

December 2021
VOL. XXXVIII, NO. 12

Daniel Burrus'

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TECHNOTRENDS® NEWSLETTER

*The biggest ideas that are
changing everything*

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When Will You Use AR, VR and the Metaverse for Business?

By Daniel Burrus, CEO of Burrus Research

Now that Facebook has changed their name to Meta in an effort to both change the media's focus on negative news and to stake their claim on the personal and business use of Virtual Reality (VR) environments — the Metaverse — when will you be using VR and/or Augmented Reality (AR) for business or pleasure on a daily basis? So far, the large-scale usage of VR or AR has not happened. To understand why and see its potential, let's start with understanding the difference between VR and AR.

Virtual reality requires the user to close themselves off from the real world by entering a specialized room filled with 360-degree high-definition screens, by entering a VR simulator like a professional flight simulator or by wearing a VR headset, so the user can be fully immersed in a virtual reality. Unlike AR, which allows the user to see the real world while also seeing data and/or images overlayed to augment the real world they are looking at, with VR you can only do one thing at a time and you are fully in a virtual world, which has both limitations and advantages.

For quite some time now, VR headsets have been used by video gamers, but even today, the number of users is relatively small compared to 2D video gaming platforms. In addition, VR is being used in business for simulations, training, education and design work, but the use is currently still quite narrow and limited.

Let's face it, do you have a VR headset at your office or shop, where you utilize it often as a key tool like you utilize a tablet, smartphone or

laptop computer? Probably not.



Despite many advancements in the past decade, VR and AR applications seemingly have not taken hold

Back to AR: Remember Google Glass, an early attempt at AR glasses that didn't catch on, and more recently, Pokemon Go, the interactive smartphone game that had people wandering around catching creatures only visible through their screens? That created a huge explosion of interest for AR and the general public. Today, there are a growing number of AR applications you can use with your smartphone camera for fun and for business, but how often do you use an AR business application or when shopping at a retail outlet? Most likely not, right?

Despite many advancements in the past decade, VR and AR applications seemingly have not taken hold in the same way as our devices and other technologies like new 2D video game platforms or your tablet, or streaming services and social media, have. Why?

The Current State of Virtual Reality

As a precursor to where we are as a global society in the realm of VR, let's simplify the general idea of what VR actually is. In short, it is not your traditional video medium, where a screen positioned in front of a user plays

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TECHNOLOGY NEWS HIGHLIGHTS

Micro-Sized Camera

Scientists have developed a camera about the size of a coarse grain of salt that can produce crisp, full-color images similar to conventional compound camera lenses.

The ultra-compact camera is based on a technology called metasurface, which is composed of 1.6 million cylindrical posts of silicon nitride — a glass-like material used in semiconductor manufacturing.

The metasurface can be mass produced more easily and at a lower cost than traditional lenses. It can also be integrated with machine learning algorithms to enhance image quality and expand field of view.

Devices such as this represent another step toward creating surfaces as sensors. For example, instead of a camera on the back of a phone, the entire back surface would become an imaging device.

Added capabilities could also include artificial intelligence-based object recognition and electrical sensing modalities for robotics and biomedical applications.

For information: Felix Heide, Princeton University, Princeton Research Computing, Peter B. Lewis Science Library, Washington Road and Ivy Lane, Princeton, NJ 08544; phone: 609-258-0419; email: fheide@cs.princeton.edu; Web site: <https://www.princeton.edu/> or <https://engineering.princeton.edu/news/2021/11/29/researchers-shrink-camera-size-salt-grain>



See The Future Before It Happens

[Burrus.com/SeeTheFuture](https://burrus.com/SeeTheFuture)

Daniel Burrus shares the most influential technology trends shaping 2022.





Autonomous Cargo Ship

A new cargo ship design was recently unveiled in Norway that is not only fully autonomous but also totally fossil fuel free.

