realwear



ALL YOU NEED TO KNOW ABOUT

HEAD-MOUNTED WEARABLES



Here at RealWear, we're serious about empowering, engaging, and elevating frontline workers. That's why we're passionate about rugged, head-mounted wearable technology - after all, it's the backbone of our solution. One thing we've noticed is that while the industry is embracing terms like 'XR' and 'Assisted Reality', a bit more guidance may be required for buyers.

While many of the solutions covered are getting popular with consumers (such as VR videogaming), head-mounted devices (HMDs) are building momentum in the industrial sector. In fact, the whole XR industry is moving at such a pace that it can be a little daunting at times.

We're going to attempt to demystify the variety of buzzwords to help you better navigate the technology and perhaps gain a better path forward on how you may be able to transform your business area - or even your entire operations as some have already done.

But we're getting ahead of ourselves. Let's start at the top.

Wearables



What are wearables?

While clothes, hats, and scarves are surely wearable, the term ‘wearables’ today refers to computer devices that you wear on your body and therefore you don’t have to hold. Smartwatches are a great example of this. Devices such as Fitbit and Apple Watch provide the wearer with an incredible amount of information including phone notifications, pedometer data (step count), and even the wearer’s heart rate.

What makes a wearable special though, is that it’s more human-centric than a laptop as the hardware itself is almost part of your body. As Apple’s famous designer, Joni Ive, once said that it was the intimacy of the watch that made it a logical product for Apple to turn its attention to. This human-centric approach made Apple Watch the most personal product the company has ever, noting that the company’s most significant contributions come in personal products.





Image Credit: Ray-Ban

Smartglasses

What are smartglasses?

Smartglasses (sometimes written as ‘smart glasses’) or data glasses are a type of wearable - a pair of eyeglasses that use immersive technology and Extended Reality (XR) to enhance your environment using digital content. They’ve been featured in many movies and shows, including, of course, Star Trek. The key point here is that the digital content is presented on lenses that you can see through.

For decades, companies have been trying to develop glasses with lenses that could display digital information.

In 2013, the term “smartglasses” was on top of mind when the #1 search engine unveiled their hyped solution, Google Glass (remember their PR stunt with skydivers in San Francisco?) - a pair of spectacles that offer tablet functionality with an interface that sits within the lens.



Image Credits - Google

To say the least, the industry has learned a lot in the following years. The smartglasses market has seen a host of companies joining the emerging industry to capitalize on the opportunity for broad adoption of the tech.

Immersive Technology

What is immersive technology?

This is where it gets interesting. As mentioned, smartglasses utilize immersive technology to bring content into your view and enhance your reality – hence the term ‘extended reality’. The main subsets of XR that are used in smartglasses are Augmented Reality (AR), Mixed Reality (MR), and Assisted Reality (aR). We’ll get onto the difference between these three shortly.



The head-worn element is useful in industry because it means the user can keep their hands free to carry out their operations, hold onto safety railings, and climb ladders.

The Industrial Metaverse

What is the Metaverse?

The Metaverse is the vision of the future of the internet. It's a shared digital space in which humans interact with each other in ways that they can't in the real world. It also encompasses shared digital content that augments the real world. Primarily, the consumer Metaverse will use XR tech as a means of access. Of course, 2022 was the year Facebook, Inc. changed its name to Meta (and debuted the avatars with no legs).

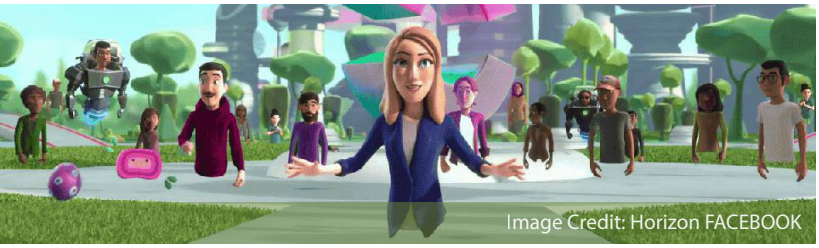


Image Credit: Horizon FACEBOOK

What's the Industrial Metaverse?

