath](#). Meta declined to comment on the number).

If all goes well, it could take a few years for that to happen.

2. I've tried them, and they are very cool!

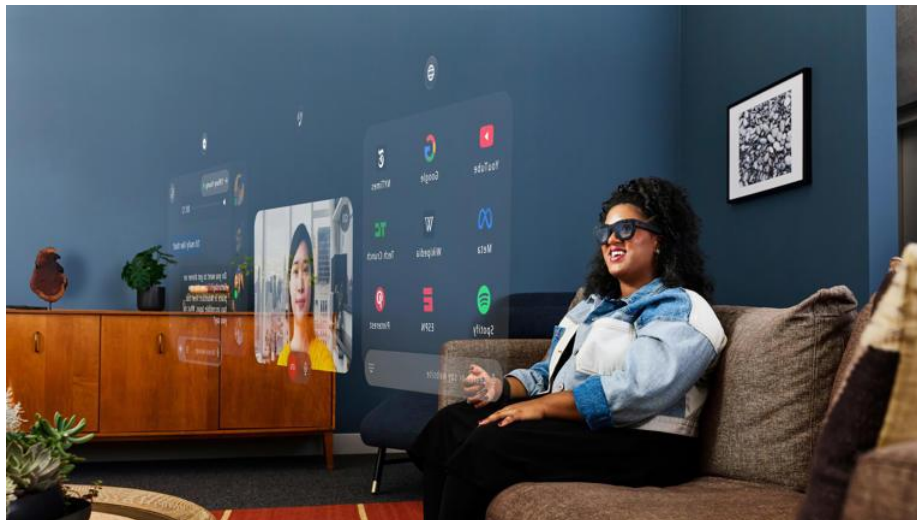
They don't make you *look* cool — you look like someone wearing tech on your face — but the ideas and engineering behind them are really fascinating. If you're one of the people who complains that Silicon Valley hasn't made anything except soul-sucking social networks and monetization machines for years, here's a compelling counter.

More important: Unlike other face-computing tech I've tried over the years — [Google's Glass](#), Apple's [Vision Pro](#), Meta's own line of Quest goggles — this is one I can actually imagine buying, and using, in real life.

My brief experience with [Orion](#) comes with major caveats. The biggest is that it's not actually ready for mass production. But if this pans out, it will deliver what lots of people in tech, and outside tech, say they want: a wearable computer jammed into a pair of glasses.

What would you do with a wearable computer?

For starters, lots of things you can do with a phone: Take and make phone calls and video calls. Send and receive texts. Take photos and videos. Watch videos. Play time-wasting games. Play around with AI.



Meta's Orion glasses can serve many of the same purposes as a smartphone. Meta© Meta

And because Orion sits on your face like glasses — bulky glasses that use silicon carbide instead of glass — you can do all those things while looking at, and interacting with, everything and everyone around you.

This is "[augmented reality](#)" — digital images laid over the real world. As opposed to "virtual reality" — where you are totally enveloped by a digital landscape.

There are obvious downsides to this. If you think it's frustrating to talk to someone who keeps looking at their phone to check a text or a viral video, imagine what it will be like to hold a conversation with someone who's staring at you and staring at something else at the very same time.*

But there are very intriguing upsides, too. Most obviously: Picture yourself with a task — like changing a tire, making marinara, or solving a math problem — and the ability to simultaneously look at the thing you want to do and instructions on how to do it.

Orion uses eye tracking, which means you select digital items just by looking at them. And you manipulate them — turn an app on or off, respond to a text message, swipe through videos on [Reels](#) — by making subtle flicks and clicks with your fingers. Those gestures get registered by a snug-but-not-bulky wristband** that registers your muscles' movements using [electromyography](#)*** and transmits them wirelessly to your glasses.



Meta's Orion glasses are connected to a wristband that reads muscle movements. Meta© Meta

Orion also comes the closest I've seen to a face computer you could take for a stroll. Unlike other devices I've seen, it doesn't need to be plugged into a [bulky power source](#) or tethered to a phone. Instead, it connects wirelessly to a TV-remote-sized power/computing device you can slip into your pocket that connects to the internet via WiFi or cell signals. Meta says its battery will last for two to three hours of continual use.

And here, I'm going to stop talking about Orion's specs. Because it seems pretty silly to get very deep into a thing that's still in development and may never actually materialize for mass production.

It's also important to stress that my brief demo time was in a Meta building, surrounded by Meta employees who guided me through a Meta-scripted walk-through. I have no idea how, or if, this thing works in the real world.

Neither do Meta executives, really. They say they're about to start "dogfooding" the device with lots of employees to get a better sense of how it performs while continuing to figure out how to make it lighter and cheaper.

Which brings us to two questions about Zuckerberg's reveal this week.

First: Why is Meta showing off something no one's going to be able to buy — at best — for years? This reminds me of pre-iPhone reveals, where it was common for tech companies to show you stuff they *might* make one day, but very often didn't.

When I ask Meta executives that question, they murmur about wanting their fellow employees to see the work they're doing, and to be encouraged by the progress they're making. But surely there are other ways to pump up morale — like having a [record-high stock price](#), which happens to have happened this week.

My theory relates to that stock price: that Zuckerberg, who has gotten grief over the years for plowing billions into his [metaverse dreams](#), wants to show the world — and specifically investors — that all those dollars weren't wasted. And that he's getting very close to a consumer device people might buy in very large numbers.

Which brings us to my second question: Why does Meta, whose online ad business is one of the world's greatest money-printing machines, want to make hardware anyway?

That one is easier to answer. Most practically: As great as that money-printing machine is, it can't work without phones made by [Apple](#) and Google — companies that force Meta to play by their rules and restrictions. If Orion, or any other device Meta makes, becomes the future of computing, then Zuckerberg can operate *his* business on *his* devices.

But if you're into vibes-based answers: Orion's debut is part of the [Mark Zuckerberg 3.0 era](#).

One where he says he's [done apologizing](#) (even though he's [still apologizing](#)) and [done with politics](#) (even though [politics is not done with him](#)). One where he's trying [new looks](#) (including [his own designs](#)).

So if he wants to take a victory lap with very cool new tech — even if the tech isn't quite ready for prime time? He's going to do that, too.

