STATE OF PHYGITAL

WWW.LETA.VC/PHYGITAL-2022

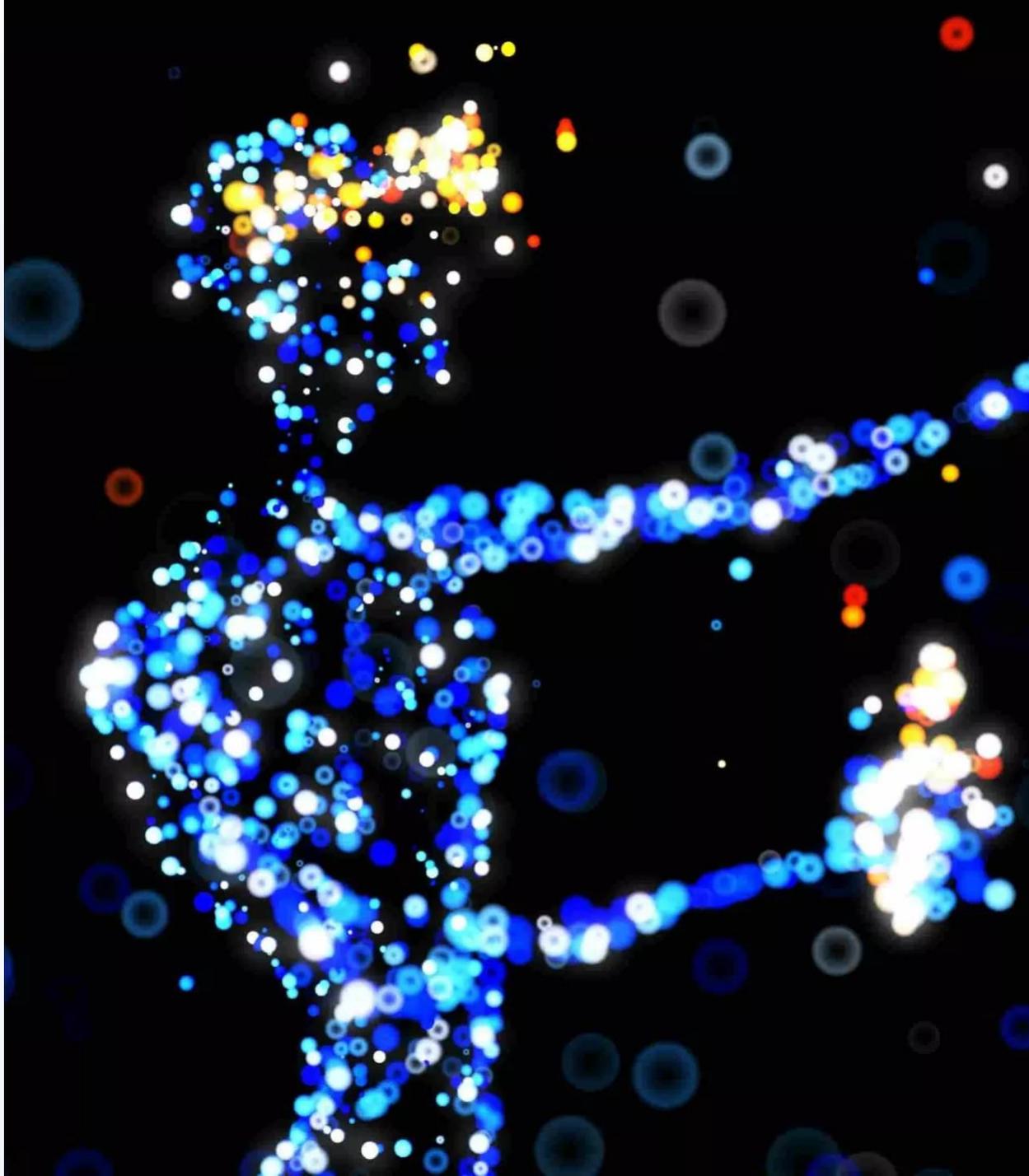## 2022

Table of Contents

Zooming in

Phygital Use Cases

Zooming out

STATE OF PHYGITAL

Foreword

This is the second State of Phygital Report prepared by the VC firm LETA Capital. In the previous report, we focused on macroeconomic factors of the phygital economy's emergence, challenges, and projections. Most of them are still relevant today. In the State of Phygital 2022 report, we paid maximum attention to the penetration of phygital in our daily lives, practical use cases, and its implementation in various industries.

State of Phygital 2022 describes the world around us through the lens of digital and IT. We believe that the phygital revolution has already started, and those who follow the markers will benefit.

You can recall the State of Phygital 2021 here.

Click here to view the previous report

What Is Phygital?

"Phygital" is an evolution of everything that has been developed in computing, AR and VR and is set to dramatically change the way we live, work, communicate, travel, study, entertain, and much more.

As a result, all physical objects in the future will be Phygital, i.e. powered by a set of breakthroughs (AR, IoT, M2M, etc.), while online environments (social media, eCommerce, etc.) that exist today in the digital form only, will finally merge with physical objects, not just as add-ons, but rather as an integral part.

This will lead to a dramatic redistribution of wealth and assets, primarily disrupting the offline world and acting as a gateway to the offline economy for today's digital enterprises.

" Phygital enables the close integration of the virtual environment (digital) into real human life (physical)."

Phygital

$200tn**

AR, XR accessories to deepen the experience

Cyber Physical Systems, Smart Infrastructure

Human-machine interfaces, Digital Twins

Augmented & Mixed Reality (headsets, lenses)

Brain Computer Interface, Whole brain emulation

Wearables, Beacons

IoT, Smart Sensors, Robotics

5G, 6GHz Wi-Fi

Physical
$96tn*

Digital
$10tn*

AR / VR
$38Bn*

* Global Market Size in 2021, $US trillion
** Upside potential in the next 5-10 years, LETA Capital estimate, $US trillion

Macroeconomic Challenges In 2022

What's wrong with offline industries?

- High inflation
- Slow economic growth
- Increasing interest rates
- Surge in energy and food prices
- Supply, trade and production disruptions
- Export and import restrictions further magnify rise in prices
- Intensifying geopolitical tensions
- Increasing poverty, especially in developing countries
- Real income per capita stagnation in most developed countries
- Weak investment activity in the most parts of the world
- Tightening of monetary policies in many countries
- Record levels of external public debt in developing economies
- Aging population continues to create labor challenges, especially in developed economies
- Continued supply-demand imbalances
- Asset bubbles

We are now likely to enter a "lost decade," including a string of debt crises and stagflation

State of Phygital 2022
leta.vc/phygital-2022

6

Phygital Is A Solution

Entire economies have grown from just a smartphone. The same is happening with phygital. We are now witnessing a process of creating more and more with less and less… until eventually, we will make everything with nothing.