Dubbed the Yara Birkeland, it's the first of its kind in the world and a promising step forward in reducing the impact of the shipping industry on the environment.

The new ship is designed to carry mineral fertilizer from a manufacturing plant in Porsgrunn to a port in Brevik, about eight miles (12 kilometers) away.

These types of short voyages are well-suited to electric power, which is supplied by eight batteries with a total capacity of 6.8 megawatt-hours — the approximate equivalent of 100 Teslas.

It's been estimated that the new vessel will reduce carbon dioxide emissions by 678 metric tons per year by eliminating the need for 40,000 trips using trucks that are currently diesel-fueled.

The 260-foot (80-meter) ship has a maximum deadweight capacity of 3,200 metric tons and recently embarked on its maiden voyage in Oslo fjord. It will undergo a two-

year testing period before becoming fully autonomous.

For information: Yara International ASA, Drammensveien 131, 0277 Oslo, Norway; phone: +47-2415-7000; Web site: <https://www.yara.com/> or <https://www.yara.com/corporate-releases/yara-to-start-operating-the-worlds-first-fully-emission-free-container-ship/>



Solar Refinery

A team of technical experts has devised a method for synthesizing carbon-neutral aircraft fuel from carbon dioxide (CO₂) in the atmosphere.

The process is similar to photosynthesis in which CO₂ combines with water and is converted into organic molecules using energy from the sun.

In the first of three stages, CO₂ and water are absorbed using a direct air capture device like the one in Ireland that we reported about last month (See "World's Largest Carbon Capture Facility").

But instead of storing it in basalt rock, the CO₂ and water react with cerium oxide that has been heated by sunlight.

This produces carbon monoxide (CO) and hydrogen — the raw materials for syngas. The byproduct of these reactions is oxygen, which is vented to the atmosphere. In the final stage, the syngas can then be turned into hydrocarbons or methane.

A proof-of-concept mini-refinery has demonstrated that the process is scalable.

According to estimates, it would require 45,000 square kilometers of land with adequate sun exposure (the equivalent of approximately 0.5 percent of the Sahara Desert) to match current demands for aviation fuel.

For information: Aldo Steinfeld, ETH Zurich, Department of Mechanical and Process Engineering, Sonneggstrasse 3, 8092 Zurich, Switzerland; phone: +41-44-632-7929; email: aldo.steinfeld@ethz.ch; Web site: <https://ethz.ch/en.html> or <https://ethz.ch/en/news-and-events/eth-news/news/2021/11/technical-feasibility-of-sustainable-fuels-production-demonstrated.html>



Smart Tractor

The next big thing in tractor farming may mean going smaller. At least that's how one company sees the future as they ramp up testing of an autonomous electric tractor aimed at smaller

specialty farms.

The MK-V can largely function on its own thanks to built-in GPS and a system of multi-directional cameras. In addition to keeping it on track, the cameras are integrated with computer vision models to examine crops for damage from disease and/or pests. The system also maps and tags every crop to generate valuable historical data from year to year.

A farmer can monitor up to eight tractors remotely, saving time and labor while increasing safety. In addition, the autonomous platform enables 24-hour operation without overtime costs. In comparison to traditional diesel tractors with 400 horsepower or more, the Monarch tractor will max out at 70 horsepower. It can run for ten hours on a single charge, and the base model is expected to list for around \$58,000.

For information: Monarch Tractor; phone: 833-247-4797; Web site: <https://www.monarchtractor.com/index.html>



Electric Semi-Truck

A Chinese automaker recently announced an electric semi-truck scheduled to hit the market in 2024. Known as Homtruck, it will feature multiple power options including plug-in hybrid

and fully electric versions.

The new vehicle will be partially autonomous, allowing hands-free driving on certain roads. It will also feature a modern sleeper cab for extra comfort. By 2030, the company plans to make the truck fully self-driving.