*The entire time I played with Orion, I kept thinking about teenagers I see walking around with a [single AirPods in their ear](#) at all times. The idea, supposedly, is that they can keep listening to whatever they want while begrudgingly listening to you, too. I find that half-in, half-out way of interacting with the world incredibly frustrating. But I'm old. Your mileage may vary.

**For whatever reason, some Meta people call this a "neural wristband," which makes it seem like it's somehow reading your brain. Thankfully, it is not.

Meta CEO Mark Zuckerberg showed off a flurry of new AI and mixed reality products, including a future version of holographic glasses, at the [company's annual Connect developer conference](#) on Wednesday, as the social media company seeks to stay ahead amid an industry-wide race to define the next phase of computing.

Zuckerberg showed off a prototype of its Orion holographic smart glasses that allow users to see digital objects overlaid over the real world and which he said can be controlled with brain waves through a "neural interface."

The glasses are not currently available, and Zuckerberg did not provide a specific time frame on when they might be available or at what price. The prototype provides a glimpse of the future that the company is working toward, he said.

The holographic smart glasses use an entirely new type of display, Zuckerberg said as he donned them. "This is not pass-through, this is the real world with holograms overlaid on it," he said.

The glasses "do voice and AI, hand and eye-tracking, but there's one more way you'll be able to interact with that's pretty neat – neural interface – send a signal from your brain to the device," Zuckerberg said.

In a bit of theatrics scripted for the audience of Meta software developers and partners, the glasses were brought on stage in a silver metal briefcase handcuffed to the bearer's wrist.

Mark Zuckerberg unveils new Orion holographic smart glasses with a 'neural interface'

The Orion glasses, which have proven to be a [technical challenge for the company's engineers](#), would represent a major leap forward for Meta, which currently offers a far more limited type of "smart glasses" device. Meta showed off updates to the popular, [existing RayBan smart glasses](#) that it makes and sells through a partnership with eyewear giant [EssilorLuxottica](#). These glasses don't have mixed reality features but have voice-based AI capabilities that can do real time language translation, as well as take notes and make reminders for users, such as remembering a parking space number.

Celebrity AI voices

Meta has invested tens of billions of dollars in recent quarters as it builds out its computing infrastructure to support a new generation of compute-intensive generative AI models amid [intense competition from Google and Microsoft](#). And the company has integrated its AI tools across its portfolio of internet apps including Instagram, [Facebook](#), and Whatsapp.

Nearly 500 million users now use Meta's AI products, Zuckerberg said, claiming that Meta AI is on track to be the most used AI in the world. The company rolled out new features for its AI products, including voices of celebrity actors including Awkwafina, John Cena and Dame Judi Dench. And it announced the next version of its Llama large language model, Llama 3.2, which the company said can understand both images and text.

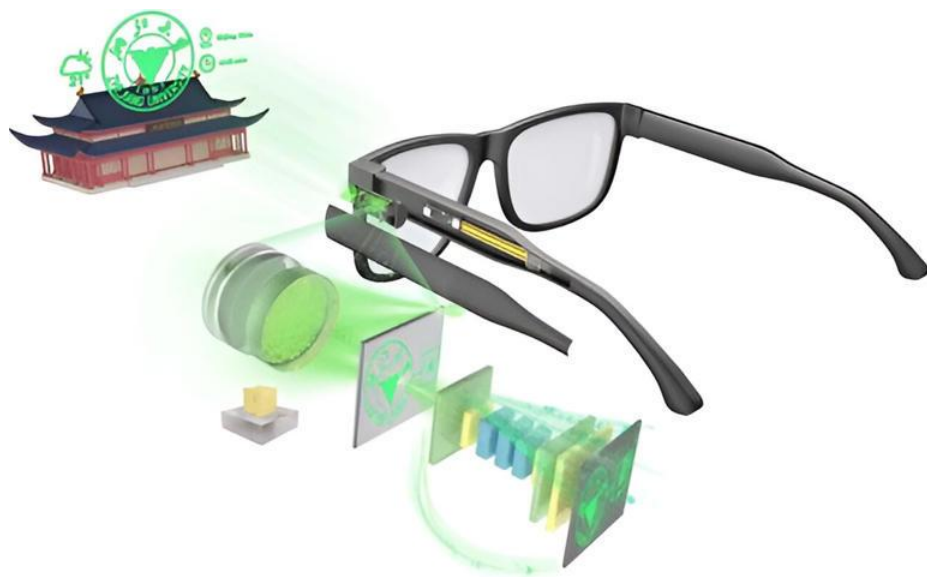
Clad in a black T-shirt and dark, slim cut jeans highlighting [a recent image makeover](#), Facebook's 40-year old founder touted the progress at the company

which now employs more than 70,000 workers and supports more than 3.27 billion users on its various products every day.

"It's been a very busy year. A lot of the stuff we've been talking about for a long time – it's happening – we can start to see how the future of computing, human connection are gonna look and it's pretty awesome," Zuckerberg said.

Among some of the other products unveiled Wednesday: a new, \$299 version of the Quest mixed reality headset.

Augmented reality (AR) takes digital images and superimposes them onto real-world views. But AR is more than a new way to play video games; it could transform surgery and self-driving cars. To make the technology easier to integrate into common personal devices, researchers [report](#) in *ACS Photonics* how to combine two optical technologies into a single, high-resolution AR display. In an eyeglasses prototype, the researchers enhanced image quality with a computer algorithm that removed distortions.



Graphical abstract. Credit: ACS Photonics (2024). DOI: 10.1021/acsp Photonics.4c00989

AR systems, like those in bulky goggles and automobile head-up displays, require portable optical components. But shrinking the typical four-lens AR system to the

size of eyeglasses or smaller typically lowers the quality of the computer-generated image and reduces the field of view.

Youguang Ma and colleagues may have found a solution for condensing the technology. They combined two optical technologies—a metasurface and a refractive lens—with a microLED screen (containing arrays of tiny green LEDs for projecting images) to create a compact, single-lens hybrid AR design.

Their display's metasurface is an ultrathin, lightweight silicon nitride film etched with a pattern. The pattern shapes and focuses light from the green microLEDs. Then, a black-and-green image forms on a refractive lens made from a synthetic polymer, which refines the image by sharpening and reducing aberrations in the light.