The digital revolution allows us to:

- optimize resource use;
- change the image of a city;
- reshape the whole services economy;
- better use resource-intensive.

1-1 replacement of something physical with something digital

You don't need to buy a dress to post a new look on Instagram; virtual clothes replace the real ones.
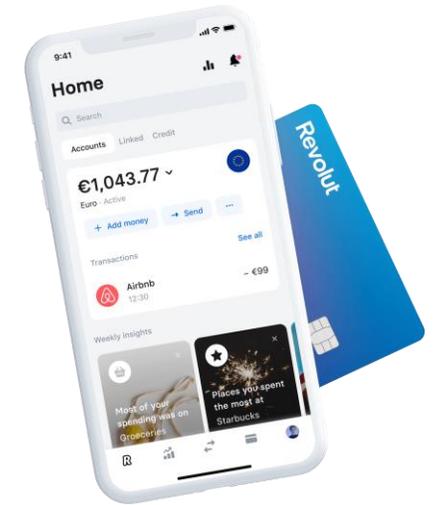
You don't need to physically exchange cash with someone to buy that dress; just transfer money via a mobile app.

STATE OF PHYGITAL

Source for picture 1, source for picture 2

Tech Breakthroughs Tendencies

We should admit that through the past several decades, there has been a clear focus on dematerialization. Computer memory and storage cost less and less per megabyte while the computational capacity of supercomputers allow an increasing number of floating-point operations carried out per second. Scientists nowadays are capable of conducting more and more research about outer space, as well as continuing to sequence the human genome. This leads us to even greater breakthroughs, some of which will be discussed in the next section.

Historical cost of computer memory and storage
Measured in US dollars per megabyte.

Source: John C. McCallum (2022)
Note: For each year the time series shows the cheapest historical price recorded until that year.

The computational capacity of the largest supercomputers
Number of floating-point operations carried out per second by the largest supercomputer in any given year.

Source: TOP500 Supercomputer Database
Note: Floating-point operations are needed for very large or very small real numbers, or computations that require a large dynamic range. Floating-point operations per second are therefore a more accurate measure than instructions per second.
OurWorldInData.org/technological-progress • CC BY

Cost of space launches to low Earth orbit, 1961 to 2019
Cost to launch one kilogram of payload mass to low Earth orbit (LEO) as part of a dedicated launch. This data is adjusted for inflation.

Source: CSIS Aerospace Security Project (2022)
Note: Small vehicles carry up to 2,000 kg to LEO, medium ones between 2,000 and 20,000 kg, and heavy ones more than 20,000 kg.
OurWorldInData.org/space-exploration-satellites • CC BY

Cost of sequencing a full human genome
The cost of sequencing the DNA of the complete human genome, measured in US$. This data is not adjusted for inflation.

Source: National Human Genome Research Institute (2022)
OurWorldInData.org/technological-change • CC BY

Tech Breakthroughs 2021-2022

Mojo Vision CEO Drew Perkins has begun testing the company's AR contact lens.
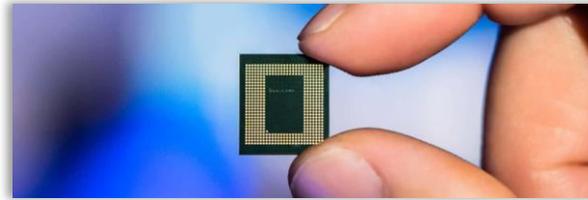
Samsung Electronics has started initial production of its 3-nanometer process node applying Gate-All-Around transistor architecture.

An amyotrophic lateral sclerosis (ALS) patient posted the 1st tweet using the Stentrode brain computer interface.

Digital mapping service NavVis partnered with Magic Leap to enable enterprise-grade 3D mapping tools and digital twins.

Thomas Oxley @tomoxl · Dec 23, 2021
no need for keystrokes or voices. I created this tweet just by thinking it. #helloworldbci

329   4,331   11.4K

Phygital Use Cases
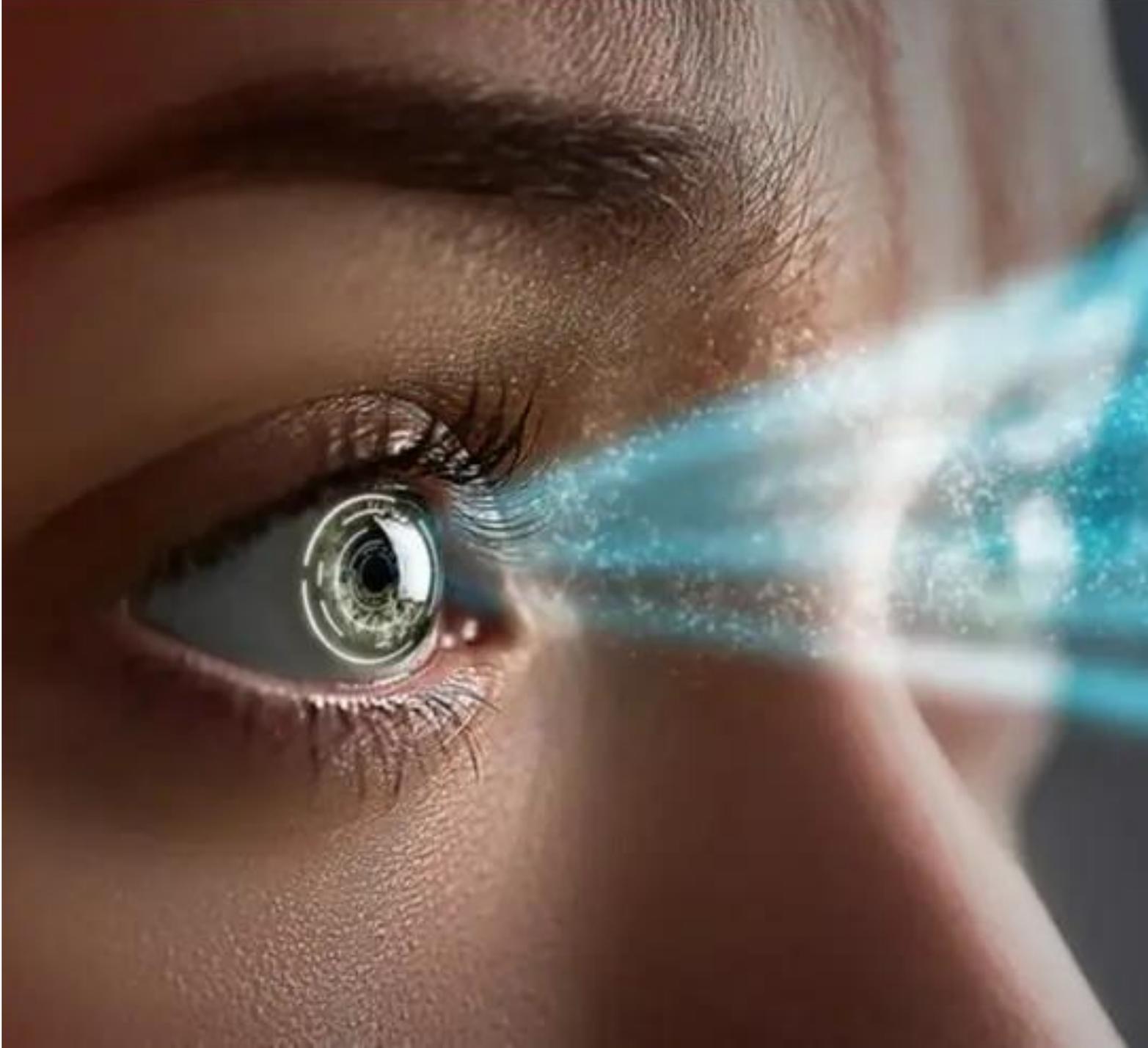
Phygital Market Map 2022