The manufacturer has set a goal of 40 percent of annual sales to be “new energy” vehicles by 2025. That includes hydrogen as well as electric and hybrids. The new semi-truck will compete directly with Tesla’s counterpart, which is scheduled for production in 2022.

For information: Geely Auto; Web site: <http://global.geely.com/>

more aerodynamic than conventional aircraft.

This initial test flight revealed some difficulties with keeping the wings level due to their shape. However, the radio-controlled model performed as expected in terms of thrust, flight speed and angles. The data collected will be used to fine-tune a design for a second scale model.

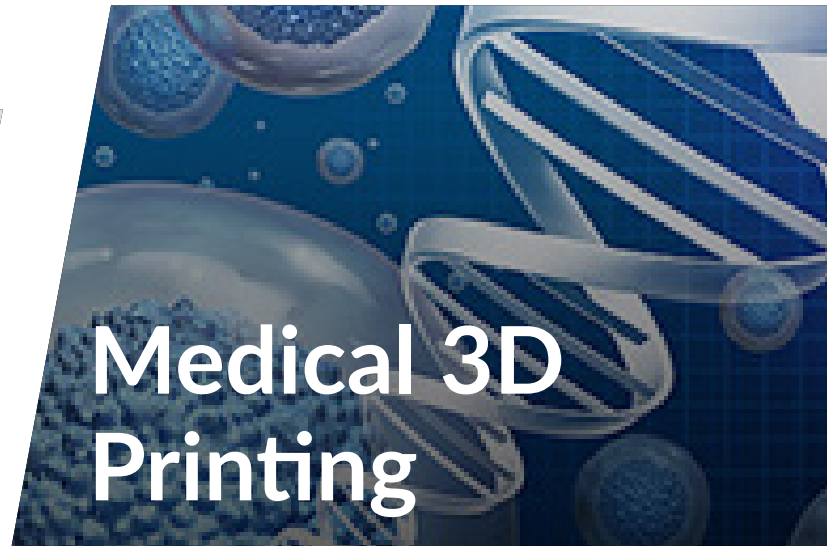
For information: Delft University of Technology, Aerospace Engineering, Kluyverweb1, 2629 HS Delft, The Netherlands; phone: +31-15-27-89804; Web site: <https://www.tudelft.nl/en/> or <https://www.tudelft.nl/en/ae/flying-v/flying-scale-model>



Blended-Wing Airplane

A scale model of an experimental aircraft known as the Flying-V recently took flight in Germany. The unusual design features passenger seating, baggage and fuel tanks built into the wings, and would be capable of seating 314 passengers at full-scale.

Flying-V is part of a company initiative to improve sustainability. Research indicates that it could increase fuel efficiency by 20 percent over today’s most advanced planes. It’s also



Medical 3D Printing

The 3D printing industry is projected to hit \$32 billion by 2025, and while healthcare currently represents only about 10 percent of the demand for online printing, trends indicate that this is on the rise.

As the population ages, and the demand for donor organs increases, bioprinting can fill a vital need. In regenerative medicine, 3D printing with patient-derived stem cells enables personalized therapies and minimizes rejection rates.

And a recent research report indicates that 3D printing can be a valuable tool during complex surgical cases where the ability to generate patient-specific instruments and implants shortens surgery times and speeds recovery.

Although the technology is already seeing widespread use in orthopedics, cranio-maxillofacial surgery, reconstructive surgery and cardiology applications, additional research will undoubtedly uncover new uses for this rapidly expanding tool.

For information: Atanu Chaudhuri, Durham University, Stockton Road, Durham DH1 3LE, United Kingdom; Web site: <https://www.durham.ac.uk/homepage/>



Affordable Space Travel

A new rocket is destined to redefine space travel, making it accessible to more people and nations.

The breakthrough design is made possible by combining 3D printing with artificial intelligence and robotics to automate and simplify construction.