The final image is projected out of the system and superimposed onto an object or screen. To further enhance the resolution of the projected image, Ma and the team used computer algorithms to identify minor imperfections in the optical system and correct them before light leaves the microLED.

The researchers integrated the hybrid AR display into a pair of eyeglasses and tested the prototype's performance with computer image enhancement. Projected images from the one-lens hybrid system had less than 2% distortion across a 30° field of view—image quality that's on par with current commercial AR platforms with four lenses. The researchers then confirmed that their computer preprocessing algorithm improved a reprojected AR picture of a red panda.

The reprojected red panda was 74.3% structurally similar to the original image—a 4% improvement from the uncorrected projection of the image. With additional development, the researchers say the platform could extend from green to full color and enable a new generation of mainstream AR glasses.

More information: Qikai Chen et al, Hybrid Meta-Optics Enabled Compact Augmented Reality Display with Computational Image Reinforcement, *ACS Photonics* (2024). DOI: [10.1021/acsp Photonics.4c00989](https://doi.org/10.1021/acsp Photonics.4c00989)

Provided by American Chemical Society



Meta Orion AR Glasses

Mark Zuckerberg has unveiled the Meta Orion AR glasses. Although still a prototype, these holographic [Augmented Reality](#) (AR) glasses offer multi-sensory controls.

Meta's AR glasses offer holographic overlay

At the Meta Connect 2024, Mark Zuckerberg unveiled Meta's holographic AR glasses prototype. Codenamed Orion, the AR glasses are [still a work in progress](#). However, the prototype Mark demoed [was reportedly fully functional](#).

The Meta Orion AR glasses are the culmination of over a decade's work, announced the Meta CEO. As the [brief demo video](#) indicates, these AR glasses appear thick. However, they weigh less than 100 grams.

Meta's latest AR tech offers a virtual overlay to augment what wearers will see in the real world. These glasses can highlight objects, let users video chat with another person's life-like persona, and give wearers access to web browsing and video streaming.

Mark has cautioned that the design of the Meta Orion AR glasses isn't yet finalized. Interestingly, he implied the aesthetics, and not the inner hardware, "aren't as fashionable".

The Orion AR glasses benefit from Meta's Artificial Intelligence LLM. Both the Generative Artificial Intelligence ([Gen AI](#)) and the glasses are multimodal. In other words, they can see and understand whatever the wearer is looking at.

Meta Orion AR glasses specifications and features

According to multiple social media posts, Meta's new AR glasses feature "waveguide" displays. In its current iteration, these glasses have a 70-degree FoV (Field of View).

The frame of the AR glasses is made from a Magnesium alloy for better weight and thermal distribution. The stems of the glasses have molded batteries, speakers, and multiple sensors.

The Meta Orion AR glasses reportedly have seven cameras. Coupled with Meta AI, these glasses can accept commands in multiple ways. Wearers can rely on gesture navigation using their eyes and hands. Alternatively, they can use their voice.

Mark indicated the company's latest gadget also had a neural interface. Specifically speaking, there's a wristband that can detect the wearer's hand swipes and movements.

[Meta](#) intends to optimize the hardware, make the form factor smaller, and enhance the sharpness of the visuals. Interestingly, the social media giant also indicated it is working on making the glasses more affordable, presumably [while working with Ray-Ban](#).

The post [Meta announces Orion AR glasses with multi-sensory controls](#) appeared first on [Android Headlines](#).



Brain implants to restore sight, like Neuralink's Blindsight, face a fundamental problem© PsyPost

Elon Musk [recently pronounced](#) that the next Neuralink project will be a “Blindsight” cortical implant to restore vision: “Resolution will be low at first, like early Nintendo graphics, but ultimately may exceed normal human vision.”

Unfortunately, this claim rests on the [fallacy that neurons in the brain are like pixels on a screen](#). It’s not surprising that engineers often assume that “more pixels equals better vision.” After all, that is how monitors and phone screens work.

In our newly published research, we created a [computational model of human vision](#) to simulate what sort of vision an extremely high-resolution cortical implant might provide. A movie of a cat with a resolution of 45,000 pixels is sharp and clear. A movie generated using a simplified version of a model of 45,000 cortical electrodes, each of which stimulates a single neuron, still has a recognizable cat but most of the details of the scene are lost.

The reason why the movie generated by electrodes is so blurry is because neurons in the human visual cortex do not represent tiny dots or pixels. Instead, each neuron has a particular [receptive field](#), which is the location and pattern a visual stimulus must have in order to make that neuron fire. Electrically stimulating a single neuron produces a blob whose appearance is determined by

that neuron's receptive field. The tiniest electrode – one that stimulates a single neuron – will produce a blob that is roughly the size of your pinkie's width held at arm's length.

Consider what happens when you look at a single star in the night sky. Each point in space is represented by many thousands of neurons with overlapping receptive fields. A tiny spot of light, such as a star, results in a complex pattern of firing across all these neurons.

To generate the visual experience of seeing a single star with cortical stimulation, you would need to reproduce a pattern of neural responses that is similar to the pattern that would be produced by natural vision.

In order to do this, you would obviously need thousands of electrodes. But you would also need to replicate the correct pattern of neuronal responses, which requires knowing every neuron's receptive field. Our simulations show that knowing the location of each neuron's receptive field in space is not enough – if you don't also know the orientation and size of each receptive field, then the star becomes a fuzzy mess.

So, even a single star – a single, bright pixel – generates an immensely complex neural response in the visual cortex. Imagine the even more complex pattern of cortical stimulation needed to accurately reproduce natural vision.

Some scientists have suggested that by stimulating exactly the [right combination of electrodes](#), it would be possible to [produce natural vision](#). Unfortunately, no one has yet suggested a sensible way to determine the receptive field of each individual neuron in a specific blind patient. Without that information, there is no way to see the stars. Vision from cortical implants will remain grainy and imperfect, regardless of the number of electrodes.

Sight restoration is not simply an engineering problem. Predicting what kind of vision a device will provide requires knowing how the [technology interfaces with the complexities of the human brain](#).

How we created our virtual patients

In our work as [computational neuroscientists](#), we develop simulations that predict the perceptual experience of patients seeking to restore their sight.