LeTa CAPITAL

STATE OF PHYGITAL

Retail
PERFECT · SCANDIT · designhubz · 6d overly · ptc · Cylindo · RESTAR 3D SCANNING & AR FOR RETAIL · MYWEBAR.COM AR MADE SIMPLE · ZIPPIN · threekit · GAMELOFT · Lens.io · VNTANA · arpalus · InContext · Sunvega · vuzix

Healthcare
MediVis · Augmedics · AccuVein · EyesDecide · VAST · FUNDAMENTAL VR · nreal · KARUNA · mojo · SURGICAL THEATER · Proprio · mindmaze · VICARIOUS SURGICAL · SUITX · TOUCHSURGERY from Medtronic · CHOC · Anatomy 4D · ORama VR · mediVR · HEALTH SCHOLARS · AR ANATOMY

Food
Zappar · iFarm · blippar · wikitude · ROVIO ANIMATION · ZealAR Augmented Reality · 6d overly · Unity · BOWERY · Menu AR · meero · MYWEBAR.COM AR MADE SIMPLE

Education
vuzix · cogmeta · POLITECNICO MILANO 1863 · UNIGINE · zSpace · STRIVR · ARETE · ARVR EDUCATION · VR Education · OSSO vr · FUNDAMENTAL VR · MYWEBAR.COM AR MADE SIMPLE · PlayShifu

Fashion & Beauty
3D LOOK · PERFECT · Meta · Google · banuba · REACTIVE REALITY · TRUE FIT · WANNA · Lens Studio · hoverlay · Poplar.Studio · phygit

Toy-lo-life & Gaming
MIRRORSCAPE · LEGO · NIANTIC · EPIC GAMES · Unity · Meta · UNREAL ENGINE · Shapes XR · MISHKA AI · Microsoft · SoapBox · SONY · EA ELECTRONIC ARTS

Space
VARJO · SPACEX · Orsted · Pale Blue · Meta · Microsoft · LOCKHEED MARTIN · TUSUR Tomsk State University of Control Systems and Radioelectronics

Manufacturing
intenseye · Matterport · Extend Robotics Extend Human Capabilities Beyond Physical Presence · mira · realwear · arVIZIO · Ansys · DECAGEAR · FIELDBIT · Microsoft · UpKeep · SCOPE AR · KOGNITIV SPARK · Magic Leap · Zerynth Enabling IoT · LG · HOLO-LIGHT · Lenovo · TAQTILE · IoT TRACKER · aws

E-
Unity · commerce · MYWEBAR.COM AR MADE SIMPLE · TRUE FIT · phygit · nextech AR solutions · sayduck · SAMSUNG · Obsess · part / whole · morpholio · 3D LOOK · fixtuur

Construction & Logistics
AKULAR · AUGMENT · Air Measure · ptc · vGIS · arVIZIO · AUGVIEW augmented technology · realwear · DALUX · VISUAL LIVE · THE WILD · ClipDrop · FOLOGRAM · AUTODESK REVIT · GAMMA AR · JBKNOWLEDGE

Travel & Entertainment
Qualcomm · Shapes XR · sensetime · BRINK · Poplar.Studio · RENDEVER expanding worlds. · Google · Meta · BLEND MEDIA · Microsoft · VARJO

Phygital Implementation: Retail

Solution providers

VUZIX · ZIPPIN · ptc · designhubz · SCANDIT · overly · MYWEBAR.COM AR MADE SIMPLE · RESTAR 3D SCANNING & AR FOR RETAIL · InContext · Lens.io · GAMELOFT · threekit · Cylindo · arpälus · Sunvega 三维家 · PERFECT · VNTANA
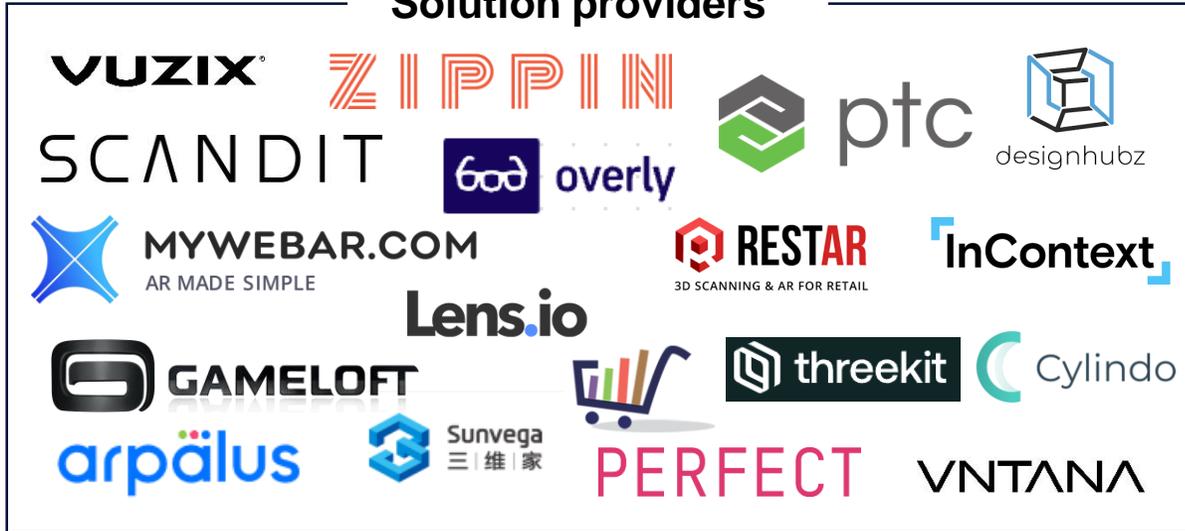
Tools