The Industrial Metaverse refers to a future in which we will use XR tools to access the Metaverse so that real world work can be accomplished in conjunction with digital systems. The Industrial Metaverse will provide the means to carry out even more tasks remotely, resulting in a more connected workforce.

Check out RealWear's blog post and XR luminary discussion moderated by the Editor Emeritus of eWeek:

https://www.realwear.com/blog/industrialmetaverse

Metaverse in popular culture

Fictionalized examples of the Metaverse can be found in the novel and adaptation of *Ready Player One* in which society spends a large amount of time in a VR environment known as The Oasis.



Image Credit: Warner Bros.

Tron and its sequel *Tron Legacy* take place primarily in a digital videogame world known as The Grid while *The Matrix* lends speculation to the notion that the real world is in fact a digital environment. Other examples include the Netflix series *Altered Carbon* and Philip K. Dick adaptations *Total Recall and Minority Report,* with the latter being more focused on the AR elements of the Metaverse.



	RealWear Devices	Smartglasses
Hands-free	Yes	Only some
Voice-controlled	Yes	Some require a control device
Tether	No	Some require a tether to a control device or battery pack
Full-shift battery	Yes	No
3D or 2D	2D	Some are 3D capable
SLAM*	Yes, Limited	Yes

*Simultaneous Localization and Mapping - This is the process of mapping an area while keeping track of the location of the device within that area. This allows digital graphics to be applied where they are relevant in the physical space.

Are RealWear devices smartglasses?

Not really. While RealWear HMT-1® Series and RealWear Navigator® 500 Series devices aren't technically smartglasses as we've defined them here, you will find them referred to them as 'smartglasses', 'glasses', or 'data glasses' depending on what region of the country you live in or which industry you work in. While RealWear devices offer much of the functionality that smartglasses do (you can free your hands with either device), they are designed especially in hazardous environments where there's a lot of noise and you need to use them for real work.

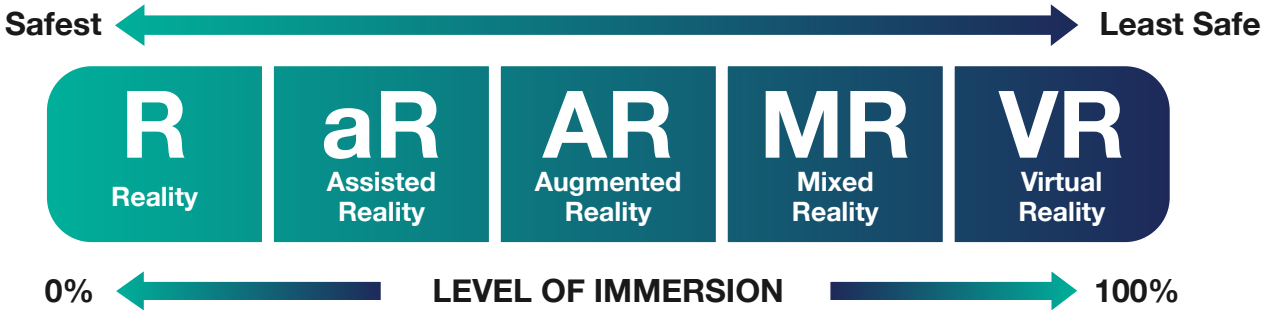
There are a few other important differences between RealWear devices and smartglasses worth mentioning. RealWear devices neither have see-through lenses, nor do they sit on the bridge of your nose. Unlike many smartglasses, RealWear Navigator Series, for example, does not use a tether or a separate control unit like a phone. It's standalone and contains a large battery for long-term use. This is ideal for keeping frontline professionals safe while boosting productivity as their vision is unobstructed, their hands are free, and there's no wires to get caught in equipment. In other words, RealWear is fully compliant with industrial environments.