We have previously created a model to predict the [perceptual experience of patients with a retinal implant](#). To create a virtual patient to predict what cortical implant patients would see, we simulated the neurophysiological architecture of the area of the brain involved in the [first stage of visual processing](#). Our model approximates how receptive fields increase in size from central to peripheral vision and the fact that every neuron has a unique receptive field.

[Our model successfully predicted](#) data describing the perceptual experience of participants across a wide range of studies on cortical stimulation in people. Having confirmed that our model could predict existing data, we used it to make predictions about the quality of vision that possible future cortical implants might produce.

Models like ours are an example of [virtual prototyping](#), which involves using computer systems to improve product design. These models can facilitate new technology development and evaluate device performance. Our study shows they can also offer more realistic expectations about what kind of vision bionic eyes might provide.

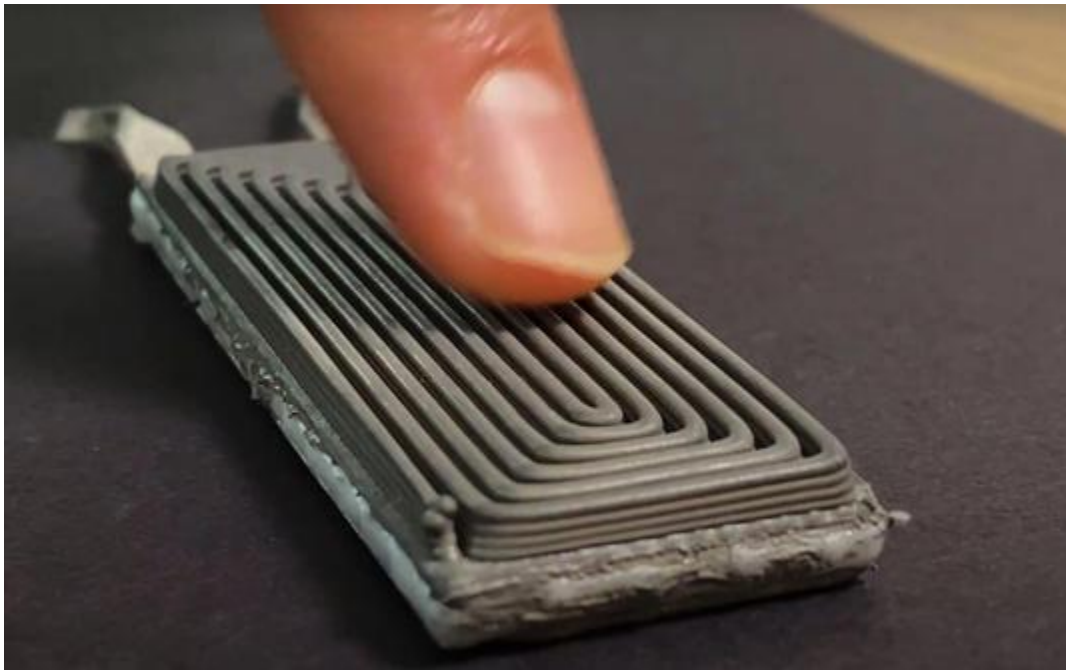
First do no harm

In our almost 20 years researching bionic eyes, we've seen the complexity of the human brain defeat company after company. [Patients pay the cost](#) when these devices fail, left stranded with orphaned technologies in their eye or brain.

The Food and Drug Administration could mandate that sight recovery tech companies must develop [failure plans that minimize harm](#) to patients when technologies stop working. Possibilities include requiring companies implanting neuroelectronic devices into patients to participate in [technology escrow agreements](#) and carry insurance to ensure continuing [medical care](#) and [technology support](#) if they go bankrupt.

If cortical implants can achieve anything close to the resolution of our simulations, that would still be an accomplishment worth celebrating. Grainy and

imperfect vision would be life-changing for many thousands of people who currently suffer from incurable blindness. But this is a moment for cautious rather than blind optimism.



Credit: University of Washington

One of the drawbacks of fitness trackers and other wearable devices is that their batteries eventually run out of juice. But what if in the future, wearable technology could use body heat to power itself?

UW researchers have developed a flexible, durable electronic prototype that can harvest energy from body heat and turn it into electricity that can be used to power small electronics, such as batteries, sensors or LEDs. This device is also resilient—it still functions even after being pierced several times and then stretched 2,000 times.

The team detailed these prototypes in a paper [published](#) Aug. 30 in *Advanced Materials*.

"I had this vision a long time ago," said senior author Mohammad Malakooti, UW assistant professor of mechanical engineering. "When you put this device on your skin, it uses your body heat to directly power an LED. As soon as you put the device on, the LED lights up. This wasn't possible before."

Traditionally, devices that use heat to generate electricity are rigid and brittle, but Malakooti and team previously created one that is highly flexible and soft so that it can conform to the shape of someone's arm.

This device was designed from scratch. The researchers started with simulations to determine the best combination of materials and device structures and then created almost all the components in the lab.

It has three main layers. At the center are rigid thermoelectric semiconductors that do the work of converting heat to electricity. These semiconductors are surrounded by 3D-printed composites with low thermal conductivity, which enhances energy conversion and reduces the device's weight.

To provide stretchability, conductivity and electrical self-healing, the semiconductors are connected with printed liquid metal traces. Additionally, liquid metal droplets are embedded in the outer layers to improve heat transfer to the semiconductors and maintain flexibility because the metal remains liquid at room temperature. Everything except the semiconductors was designed and developed in Malakooti's lab.

In addition to wearables, these devices could be useful in other applications, Malakooti said. One idea involves using these devices with electronics that get hot.

"You can imagine sticking these onto warm electronics and using that excess heat to power small sensors," Malakooti said. "This could be especially helpful in data centers, where servers and computing equipment consume substantial electricity and generate heat, requiring even more electricity to keep them cool."

"Our devices can capture that heat and repurpose it to power temperature and humidity sensors. This approach is more sustainable because it creates a

standalone system that monitors conditions while reducing overall energy consumption. Plus, there's no need to worry about maintenance, changing batteries or adding new wiring."

These devices also work in reverse, in that adding electricity allows them to heat or cool surfaces, which opens up another avenue for applications.