The engines and the rocket structure are built

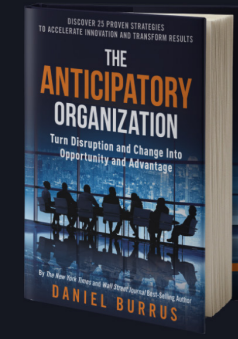
using the world's largest 3D printer — called Stargate — with custom metal alloys to create sections as much as 36 feet tall. The bumpy texture is then machined to resemble regular metal. One advantage of this method is that the number of parts can be reduced by up to 1,000 times — from over 100,000 for a conventional rocket to 1,000 for a printed one.

This not only reduces cost, but also cuts the time to construct a rocket from two years to about two months. In addition, rapid construction allows for more rapid testing and tweaking of design iterations. The engine (known as Aeon 1) has already completed more than 500 test runs.

But most importantly, when the Terran R rocket is ready for lift-off in 2024, it will be fully reusable for multiple low earth orbit (LEO) launches (rather than just portions of it as is the case with the SpaceX rocket).

Ultimately, the company views 3D printing as a vital component for establishing colonies beyond earth and aims to someday print the first rocket on Mars.

For information: Relativity Space; Web site: <https://www.relativityspace.com/home>



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When Will You Use AR, VR and the Metaverse for Business?

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footage for their consumption. Essentially, think of your smartphone, tablets, TV or a movie theater.

VR adds an element of sensory movement including visual, audio, vibrations and body movements into the equation, creating an immersive experience for the user. This is done by not only positioning the media in all areas of the user's sight, allowing them to move their head and look around as well as virtually walk around in their virtual environment. They can also use their hands to move virtual objects and use virtual tools to do things, all provoking the sensation of being in a three-dimensional space.

Early iterations of VR were largely found in entertainment destinations, such as Disney World. These did not feature individualized, immersive experiences, but rather a catch-all experience for bulk audiences to enjoy.

For instance, Disney had a few groundbreaking attractions at Epcot in the mid- to late '90s that held an audience in a simulator bay. This bay was completely isolated from the surrounding world, cutting off the human sense of time and space and then moving in syncopation with the footage playing on a screen that wrapped around the audience. This tricked the senses into believing you were actually in the media, such as a ride that took you through the human body.

Yet all these years later, the most common consumer use of VR is still in entertainment, by way of video games using VR headsets.

The biggest transformation from a user experience standpoint has been the quality of the video and its level of interactivity. The media playing in the experience is not a movie, but an actual virtual environment, similar to a flight simulator at a flight school.

The latest VR headsets, combined with a social media element, have enabled a new VR application — VR social apps like RecRoom, AltSpace VR, VRChat and others where strangers, friends, students, businesspeople or teammates can meet in a virtual world and work or play together using a cartoon-like VR avatar that may or may not resemble themselves. This application of VR is now being referred to as the Metaverse. As I said earlier, now that Facebook has created news by changing its name to Meta, and they spend large sums of marketing money to promote it, more will be wanting to experience VR.

Will Facebook's metaverse meeting room applications be a big hit with business? Virtual meetings, using applications such as Zoom, have created a wide-scale virtual burnout in the business world, and many are longing for face-to-face meetings again. Humans are social creatures and we do like to physically get together. With that said, Facebook's plan for meta workplaces, such as Horizon Workrooms, will most likely catch on with younger employees who already love VR gaming and creating avatars of themselves, but I think the rapid growth of virtual workroom applications are a Soft Trend because it will be a hard sell for most business users to spend even more time in the virtual meeting world regardless of whether it is a 2D or a 3D experience.

But while nearly 14 million VR units sold in 2020 is not bad, that does not in any way make it as universally accepted as other technological advancements are — yet.

The Current State of Augmented Reality

AR and its applications are an even bigger unicorn in our current digital landscape, but that will change soon. As previously mentioned in this article, AR has been used largely in the entertainment space, examples being Pokemon Go and derivatives of such.