Extended Reality (XR)



What is XR?

As we mentioned, ‘XR’ stands for ‘Extended Reality’ and is a broader term for potentially immersive technology that adds digital content to what we can already interpret with our senses.



XR covers a few different technologies which have varying degrees of immersivity. These include:

- Assisted Reality (aR)
- Augmented Reality (AR)
- Mixed Reality (MR)
- Virtual Reality (VR)

In terms of level of immersion, Assisted Reality keeps you almost entirely within the real world while Virtual Reality immerses you completely in a digital one. This diagram illustrates the varying levels on the XR spectrum.

In other words, between the physical world and a totally digital environment, Assisted Reality is the least immersive and has the most focus on safety and compliance. Conversely, VR is often 100% digital and unsuitable in hazardous environments as users can't see hazards in their environment.

AR and Mixed Reality fall somewhere in the middle. It's easy to see how the various terms get muddled quickly. The best way to think of AR is that it adds digital object overlays into the physical world. RealWear does offer some forms of AR (such as using SLAM technology), but we do this minimally to ensure safety.



Where can I find out more about XR?

To find out more about XR, you can visit XR Today: https://www.xrtoday.com/

Now that we understand the basics, let's delve a little deeper into the technologies that comprise Extended Reality.



What is VR?

Virtual Reality (VR) is interactive software that provides a three-dimensional digital space. This environment is accessed through a headset that will often completely block out the real world and present an entirely virtual experience using screens and speakers. With VR, you have little to no interaction with reality at all.



What are the use cases of VR?

Digital environments can serve many purposes in industry. These include but aren't limited to:

Training simulations

VR is an incredibly powerful tool for training, especially when it comes to simulating stressful scenarios where users need to learn how to overcome their natural instincts, such as in the event of a robbery or fire. It can be used to help people gain empathy for other individuals by literally experiencing what it's like to be in their shoes.



Therapies

VR is also a useful tool in healthcare in response prevention therapy, where it can be used to simulate a user's phobia and allow them to develop a resistance to debilitating reactions.

Virtual tours and product demos

The technology can also be used to present concepts and prototypes, allowing the user to experience a digital version of a physical space or to assess a digital 3D model of an upcoming product, thus eliminating the need for expensive production materials.

What hardware falls under VR?

This technology is popular in the gaming industry as it facilitates complete immersion into a game's environment. Meta Quest and PlayStation VR are examples of Virtual Reality. Meta Quest headsets are also popular within industry, as are solutions such as HTC Vive, Valve Index, and more.

Where can I find out more about VR?

To find out more about VR, you can visit:

- Virtual Reality Society: https://www.vrs.org.uk
- Road to VR: https://www.roadtovr.com
- Upload's Beginner's Guide to VR: https://uploadvr.com/beginners-guide-vr-faq-everything-you-need-to-know/



Virtual Reality and the consumer market



Image Credit: Resident Evil VII.

Virtual Reality took the gaming industry by storm a few years ago. Being an active entertainment medium, VR allows users to become even more immersed in a game than they would be using a TV. Placing the user within a totally digital environment allows for greater suspension of disbelief in the idea that what they're experiencing is real. With the real world blocked out entirely, VR gaming means that the user can only react to their digital world, where the only way to break the illusion is to remove the headset.

While this provides a new level of fun for gaming, it also means that the ante is upped for certain genres. While you can look away from the screen when watching a horror movie, it's a different story if you have to actively participate in that environment as there's no escaping to reality for comfort. As such, the technology is hugely effective if you dare playing scary title like Resident Evil VII in VR.

Augmented Reality (AR)



What is Augmented Reality?

Augmented Reality (AR) sees digital content overlaid on top of your field of view, giving you a mix of the real world and digital content at all times.

An example of this is the wildly popular game Pokémon Go, which captured the imagination of the world when it launched in 2016. This smartphone game requires the user to literally walk around in search of the titular characters. Pokémon Go uses the smartphone's camera to capture your surroundings and then integrates cartoon monsters into your view for you to try and catch.