"We're hoping someday to add this technology to virtual reality systems and other wearable accessories to create hot and cold sensations on the skin or enhance overall comfort," Malakooti said. "But we're not there yet. For now, we're starting with wearables that are efficient, durable and provide temperature feedback."

More information: Youngshang Han et al, 3D Soft Architectures for Stretchable Thermoelectric Wearables with Electrical Self-Healing and Damage Tolerance, *Advanced Materials* (2024). DOI: [10.1002/adma.202407073](https://doi.org/10.1002/adma.202407073)

Provided by University of Washington

Study discovers a 'brain thesaurus' that lets neurons derive meaning from spoken words

Using a novel technology for obtaining recordings from single neurons, a team of investigators at Massachusetts General Hospital, a founding member of the Mass General Brigham health care system, discovered a microscopic "thesaurus" that reflects how word meanings are represented by neurons in the human brain.

The research, which is [published](#) in *Nature*, opens the door to understanding how humans comprehend language and provides insights that could be used to help individuals with medical conditions that affect speech.

"Humans possess an exceptional ability to extract nuanced meaning through language—when we listen to speech, we can comprehend the meanings of up to tens of thousands of words and do so seamlessly across remarkably diverse concepts and themes," said senior author Ziv Williams, MD, a physician-investigator in the department of Neurosurgery at Massachusetts General Hospital and an associate professor of Neurosurgery at Harvard Medical School.

"Yet, how the human brain processes language at the basic computational level of individual neurons has remained a challenge to understand."

Williams and his colleagues set out to construct a detailed map of how neurons in the human brain represent word meanings—for example, how we represent the concept of animal when we hear the word cat and dog, and how we distinguish between the concept of a dog and a car.

"We also wanted to find how humans are able to process such diverse meanings during natural speech and through which we are able to rapidly comprehend the meanings of words across a wide array of sentences, stories, and narratives," Williams said.

To start addressing these questions, the scientists used a novel technology that allowed them to simultaneously record the activities of up to a hundred neurons from the brain while people listened to sentences (such as, "the child bent down to smell the rose") and short stories (for example, about the life and times of Elvis Presley).

Using this new technique, the investigators discovered how neurons in the brain map words to particular meanings and how they distinguish certain meanings from others.

"For example, we found that while certain neurons preferentially activated when people heard words such as 'ran' or 'jumped,' which reflect actions, other neurons preferentially activated when hearing words that have emotional connotations, such as 'happy' or 'sad,'" said Williams.

"Moreover, when looking at all of the neurons together, we could start building a detailed picture of how word meanings are represented in the brain."

To comprehend language, though, it is not enough to only understand the meaning of words, but also to accurately follow their meanings within sentences. For example, most people can rapidly tell the correct meaning of words such as "sun" and "son" or "see" and "sea" when used in a sentence, even though the words sound exactly the same.

"We found that certain neurons in the brain are able to reliably distinguish between such words, and they continuously anticipate the most likely meaning of the words based on the sentence contexts in which they are heard," said Williams.

Lastly, and perhaps most excitingly, the researchers found that, by recording a relatively small number of brain neurons, they could reliably predict the meanings of words as they were heard in real-time during speech. That is, based on the activities of the neurons, the team could determine the general ideas and concepts experienced by an individual as they were being comprehended during speech.

"By being able to decode word meaning from the activities of small numbers of brain cells, it may be possible to predict, with a certain degree of granularity, what someone is listening to or thinking," said Williams.

"It could also potentially allow us to develop brain-machine interfaces in the future that can enable individuals with conditions such as motor paralysis or stroke to communicate more effectively."

More information: Mohsen Jamali et al, Semantic encoding during language comprehension at single-cell resolution, *Nature* (2024). DOI: [10.1038/s41586-024-07643-2](https://doi.org/10.1038/s41586-024-07643-2)

Quantum Entanglement Communicator

The Quantum Entanglement Communicator represents a monumental leap in global communication technology, inspired by the advanced systems featured in *Ender's Game*. This groundbreaking device harnesses the principles of quantum entanglement to enable instantaneous communication across vast distances, eliminating the delays associated with traditional systems.

By utilizing entangled particles, this communicator ensures that messages are transmitted instantly, regardless of physical barriers. Its secure, nearly unhackable nature provides a significant tactical advantage, allowing for strategic discussions without the risk of interception.

As the Quantum Entanglement Communicator bridges the gaps of time and space, it transforms not only military operations but also the very fabric of global connectivity, paving the way for a future where communication knows no bounds.

Jarvis AI is real – Google accidentally leaks its AI agent that browses the web for you

- **Google has accidentally leaked its Jarvis AI**
- **Jarvis AI browses Chrome for you**

- **It's expected to be officially unveiled in December**

Google has accidentally leaked its upcoming AI agent, Jarvis AI, which will browse the web for you in Chrome.

According to [The Information](#), Google posted an internal preview of the product, codenamed Jarvis, on the Chrome extension store but was quick to remove the prototype before too many users noticed.

The listing read "a helpful companion that surfs the web with you." which lines up with the [news from October that Google was developing Jarvis](#), the AI agent that would help you shop online and even be able to book your next vacation.

Those who managed to download the Jarvis AI prototype before it was pulled from Chrome's extension store were unable to use it as the program required specific access permissions.

With The Information reporting Google plans to officially unveil Jarvis in December, this leak confirms that we won't have long to wait.

Christmas shopping for me

The screenshot displays the Jarvis AI interface within a Chrome browser. On the left, a sidebar contains instructions for filling out a vendor request form and a 'Get situated' section. The main area shows a spreadsheet titled 'messy-vendor-data' with columns for Company Name, Phone Number, Tax ID, Country, and Legal Entity Address. A 'Vendor Search Portal' tab is active, showing a list of vendors. On the right, a 'Vendor Form' is open for 'Acme Inc. Vendor R', with fields for Company Information, Legal Entity Address, and Contact Details.

Please fill out the vendor request form for 'Ant Equipment Co.' using data from either the vendor spreadsheet or search portal tabs in window one. List & verify each field as you complete the form in window two.

Get situated

I'll help you fill out the vendor form for 'Ant Equipment Co.'. Let me start by taking a screenshot to see the current state of the windows.