- Checkout-free systems
- Web AR-experience creation platforms
- Interactive AR apps, games, and videos
- Mobile app builders
- Computer vision systems
- IoT hardware systems
- 3D modeling software

Problem solving / Goals

- Reduction of time to serve
- Customer loyalty management
- Increasing brand awareness
- Providing new ways to play with products
- Obtaining instant feedback on physical goods usage
- Increasing marketing campaign reach
- Scaling marketing campaigns and reducing costs

Clients

asos · THE HOME DEPOT · ULTA BEAUTY · Dulux · alpura · WARBY PARKER · KOHL'S · BOSS HUGO BOSS · Nestlé · L'ORÉAL · ESTÉE LAUDER · Kellogg's · FERRERO · EMPOWER FIELD AT MILE HIGH · IKEA · BACARDI · TotalEnergies

Case: Checkout-free payment systems in sports stadiums

Goal: Reduction of queues in shops at stadiums

Tools: Zippin (Checkout-free system)
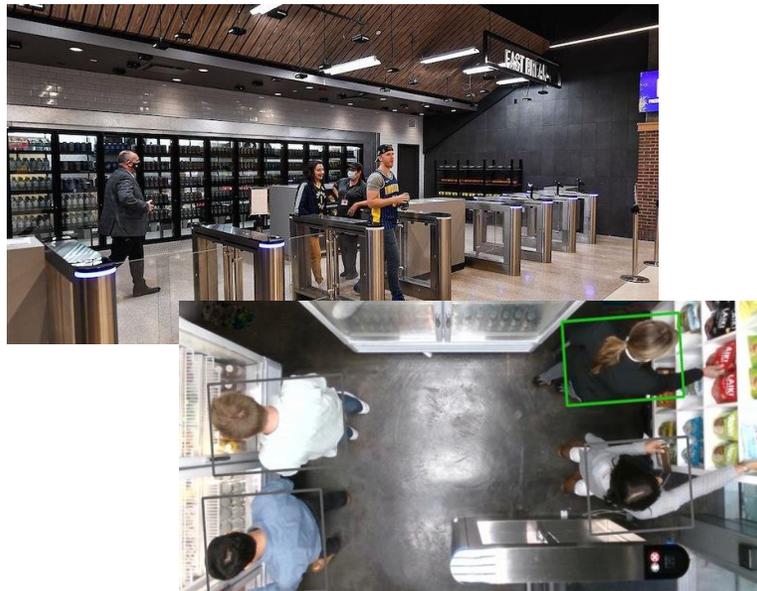
Checkout-free shopping payment systems, where customers simply take items off shelves and are charged automatically as they exit the store, are now arriving in sports stadiums. Zippin, a startup that provides checkout-free technology, is leading the way with active installations in Sacramento and Denver in the United States..

The checkout-free systems solve one of the biggest pain points of stadium visits—waiting in line for concessions. With transaction times in both Sacramento and Denver averaging less than a minute (and some in Sacramento as quick as 10 seconds), it's also a good bet that fans will buy more and return more quickly to their seats to enjoy the event they paid to attend.

Results:
< 60 seconds - average transaction time.

STATE OF PHYGITAL

Source: mobilesportsreport

Case: Entertaining Alpura customers with animated cows

Goal: Customer loyalty management

Tools: MyWebAR (Web-based Augmented Reality)
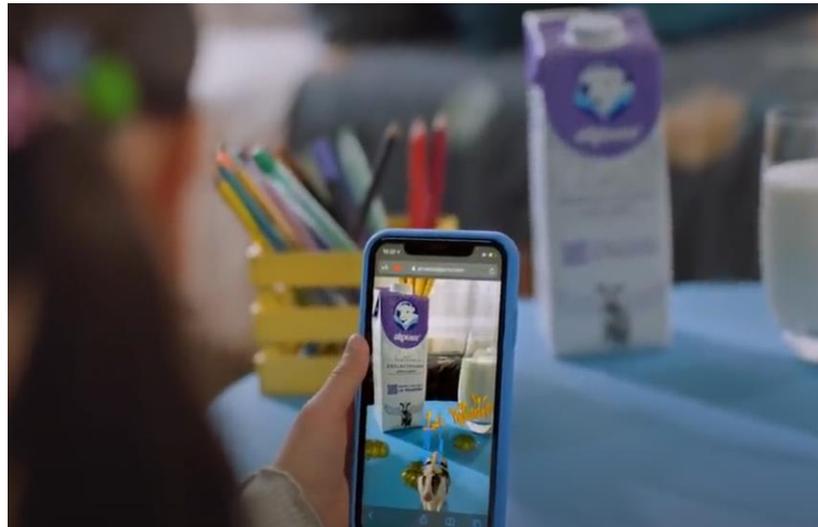
Alpura, a Mexican dairy products company, launched a marketing campaign, based on the idea of collecting items. In this case, the items are Alpura's cows pictured on the interactive milk cartons. Buyers can scan the QR codes and see Alpura's cows on their smartphone using augmented reality technology.

The marketing campaign is aimed at increasing customer loyalty, especially through gamification and involving children who may be interested in the idea of collecting items using augmented reality.

Results:
More than 1 million QR code scans

STATE OF PHYGITAL

Use cases. **Retail**

Case: Total Energies exchanging points gained with AR games for branded prizes

Goal: Increase audience engagement rate

Tools: Interactive AR real-time games

Total Energies is an international oil and gas company, 29th in the Forbes Global 2000 list for 2020. The company was looking for opportunities to increase awareness of the Café Bonjour, Wash, Excellium, and lubricant (Quartz, Hi-Perf) brands among millennials in Cambodia through interactive real-time games.