Mixed Reality (MR)

What is Mixed Reality?

Mixed Reality (MR) and Augmented Reality are very similar. The difference between them is that the content in Mixed Reality is anchored to the real world. For instance, you could place a digital box onto a real surface and move around to view it from various angles. Although MR is technically a subset of AR, the terms are often used interchangeably and sometimes incorrectly.

Augmented Reality	Mixed Reality
Augment reality is an enhanced reality that projects computer-generated images over a user's view of the physical world.	Mixed Reality is an enhanced version of AR where digital content is merged with the real world.
Digital content is simply overlaid on top of the real world and is interacted with separately from reality.	Digital content is tethered to the real world and users can view it in different angles and interact with it as if it were real.
Digital content is tethered to the lens of the individual's device. Others can't interact with it.	Multiple users can see the digital content as it is tethered to the physical spaces.

Microsoft and MR

While the term 'Mixed Reality' was coined back in 1994 by Paul Milgram and Fumio Kishinio, it gathered momentum when Microsoft unveiled its Holographic Head-Mounted Device – Microsoft HoloLens.



Image Credits - Microsoft

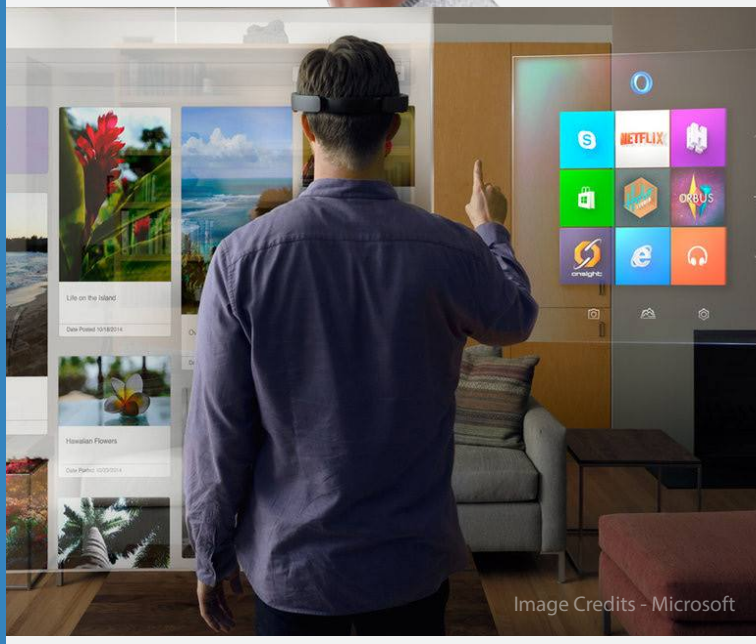
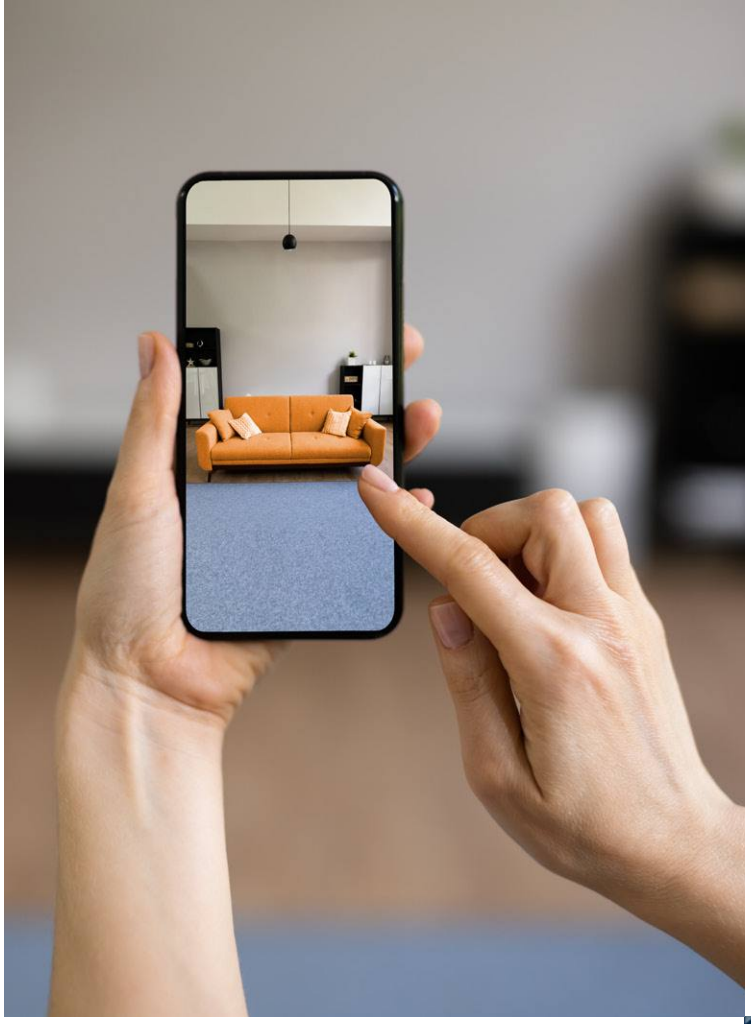