Screenshot

Open vendor search portal

I notice that 'Ant Equipment Co.' is not visible in the spreadsheet. Let me check the vendor search portal. First, I'll need to click on the vendor search portal tab.

Company Name	Phone Number	Tax ID	Country	Legal Entity Address
Table Lumber Co	+1-456-789-0123		canada	789 Timber Lane
TechPro Services, LLC	(555) 234-5678	98-7654321	United States	456 Tech Drive
Global Manufacturing Ltd.	+44 20 7123 4567	GB123456789	UK	789 Industrial Way
Smith & Co. Suppliers	1-555-345-6789		United States	321 Commerce St
Innovate Tech Solutions	555-456-7890	45-6789012	us	987 Innovation Dr
SUPREME PARTS & SUPPLY	(555)567-8901	67-8901234	USA	654 Supply Chain F
Data Systems International, Inc.	+1-678-901-2345	34-5678901	USA	432 Data Center A
mikrotech solutions	+49 30 12345678	DE987654321	Germany	Technologiepark 42
GOLDEN BRIDGE IMPORTS,LLC	555-890-1234	89-0123456	usa	741 Harbor Blvd.
BlueSky Logistics, Inc	510-555-9876		United States	1840 Harbor Bay P
Quantum Electronics LLC	(408) 555-1234	77-8899012	usa	2001 Technology D
FASTSHIP CARRIERS, INC.	1.888.555.7890	88-1122334	USA	789 Port Way
advance auto parts	1-777-555-4321	99-3344556	United States	452 Auto Plaza
pacific trading co. ltd	+61 3-5555-1212	JP9988776655	Japan	Nihonbashi Building
megaTECH solutions	+44 20 7123 4567	GB123456789	UK	Unit 3 Tech Park
Southwest Paper Supply	214-555-8901	45-6677889	us	1234 Industrial Pk
Nordic Furniture AB	+46 8 555 123 45	SE556677-8899	Sweden	Möbelsvägen 12
GREENFARM AGRICULTURE	(555) 555-3456	33-9988776	United states	875 Farm Road

Acme Inc. Vendor R

Please provide the information below.

Company Information

Company Name *

Purchase Order Email *

Accounting Email *

Legal Entity Address

Select a country *

Address Line 1 *

Address Line 2

City *

State/Province *

Postal Code *

Anthropic released the 'computer use' feature (above) for its Claude AI, which similarly lets it interact with your computer. (Image credit: Anthropic)

Jarvis AI is expected to allow users to automate web browsing tasks from within Google Chrome so they can focus on more important things while the AI agent shops or even books flights for you.

For example, think of how great this could be for mundane Christmas shopping – after all, nothing says 'I love you' more than a gift purchased by AI.

AI agents, which are systems that can complete tasks without your supervision, are starting to pop up increasingly with companies like [Anthropic releasing a product similar to Jarvis last month](#). It's also reported that OpenAI could be working on an agent too, although we're yet to see how that would differ from Google's upcoming product.

AI development is booming with companies releasing new tools almost daily. Just last week [ChatGPT Search](#) became available to Plus subscribers ushering in a new era for AI search engines. With Jarvis AI, however, we might not even need to do the searching ourselves.

Memories are not only in the brain, human cell study finds

An NYU researcher administers chemical signals to non-neural cells grown in a culture plate. Credit: Nikolay Kukushkin

It's common knowledge that our brains—and, specifically, our brain cells—store memories. But a team of scientists has discovered that cells from other parts of the body also perform a memory function, opening new pathways for understanding how memory works and creating the potential to enhance learning and to treat memory-related afflictions.

"Learning and memory are generally associated with brains and brain cells alone, but our study shows that other cells in the body can learn and form memories, too," explains New York University's Nikolay V. Kukushkin, the lead author of the [study](#), which appears in the journal *Nature Communications*.

The research sought to better understand if non-brain cells help with memory by borrowing from a long-established neurological property—the massed-spaced effect—which shows that we tend to retain information better when studied in spaced intervals rather than in a single, intensive session—better known as cramming for a test.

In the research, the scientists replicated learning over time by studying two types of non-brain human cells in a laboratory (one from nerve tissue and one from kidney tissue) and exposing them to different patterns of chemical signals—just like brain cells are exposed to patterns of neurotransmitters when we learn new information.

In response, the non-brain cells turned on a "memory gene"—the same gene that brain cells turn on when they detect a pattern in the information and restructure their connections in order to form memories.

To monitor the memory and learning process, the scientists engineered these non-brain cells to make a glowing protein, which indicated when the memory gene was on and when it was off.

The results showed that these cells could determine when the chemical pulses, which imitated bursts of neurotransmitter in the brain, were repeated rather than simply prolonged—just as neurons in our brain can register when we learn with breaks rather than cramming all the material in one sitting.

Specifically, when the pulses were delivered in spaced-out intervals, they turned on the "memory gene" more strongly, and for a longer time, than when the same treatment was delivered all at once.

"This reflects the massed-space effect in action," says Kukushkin, a clinical associate professor of life science at NYU Liberal Studies and a research fellow at NYU's Center for Neural Science. "It shows that the ability to learn from spaced repetition isn't unique to brain cells, but, in fact, might be a fundamental property of all cells."

The researchers add that the findings not only offer new ways to study memory, but also point to potential health-related gains.

"This discovery opens new doors for understanding how memory works and could lead to better ways to enhance learning and treat memory problems," observes Kukushkin.

"At the same time, it suggests that in the future, we will need to treat our body more like the brain—for example, consider what our pancreas remembers about the pattern of our past meals to maintain healthy levels of blood glucose or consider what a cancer cell remembers about the pattern of chemotherapy."

The work was jointly supervised by Kukushkin and Thomas Carew, a professor in NYU's Center for Neural Science. The study's authors also included Tasnim Tabassum, an NYU researcher, and Robert Carney, an NYU undergraduate researcher at the time of the study.

More information: N. V. Kukushkin et al, The massed-spaced learning effect in non-neural human cells, *Nature Communications* (2024). DOI: [10.1038/s41467-024-53922-x](https://doi.org/10.1038/s41467-024-53922-x) Provided by New York University

Study discovers a 'brain thesaurus' that lets neurons derive meaning from spoken words

Credit: CC0 Public Domain© Provided by Medical Xpress

Using a novel technology for obtaining recordings from single neurons, a team of investigators at Massachusetts General Hospital, a founding member of the Mass General Brigham health care system, discovered a microscopic "thesaurus" that reflects how word meanings are represented by neurons in the human brain.