Total Energies & Morozzi Creative Lab launched an AR game campaign, with the following general mechanics: users interact with a chatbot via a special link, then play one of the AR games to earn prize points that can be exchanged for branded prizes.

Results:
Audience engagement was **three times higher** than projected while the cost per engagement was **three times lower**.

STATE OF PHYGITAL

Use cases. Retail

Case: Kinder launches AR app to bring Kinder toys to life

Goal: Viral marketing campaign

Tools: Mobile app by Gameloft

Applaydu is a free edutainment mobile app from Kinder Surprise. It unleashes the iconic tiny Kinder Surprise figurines from their physical limitations, opening a safe and imaginary world where kids can now interact further with their toys through educational games.

The app delivers one of the first AR experiences to kids. Created for the whole family, Applaydu encourages bonding moments where parents and children can play and learn together. Ferrero increases the loyalty of parents and children to Kinder Surprise and brings a new experience of interaction with its products.

Results:
+10 million app downloads since its launch;
+28% net increase in value for money;
87% of parents state that Applaydu enhances playing moments between them and their children.

STATE OF PHYGITAL

Case: Immersive virtual tour of an aquarium by Nestle

Goal: Engaging marketing campaign for children

Tools: AR technology
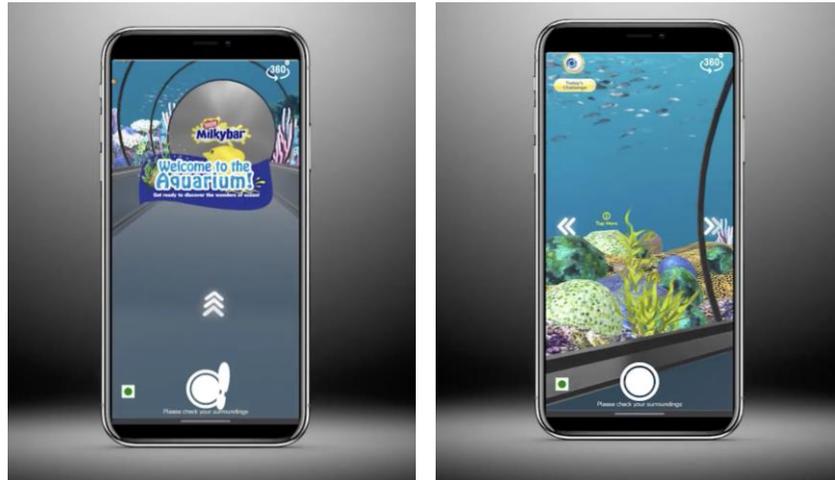
In recent years, Nestle has increased the use of augmented reality technology in its marketing campaigns. One of the latest examples is the Nestlé Milkybar Wonders of Ocean campaign.

By scanning QR codes on Nestlé Milkybar and Milkybar Moosha packaging, children can experience an immersive virtual tour of an aquarium. There are a variety of experiences where they meet new aquatic creatures every day and learn new and interesting information about them.

STATE OF PHYGITAL

Phygital Implementation: Healthcare

Solution providers

Tools

- Laser-guided, optical devices
- AR smart glasses
- Computer vision software
- VR headsets
- Interactive AR applications
- Remote guidance software
- Video communication software
- Exoskeletons

Problem solving / Goals

- Find hard-to-locate veins
- Facilitate social interaction
- Medical training for healthcare professionals
- Assist patients through MRIs
- 3D models of patients' internal organs
- Make medical services more accessible and affordable

Clients

Use cases. **Healthcare**

Case: Real-time image projection of vein location by AccuVein

Goal: Find hard to-locate veins

Tools: Laser-guided, optical technology

STATE OF PHYGITAL

AccuVein, a global leader in medical imaging solutions, presented a working prototype of their medical device, the AV300: a laser-guided, optical vein finder. When directed toward the arm, it provides an instantaneous, non-contact, real-time image projection of the vein's location below the skin surface. The AccuVein AV300 is the world's first handheld vein viewer.

Results:
350 percent first-stick success improvement;
39 percent reduction in patient pain;
45 percent fewer escalations.

Source: Benchmark

Case: Head-mounted device using spatial audio to read the names aloud

Goal: Facilitate social interaction among blind children

Tools: Nreal (AR smart glasses)

Microsoft and smart glasses vendor Nreal partnered to develop an augmented reality solution to assist low-vision children with locating and identifying others.

The partnership resulted in PeopleLens, a head-mounted device (HMD) that sits just above a wearer's eyes and uses spatial audio to read the names aloud of individuals when a child looks at them. Using spatial audio, the HMD locates individuals in a space to create a mental map of a child's surroundings.

The Nreal-powered headset detects the location of individuals and relays this back to the user, enabling blind children, or those with low vision, to understand a group's relative position and distance.

STATE OF PHYGITAL

Use cases. **Healthcare**

Case: VR training simulations for healthcare by ORamaVR

Goal: Medical training for healthcare professionals

Tools: HTC VIVE VR

Healthcare workers now have access to new medical training and minimize errors with VIVE VR.

ORamaVR is a company that has built the world's most intelligent VR training simulations for healthcare and has successfully deployed them on HTC VIVE VR hardware.

ORamaVR works with medical universities, hospital systems, surgical training centers, and medical VR content creators to provide its technology for medical staff to reskill and upskill more effectively, without a large time investment.

Results:
Training time reduced by **29%;**
Average costs decreased by **$300,000 per year;**
~16% improvement of sensorimotor performance of trainees in VR group.

Case: Mascot 'Choco' provides AR experience for children

Goal: Assist young patients through MRIs

Tools: AR technology
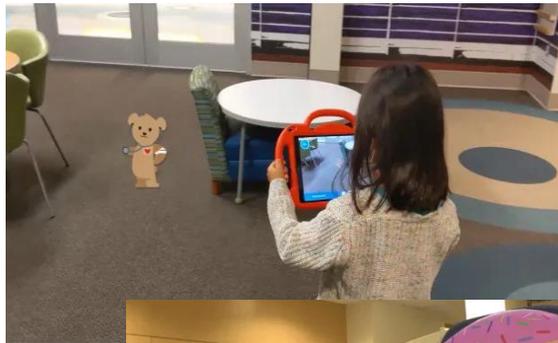
Children's Health of Orange County (CHOCK), a children's hospital located in Orange County, California, has transformed its mascot 'Choco' into an AR experience that guides children through the steps of a standard MRI scan. The idea is that by familiarizing younger patients with the process, they'll feel more comfortable during the actual procedure.