Image Credits - Microsoft

Currently on its second iteration, HoloLens 2 is an Augmented and Mixed Reality headset and is described by the tech giant as a "fully untethered, see-through holographic computer", allowing users to experience 3D content as if part of their physical environment.



Examples of Mixed Reality

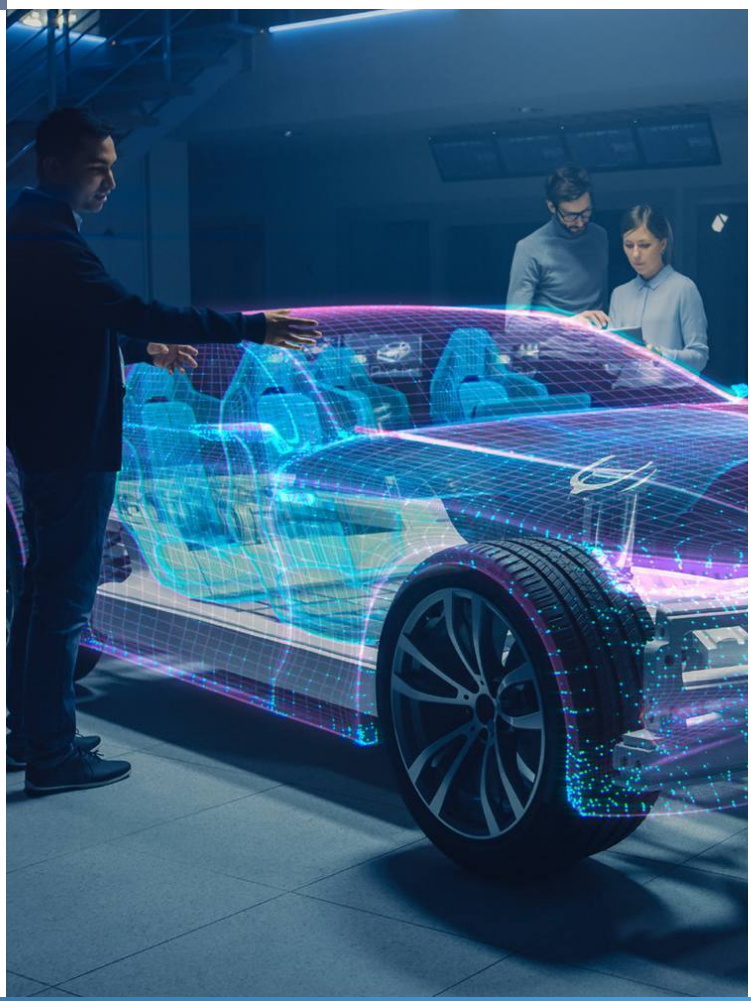
Beyond the HoloLens 2, other use cases of MR include shopping, such as the IKEA Shopping App which allows you to place digital models of furniture into your camera's view to see how they look in your home. Other applications include the Measure App that allows iPhone users to map their surroundings and digitally measure real items within that space.