The research, which is [published](#) in *Nature*, opens the door to understanding how humans comprehend language and provides insights that could be used to help individuals with medical conditions that affect speech.

"Humans possess an exceptional ability to extract nuanced meaning through language—when we listen to speech, we can comprehend the meanings of up to tens of thousands of words and do so seamlessly across remarkably diverse concepts and themes," said senior author Ziv Williams, MD, a physician-investigator in the department of Neurosurgery at Massachusetts General Hospital and an associate professor of Neurosurgery at Harvard Medical School.

"Yet, how the human brain processes language at the basic computational level of individual neurons has remained a challenge to understand."

Williams and his colleagues set out to construct a detailed map of how neurons in the human brain represent word meanings—for example, how we represent the concept of animal when we hear the word cat and dog, and how we distinguish between the concept of a dog and a car.

"We also wanted to find how humans are able to process such diverse meanings during natural speech and through which we are able to rapidly comprehend the meanings of words across a wide array of sentences, stories, and narratives," Williams said.

To start addressing these questions, the scientists used a novel technology that allowed them to simultaneously record the activities of up to a hundred neurons from the brain while people listened to sentences (such as, "the child bent down to smell the rose") and short stories (for example, about the life and times of Elvis Presley).

Using this new technique, the investigators discovered how neurons in the brain map words to particular meanings and how they distinguish certain meanings from others.

"For example, we found that while certain neurons preferentially activated when people heard words such as 'ran' or 'jumped,' which reflect actions, other neurons preferentially activated when hearing words that have emotional connotations, such as 'happy' or 'sad,'" said Williams.

"Moreover, when looking at all of the neurons together, we could start building a detailed picture of how word meanings are represented in the brain."

To comprehend language, though, it is not enough to only understand the meaning of words, but also to accurately follow their meanings within sentences. For example, most people can rapidly tell the correct meaning of words such as "sun" and "son" or "see" and "sea" when used in a sentence, even though the words sound exactly the same.

"We found that certain neurons in the brain are able to reliably distinguish between such words, and they continuously anticipate the most likely meaning of the words based on the sentence contexts in which they are heard," said Williams.

Lastly, and perhaps most excitingly, the researchers found that, by recording a relatively small number of brain neurons, they could reliably predict the meanings of words as they were heard in real-time during speech. That is, based on the activities of the neurons, the team could determine the general ideas and concepts experienced by an individual as they were being comprehended during speech.

"By being able to decode word meaning from the activities of small numbers of brain cells, it may be possible to predict, with a certain degree of granularity, what someone is listening to or thinking," said Williams.

"It could also potentially allow us to develop brain-machine interfaces in the future that can enable individuals with conditions such as motor paralysis or stroke to communicate more effectively."

More information: Mohsen Jamali et al, Semantic encoding during language comprehension at single-cell resolution, *Nature* (2024). DOI: [10.1038/s41586-024-07643-2](https://doi.org/10.1038/s41586-024-07643-2)

Provided by Massachusetts General Hospital

Our brains trick us into thinking consciousness can reside outside the body, research argues

Psychology professor Iris Berent says perceiving minds and bodies as separate has evolutionary roots. Credit: Matthew Modoono/Northeastern University© Provided by Medical Xpress

The origins of consciousness have been debated by philosophers for centuries. Each conscious person has a sense of "being me," which invariably gives rise to the question of where that sense originated—from within or outside the body, says Northeastern University psychology professor Iris Berent.

"How do human brains give rise to this experience? That's the big mystery, right?" she says.

Influential philosopher David Chalmers famously won a bet in 2023 for claiming consciousness exists beyond the merely physical, Berent says.

But she says the question of where consciousness exists is a false one—and she has a new paper that presents her position.

In an [article](#) published in the *Neuroscience of Consciousness*, she argues that the debate stems from the delusional—albeit natural—biases in the way humans think about the separation, or lack thereof, between body and mind.

"One of the biases is dualism, intuitive dualism—the fact that we perceive minds as separate from our bodies."

"The extent to which we look at consciousness and think that it is this really mysterious thing could very well arise from how we see it rather from what consciousness really is," Berent says.

"Consciousness isn't hard. Psychology is," she says.

Mary and the zombie

Berent points to an experiment in perception she conducted in her lab that used the well-known Mary and the zombie hypothetical exercise, but with a twist.

According to the experiment, when people are asked to think of a zombie twin of themselves, they describe a creature with their physical features but without their thoughts or feelings.

"They intuit that the mind, consciousness included, is really separate from the physical," Berent says.

In the other thought experiment, Mary is a neuroscientist who knows everything about color and how the brain perceives color, even though she lives in a black-and-white world.

When Mary sees a red rose for the first time, people participating in the experiment say she learns something outside the bounds of physical, scientific explanation.

Berent says she decided to challenge these conclusions with two additional questions.

"The first question is kind of a reality check question, which is do they think Mary's case is significant? Is it transformative? And everybody said, 'Sure, it's super transformative,'" Berent says.

"We also asked how likely is it that this experience will actually show up in her brain? If we scan her brain, will it light up? And it turns out that that's exactly what people said. It will significantly register in the brain."

"The point being, in the condition of the zombie people say, 'no,' (consciousness) is not physical," Berent says. "And in Mary's condition, people say it's physical."

"If people change their mind in this way, it can't possibly be that in reality consciousness has changed. It must be that there is something within the human psyche that colors how we see consciousness."

"For me, this means that we need to be really careful before we assume that there is any real mystery going on."

The evolutionary roots of dualism

Berent blames what she calls "delusional attitudes about bodies and minds" to "the same old psychological biases that I've been studying in my lab for years."

She calls the separation of mind and body dualism. Previous research by Berent shows that autistic people are less dualistic than neurotypical people and that males are less dualistic than females.

Evolution is responsible for the fact people hold two different systems of perception in their mind, Berent says.

"Animals have an evolutionary advantage to be able to perceive objects, say, the bodies of their mothers," she says.