MRI with Choco aims to provide a more comfortable experience for young patients by allowing them to explore a radiology lobby alongside an AR bear named Choco. Voiced by a former CHOCK patient, Choco provides valuable information designed to help ease the child into the process. Children are even introduced to the members of the radiology staff.

STATE OF PHYGITAL

Phygital Implementation: Education

Solution providers

FUNDAMENTAL**VR**

ARETE

POLITECNICO MILANO 1863

VR Education

OSSO^vr

zSpace

co,meta

::UNIGINE

VUZIX

PlayShifu

STRIVR

MYWEBAR.COM
AR MADE SIMPLE

ARVR
EDUCATION

Tools

- Simulation platforms
- 3D computer graphics game engines
- AR/VR glasses
- Gamified learning platforms
- AR lenses
- Computer vision
- AR toys
- AR mobile apps

Problem solving / Goals

- Learn languages
- Help people with disabilities
- Training for various professionals
- Teach children
- Reduce training cost
- Make education more accessible and affordable

Clients

KidZania

Walmart

UCD DUBLIN

Smart Schools

GE

Western UNIVERSITY·CANADA

LASD

words**worth**learning

CLEMSON UNIVERSITY

MGM RESORTS INTERNATIONAL

Durham University

Case: ASL Lens by Snap & SignAll

Goal: American Sign Language learning

Tools: AR Lens
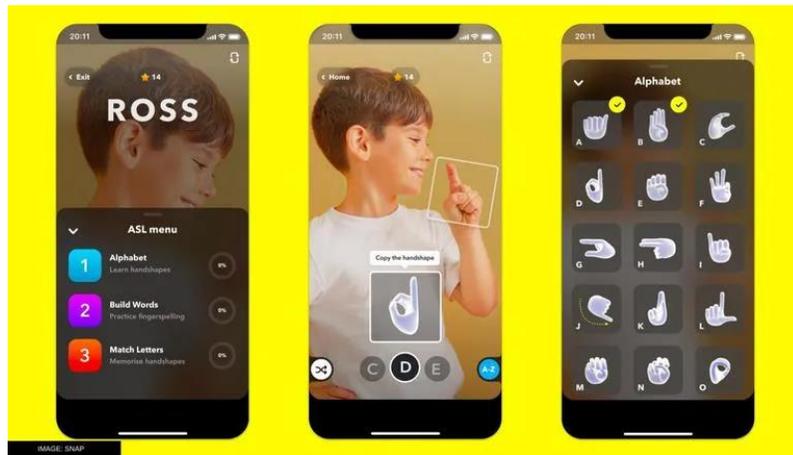
In April 2022, Snap announced a partnership with SignAll, a company that develops sign language translation technology, to launch ASL Alphabet Lens.

The ASL Alphabet Lens teaches users to fingerspell their name, practice the ASL Alphabet, and play games that inculcate new skills. The lens is built using hand-tracking technology that also powered last year's fingerspelling Lenses that were launched in honor of the International Week of the Deaf.

The new lens is a more advanced version of the finger spelling Lenses that Snap launched in partnership with SignAll in September 2021 that were designed to teach users how to communicate using sign language.

STATE OF PHYGITAL

Source: Newsroom.snap.com

Case: Simulator for subway driver by Unigine

Goal: Reduce subway train driver training costs

Tools: UNIGINE 2 Sim 3D platform

Training subway train drivers is a very time-consuming and complicated task. Smart Simulation used the UNIGINE 2 Sim 3D platform to make this task safe, accurate, and efficient.

In the point-of-view mode, a user is completely immersed in the train operating process as it is designed to be true-to-life to the maximum extent: gradual acceleration and deceleration, door slide, etc. In the exploration mode, users can get acquainted with stations themselves, and, in perspective, with any sightseeing attractions within reach.

STATE OF PHYGITAL

Case: Phygital interfaces for people with intellectual disability

Goal: Develop cognitive, sensorimotor, social, and behavioral skills

Tools: Physical items and multimedia elements on device screen

a. User places the red triangle correctly.

b. User freely chooses the yellow triangle.

c. The yellow triangle is correctly positioned.

d. Figure completed.
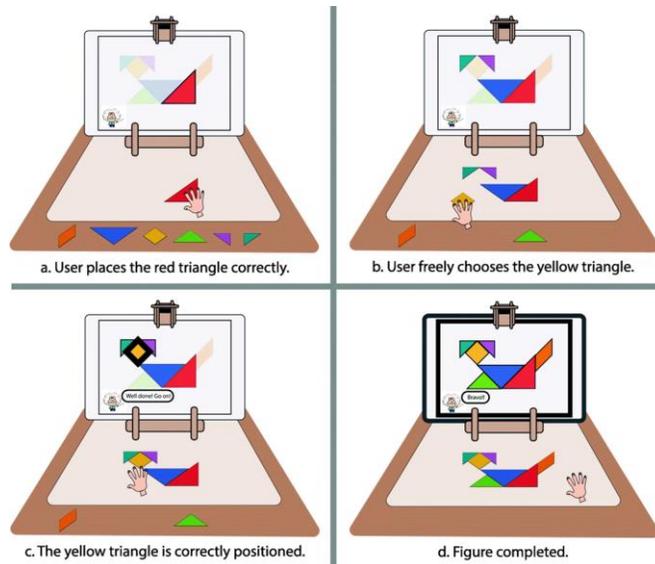
For the purpose of the research, scientists exploited a phygital system called Reflex, an application that tracks and recognizes physical items (such as cards) placed on a bordered mat (Play Zone) via a bottom-looking mirror position on the device camera. It controls the behavior of multimedia elements on the device screen according to the game logic of the ongoing user activity.

The quantitative results from the empirical study indicated that a phygital approach was effective for people with intellectual disabilities in a social care center both from a performance and a likability perspective.

The empirical study provided insights on the benefits of use of phygital activities compared to the use of paper-based only and digital only modalities.