What are the use cases of AR and MR?

Digital content overlaid onto the real world has many use cases in industry such as:

Product design

Prototyping is time consuming and expensive. It's incredibly cost-effective to instead give engineers and designers the ability to create overlays that you can see in situ within the real world.



Architecture and space

AR and MR empower users to see an interactive 3D mockup of a completed installation within a space. This means a user would be able to walk through an empty facility or room and look around to see how it will look once the project is complete.





Repair and Maintenance

AR and MR can be used to present diagnostic information relating to equipment. This can include service dates, operation times, any known issues and more. This can reduce downtime and provide preventative maintenance.



Order picking

Warehouse workers will be able to use AR and MR to quickly locate items and receive the appropriate navigation, with stock levels updating automatically.

What hardware falls under AR and MR?

The most popular AR hardware is your smartphone! There are tons of apps that overlay content into the real world and allow you to interact with it.

Elsewhere, it's smartglasses that use these technologies. As noted previously, smartglasses allow you to access this information while keeping your hands free for safety and to carry out tasks.

Where can I find out more about AR and MR?

To find out more about AR and MR, you can visit:

- The AREA (Augmented Reality for Enterprise Alliance)
- AWE – Augmented World Expo



Assisted Reality (aR)

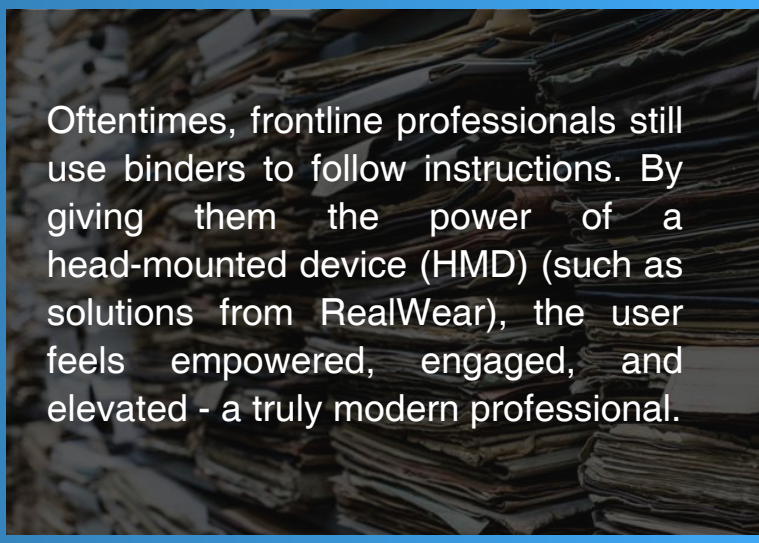
What is Assisted Reality?

Assisted Reality (aR) is the newest XR technology that allows you to maintain full awareness of the real world while content is presented on a display that sits just outside of your field of view. Think of it like a dashboard. When driving, you glance down at the speedometer to determine how fast you're going. This information is always ready to go at a moment's notice, it just sits out of your line of sight until you glance at it when you need it. It's largely the same principle. Like a dashboard, Assisted Reality adds information into your surroundings, thereby extending your reality.

What are the use cases of Assisted Reality?

Assisted Reality is the least immersive on the XR spectrum, supporting a reality-first, digital-second experience. The difference between Assisted Reality and Augmented Reality is that, with the former, content doesn't integrate with the real world while the latter requires use of the real world to fully interpret that digital content.