It's also important to be able to perceive objects that have agency as separate from other objects, Berent says. "You want to follow the mother and not a body that is inanimate" to receive nurturance and protection.

This type of dualism, she says, "primes us to think about people and their minds and bodies as separate from each other. That's one reason we think about consciousness as this ethereal thing separate from the body."

"The point is that our perception of consciousness changes depending on the situation. And if that's the case, there's no way that we can trust it to reflect what our consciousness really is. It must be that our brain plays tricks on us."

An intimate understanding of who we are

"Every psychology student that has ever come into my class asks if we're going to talk about consciousness," Berent says.

"This is considered to be super important. This is our intimate understanding of who we are."

Berent says the thought experiment outlined in her paper provides "the smoking gun" that intuitions about consciousness existing outside the body are manufactured by humans' dualistically inclined brains.

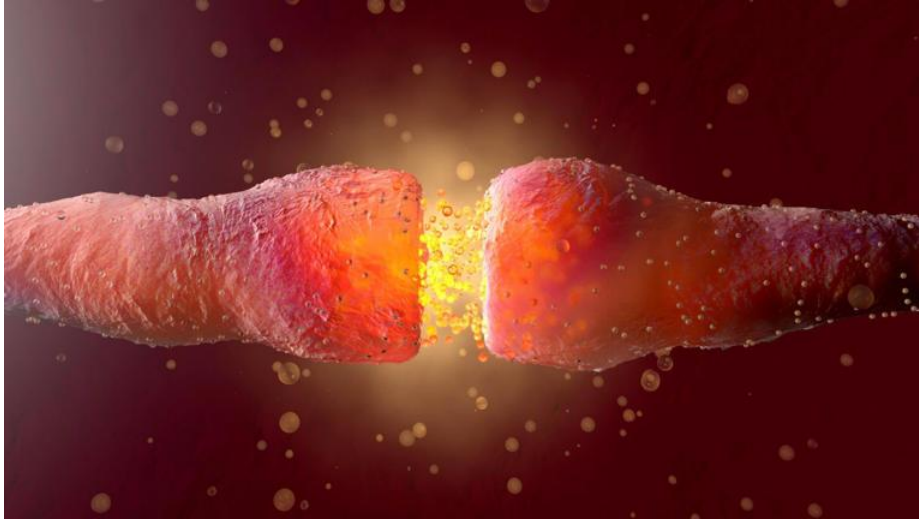
Consciousness likely comes down to electrochemical functions in the brain, she says. "It's hard for psychological reasons."

More information: Iris Berent, Consciousness isn't "hard"—it's human psychology that makes it so!, *Neuroscience of Consciousness* (2024). DOI: [10.1093/nc/niae016](https://doi.org/10.1093/nc/niae016)

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Provided by Northeastern University

Secret to lifelong memories sticking is molecular 'glue'



Scientists have discovered that a particular protein is responsible for guiding an enzyme needed to maintain long-term memory to the correct region of the brain. Specifically, this is to particular synapses, or connections between neurons, as illustrated above. © Westend61 via Getty Images

Some memories last a lifetime — and now, scientists have revealed a type of molecular "glue" that helps those memories stick around.

Memories form when collections of neurons in a region of the brain called the **hippocampus** activate in response to a particular experience. Each time you recall that experience, the same set of cells activates. When one neuron repeatedly activates another, the connection between those neurons strengthens.

Over time, this process in the hippocampus, along with related activity in other regions of the brain, solidifies a short-term memory into a long-term one.

To maintain these long-term memories, **brain cells make proteins** that help strengthen the connections, or synapses, between neurons. One critical protein is the enzyme **PKMzeta**, which is continually made by neurons. However, an outstanding question is how this enzyme "knows" to go to the right synapses to ensure that certain memories stay with us forever.

In a new study, scientists think they've found the answer: an unsung molecule called **KIBRA** glues the enzyme to strong synapses and also summons new PKMzeta to replace

that enzyme when it degrades. The researchers published their findings Wednesday (June 26) in the journal [Science Advances](#).

Related: [The brain has a 'tell' for when it's recalling a false memory, study suggests](#)

[Previous](#) research in humans [suggested](#) that different versions of the KIBRA molecule are associated with differences in memory performance, either better or worse. KIBRA was also [already known](#) to interact with the PKMzeta enzyme in the hippocampus of mice. So, the scientists behind the new study decided to delve further into that interaction.

In lab experiments, the team investigated whether blocking the interaction between KIBRA and PKMzeta influenced how well mice performed in long-term memory tests. These tests included seeing whether the mice could remember to avoid entering an area where they had previously been shocked with electricity.

Blocking the interaction between KIBRA and PKMzeta impaired the mice's long-term spatial memory — in other words, their ability to avoid the shock zone.

In a separate experiment, when the KIBRA-PKMzeta interaction was left undisturbed, the team found that even when PKMzeta degraded as expected, new complexes of KIBRA and PKMzeta formed in the hippocampus. This, in turn, helped maintain the mice's memory of the shock zone for a month.

[Earlier work](#) by the same team showed that if researchers increase the amount of PKMzeta in a rodent's brain, it appears to enhance weak long-term memories that have faded over time. This initially surprised the scientists, as the team expected PKMzeta to boost the strength of synapses at random, rather than specifically acting on those involved in long-term memory.

Instead, the new findings suggest that KIBRA acts like a "glue," sticking to these strong synapses and also guiding PKMzeta to them, which would explain this phenomenon, the team said.

The research is only in its infancy. However, eventually, it may be possible to someday use this knowledge to treat brain disorders that cause memory loss, such as [Alzheimer's disease](#), said study co-senior author [André Fenton](#), a professor of neural science at New

York University. Such treatments could work by using KIBRA to deliver PKMzeta or similar molecules to weakened synapses.

However, with neurodegenerative diseases such as Alzheimer's, the conditions [damage and eventually kill off neurons in the brain](#). That means that this kind of therapy would theoretically only work for as long as there are still synapses left to enhance.

For now, more research is needed to understand how the interaction between PKMzeta and KIBRA actually translates into people's experiences of memory.

"We have quite a way to go to turn the description of these molecules into that experiential thing that we cherish — what we call memory, belief, intention and so forth," Fenton said.