STATE OF PHYGITAL

Phygital Implementation: Manufacturing

Solution providers

intenseye • Matterport™ • mira • Extend Robotics — Extend Human Capabilities Beyond Physical Presence

realwear • DECAGEAR • arvizio • Ansys

FIELDBIT • Microsoft • UpKeep • SCOPE AR

KOGNITIV SPARK • Lenovo • Zerynth® Enabling IoT • LG

HOLO-LIGHT • MagicLeap • TAQTILE • aws

Tools

- Computer vision models
- AR headsets
- IoT systems
- IoT device management software
- Big Data processing software
- Robots
- Engineering simulation software
- Video communication software

Problem solving / Goals

- Minimize errors
- Synchronize workflows
- Reduce workplace injuries
- Reduce time per action
- Remote monitoring
- Reduce defective product returns
- Increase production efficiency
- Reduce product testing time

Clients

VW • TOTAL • BAYER • MH MANUFACTURING

RENAULT • Red Bull RACING • AIRBUS • Armal • Coca-Cola

thyssenkrupp

PBC Linear • Ford • Genie A TEREX BRAND

Case: Collaborative workflow by Intenseye

Goal: Reduce workplace injuries

Tools: Computer vision models

Employee not wearing PPE
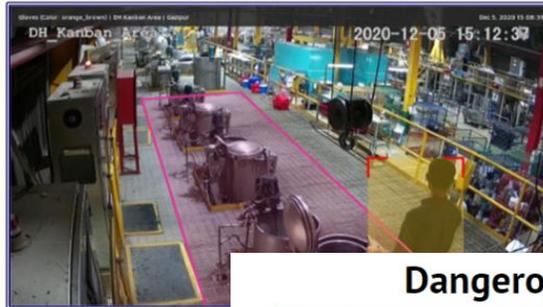
Dangerous driving

Intenseye is an AI-powered workplace safety platform that helps large enterprises to scale employee health and safety across their facility.

Intenseye's computer vision models are trained to detect over 35 types of employee health and safety (EHS) incidents that human EHS inspectors cannot possibly see in real-time. The system is live across over 15 countries and 30 cities, having already detected over 1.8 million unsafe acts in 18 months.

Intenseye creates a collaborative workflow that connects AI, workplace analytics, and behavior change to result in fewer injuries, reductions in insurance premiums, and an overall increase in company productivity.

Results:
> 3,000 health and safety inspections digitized;
1,460 working hours of one Intenseye user saved per year.

STATE OF PHYGITAL

Case: Magic Leap and Taqtile

Goal: Reduce training time and minimize errors

Tools: AR headset

Magic Leap, in collaboration with Taqtile's Manifest application, provided an unrivaled solution to the mounting challenges faced by manufacturer PBC Linear.

Overall, the solution helped PBC Linear operate and scale more effectively in several areas: (1) deliver new efficiencies and process improvements, (2) boost productivity and minimize downtime, (3) attract better talent and reduce employee turnover, (4) simplify training procedures and (5) reduce costs related to training, down-time, and human error.

Results:
80% reduction in training time;
$100,000 saved by reducing scrap and minimizing costly errors.

STATE OF PHYGITAL

Case: Digital twin automation of shop floor for Coca-Cola

Goal: Identify machine failures and improve production-line performance

Tools: AWS IoT SiteWise

Coca-Cola İçecek (CCI), one of the key bottlers in the Coca-Cola system, used AWS services to automate the shop floor and provide Coca-Cola with a holistic view of its manufacturing processes. With this information, CCI has built a managed service that makes it simple to collect, store, organize, and consume data from industrial equipment at scale to augment decision-making.

For example, CCI used AWS Professional Services to build a solution for its clean-in-place process. Coca-Cola also expects to optimize their filler-mixer machines, which have a high impact on the line utilization.

Results:
Saved **20%** on energy annually;
Saved **9%** on water annually;
Saved an estimated **34** days of process time annually.

STATE OF PHYGITAL

Case: Transformation of factory complex into LG Smart Park

Goal: Reduce defective product returns and increase production efficiency

Tools: Advanced analytics system based on ML, automated guided vehicles, etc.

LG has created a futuristic hub of home appliance manufacturing. The key elements of the transformation are a digitally-enabled end-to-end three-dimensional logistics system, an advanced analytics system based on edge computing technology and machine learning that predicts defects, and state-of-the-art facilities that can mass-produce multiple models to respond flexibly to customer requirements.

The newly implemented "digital twin" technology enables the operational system to analyze production processes in virtual reality. Automated guided vehicles (AGVs) leverage connectivity to transport parts and materials to wherever they are needed on site.

Results:
Cost of defective product returns dropped by **70%;**
Minimized amount of warehouse space needed by **30%;**
Shortened time required for hourly materials transportation by **25%.**

STATE OF PHYGITAL

Case: Car condition data collection by Ansys

Goal: Gather and organize F1 racing car testing and operation data

Tools: Engineering simulation software
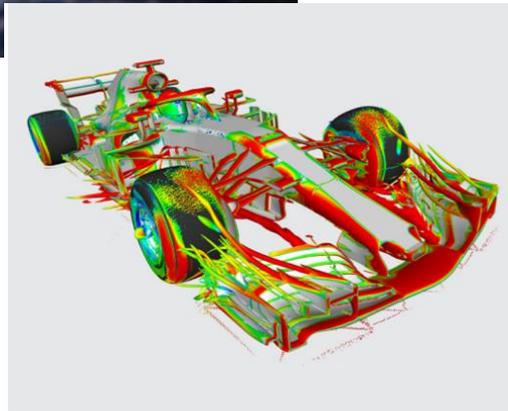
A Formula 1 car is made of many different materials, from metals to composites and more. Ensuring full traceability of each material, process and engineering data is vital to ensure that all members of the engineering team are using the same data. Ansys Granta MI is used to keep a comprehensive, single source for all material information across the engineering team.

The Red Bull Racing Honda team leverage Ansys LS-DYNA to collect even more data than is available from costly physical crash testing. These simulations allow the engineers to test impacts using virtual models, saving time and investment.

Ansys helps The Red Bull Racing team to save time, money, and reduce the risk of human errors.

STATE OF PHYGITAL

Case: Remote learning courses for Renault employees

Goal: Optimize trainings for the 60,000+ employees across 80 countries

Tools: HoloLens 2, Dynamics 365 Remote Assist

Renault Group constantly needs technicians to be trained on the intricacies of new batteries that power their vehicles. Thanks to HoloLens 2 and Dynamics 365 Remote Assist, effective training can be carried out, at-scale, remotely and in complete safety.

Thanks to the technology, the trainer sees exactly what the trainee sees, so the trainer can warn the trainee more quickly if they make a wrong move. The trainer can interrupt the maintenance to focus on a particular point or annotate with arrows or circles. There is thus an interactivity which makes the training lively and brings a real proximity.