While this doesn't have the wow factor of Virtual Reality, Assisted Reality is by far the safest form of hands-free, head-mounted wearables. By enabling the user to access digital content when and where they need it, with minimal obstruction to their field of vision, Assisted Reality is the best option for the modern industrial professionals who need their hands for the job. Its application for industry is by far the most wide-reaching due to its simplicity and connectivity.



Oftentimes, frontline professionals still use binders to follow instructions. By giving them the power of a head-mounted device (HMD) (such as solutions from RealWear), the user feels empowered, engaged, and elevated - a truly modern professional.



Equipment Maintenance and Downtime Avoidance

Experts can remotely connect to frontline workers to solve issues. This can drastically reduce equipment downtime and improve efficiency.

Training and Knowledge Transfer

Subject matter experts can mentor junior field workers, offering valuable knowledge of complex equipment. This allows field workers to get the answers they need immediately.



Digital Workflow and Industry Compliance

Using workflow apps, frontline professionals can follow step-by-step processes to ensure that tasks are carried out properly and errors are greatly reduced.



What hardware falls under Assisted Reality?

RealWear is the pioneer and market leader in rugged Assisted Reality wearables for industrial use since being the first to market with RealWear HMT-1 and HMT-1Z1. Designed with safety in mind, RealWear devices keep your field of view clear and are operated using intuitive voice controls, so that you can keep your hands free to carry out tasks safely.

You may hear of many devices claiming to be Assisted Reality, but many of them either fall short of the definition or are simply consumer devices with a different marketing name.

Where can I find out more about Assisted Reality?

The AREA (Augmented Reality for Enterprise Alliance)

Assisted Reality in Action

Assisted Reality is the safest form of XR available. With hands-free voice control and unobstructed views, it's ideally suited for use in industry. Mars Petcare needed to streamline their production facilities to minimize downtime and increase safety.



MARS Petcare

Using RealWear HMT-1 devices running Microsoft Teams, they were able to have safe, hands-free access to equipment files and remote coaching. The results were that travel was reduced by over 35% and workers were able to collaborate with multiple remote experts. The success of the solution meant it was rolled out across 14 US factories.

How popular are smartglasses, HMDs, and other XR devices?

While many of these technologies are popular in entertainment, they're also incredibly useful when applied to industry. As XR devices empower even greater levels of remote collaboration, it's no surprise that they took off when the COVID-19 pandemic struck. By allowing people to be in a location virtually rather than physically, devices minimized or eliminated the necessity for travel, and saved time, money, and carbon emissions in the process. As only 20% of workers in the world are desk-based[1], it's easy to see how XR wearables have risen in popularity.



In summary

We've covered a lot in this guide. We discussed the difference between AR and VR, we called out device types and their use cases for industry, and we attempted to demystify industry jargon.

What can we expect to see in the future from all of this? As with all technologies, we're likely to progress to convergence and consolidation of XR, especially as we move ever closer to the Metaverse – which is pretty exciting to say the least!

[1] *The Rise of the Deskless Workforce Presented by Emergence*

Next steps

Practically every industry in the world can benefit from wearables. Traditional operational methods might not be visibly broken, so it's important for decision-makers to know that there is a cheaper and more efficient way of operating which leverages frontline professionals.

Each of these types of devices has their pros and cons and you should explore some of them to determine what's best for your industry. We strongly advise that you ensure your safety and security demands are met with whichever tech you adopt.

Get in touch for a demo or chat to our sales team and find out how RealWear solutions can make your industry safer, smarter, and faster – all while cutting down on travel. We'd love to hear from you.

We'll be back soon with another guide that takes you deeper into the amazing world of Assisted Reality.



About the author

Jordan Brown is a content manager at RealWear. With decades of experience in media and technology, he is enthusiastic about the impact that these technologies can have on the world and sees them as integral in benefiting the environment while reducing operational costs for businesses. He is also passionate about writing about technology so anyone can understand it.

Outside of his professional life, Jordan lives with his wife and daughter in the Southwest of England where he has a keen interest in movies, music, and ultimate Frisbee.

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