In comparison to VR, AR applications do not feature a completely fabricated environment or media that is meant to fully immerse a user into an environment not their own. Instead, AR takes your actual environment, shown through a digital device like your smartphone, or AR glasses, and either projects graphics or information that isn't physically there on the screen as if it is. And it can have an interactive audio element for communicating to your virtual assistant, like Siri or Alexa.

In a way, AR is like turning your actual material world around you into a multimedia experience by enhancing it with visual and auditory assets to, you guessed it, augment your real world experience.

I have written about future uses of AR in past blogs and articles at length; however, as of recently, it is still met with lukewarm consumer reactions, largely due to the lack of devices on which we utilize AR. An example of such was Google Glass, which was engineered to be glasses utilizing AR features. From a consumer standpoint, Google Glass turned out to be a flop due to lack of style and few useful applications.

Outside of entertainment, AR seems to have stagnated with both potential business and personal users waiting for Apple AR Glasses to become available, bringing the technology mainstream.

Recently Ray-Ban, in collaboration with Facebook, released Ray-Ban smart glasses.

Think of it as the equivalent of wearing a Facebook camera on your face. You can take photos and/or capture 30 seconds of video, but the quality is low, and the privacy issues are very high. I mention Ray-Ban smart glasses because they will confuse consumers since they are not AR, and they are not VR, and they are not smart, and have the potential to make it harder to bring AR mainstream when major players including Apple and Samsung release their AR glasses.

Everything Can Be Improved

But much like mobile devices, desktop computers and other transformative innovations, an initial iteration of anything is not the end-all-be-all answer — everything can be improved upon because nothing is perfect.

I recently wrote about this in a blog, and while this concept is closely tied to the mindset and principles I teach about in my Anticipatory Leader System, it has been around since the dawn of time. Human beings always look for something better instinctually, which is a Hard Trend future certainty in and of itself!

Thankfully, this applies to VR and AR applications as much as anything else. The current iterations have provided specialized value, but the relatively slow growth is solely because they haven't been leveraged in new, groundbreaking ways. An identifiable Hard Trend future certainty in both VR and AR is that the functionality of these technological advancements will only get better thanks to new product and application launches enabled by the exponential acceleration driven by the Three Digital Accelerators — computing power, bandwidth and digital storage.

As those accelerators continue to enhance the ability for all digital technology to grow and transform, remember that human beings are more interested in the applications they enable

than the actual devices. Therefore, look at what people have complained about in the VR and AR space, such as Google Glass not being stylish enough to wear comfortably or VR environments not having practical applications in corporate settings — all Soft Trends that are open to influence.

Lead the Charge in VR and AR in 2022 and Beyond with Anticipation

The Hard Trend future fact is that the technology itself will only increase in power and performance, thus creating new growth opportunities for all. The Soft Trend is, will you take advantage of this growing opportunity and apply the hardware advancements to create must-have applications? By focusing on the Hard Trend certainty and developing applications based on where the tech is predictably going, you will be using an Anticipatory mindset to unlock potential for you and your organization to take advantage of the VR and AR space as the near future unfolds!

In the way of VR, one of the biggest potentials it has that has yet to be widely leveraged in the professional space is in training and education. Again, think of flight simulators. The better the virtual environments and physical devices that implement them become, the more powerful the physical training via VR becomes, and the greater the opportunity to transform the education industry.

AR is already on the cusp of exploding on the software side for consumers; it just needs a physical device counterpart that unlocks its exponential application. Good, stylish smart glasses will happen soon, but who will be the first to make them commonplace? A better question is, who will make them a must-have to the consumer as they walk through a store or to business when they meet with a customer?

Always keep your opportunity antennae up and be on the lookout for problems to solve both within and outside of your industry in 2022. With an Anticipatory mindset and the knowledge of my Hard Trend Methodology, you can identify the low-risk, high-reward opportunities that VR, AR and any other transformative technology has to offer.

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