Results:
> **€ 300K** per year saved;
Reduced CO2 emissions by **80%.**

STATE OF PHYGITAL

Use cases. **Manufacturing**

Case: Workflow modernization by Armal

Goal: Remote machine monitoring and production optimization

Tools: Zerynth Industrial IoT system

Armal has injection molding machines that produce plastic components of different sizes. Each machine has an average lifetime of 15-20 years; however, at the production level, they are still in good condition. Armal needed to modernize their workflow in order to remotely monitor the machines and optimize their production.

The Zerynth team provided Armal with an Industrial IoT system for real-time monitoring for power consumption of their industrial machines and the entire production cycle.

Results:
Energy consumption costs of their machinery have been reduced by **60%;**
IoT technology investment was recovered in **four months**;
40% power consumption reduction.

Phygital Implementation: Fashion & Beauty

Solution providers

3D LOOK

Google

PERFECT

REACTIVE REALITY

banuba

hoverlay

TRUE FIT

Poplar.Studio

Meta

phygit

Lens Studio

WANNA
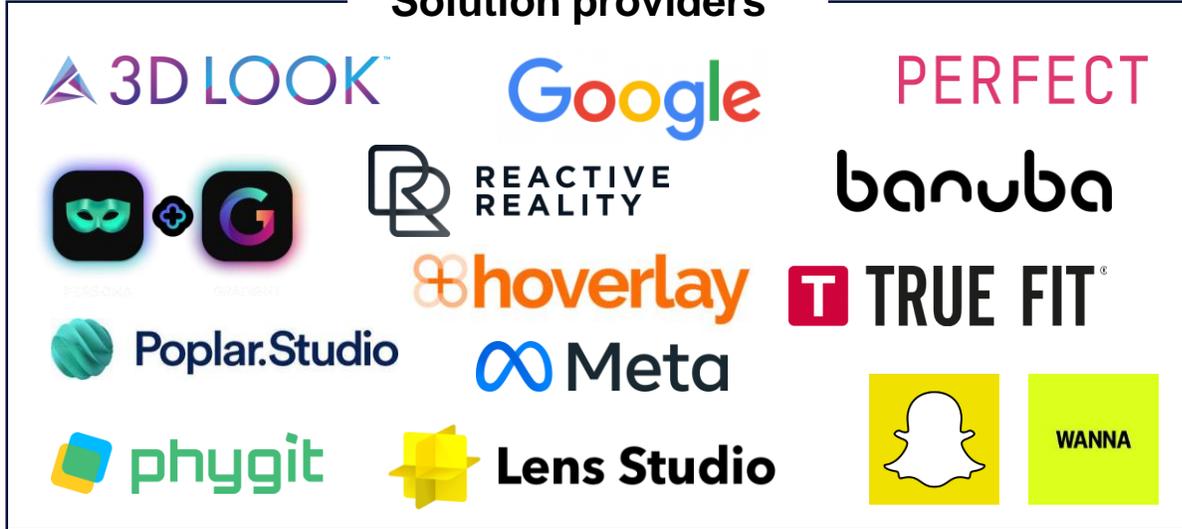
Tools

- Mobile AR apps
- AR filters
- Computer vision models
- Virtual try-on systems
- Mobile app builders
- 3d modeling software
- Web AR-experience creation platforms

Problem solving / Goals

- Make content creation easier, faster and cheaper
- Increase sales
- Increase brand awareness
- Remote try-ons
- Reduce product returns
- Attract attention to new collections

Clients

CONVERSE

SEPHORA

Reebok

UNIQLO

1822 DENIM

L'ORÉAL PARIS

Ray-Ban
GENUINE SINCE 1937

Timberland

BURBERRY

GUCCI

NIKE

ZARA

Sotheby's

Use cases. **Fashion & Beauty**

Case: Ray-Ban Stories smart glasses by Meta

Goal: To create the next big thing after the phone

Tools: 5MP cameras, microphones, AR technology

Facebook has given the camera-on-your-face idea another shot with its collaboration with Ray-Ban on Ray-Ban Stories glasses in 2021. The device allows wearers to enjoy AR-lite experiences that include immersive filters and interactive mini-games. With Ray-Ban Stories one can take photos and videos, listen to music and calls, and share content directly to social media channels.

The device also contains two integrated 5MP cameras and three microphones that enable hands-free photo or video sharing, receiving calls, and communicating with others using the platform's AI assistant.

Case: Beauty and fun filters by Persona & Gradient

Goal: Make content creation easy and accessible for everyone

Tools: AR lens
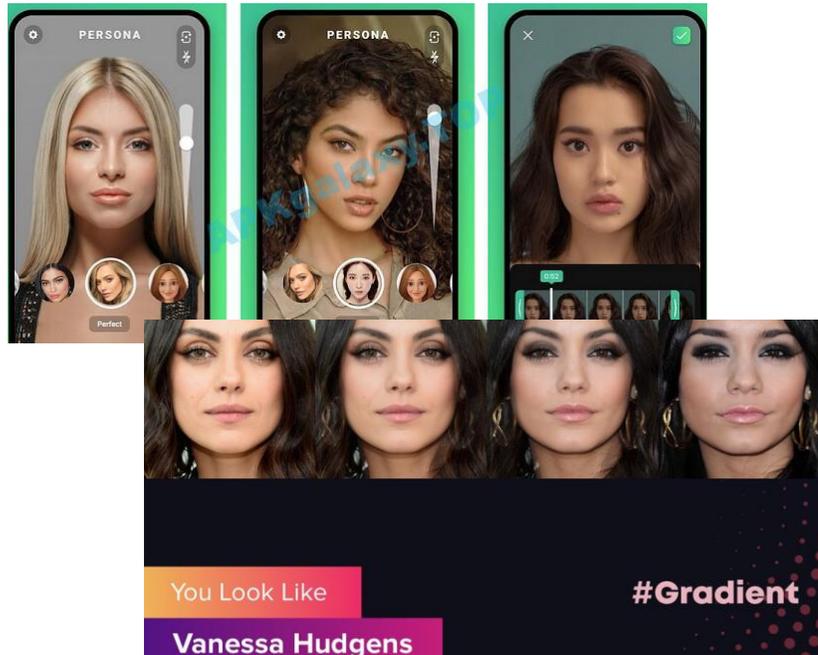
Gradient is a popular application that uses neural networks to analyze your photo and find what famous person you look like, estimate your DNA ancestry, and provide editing tools and other functions. Gradient went viral thanks to its use by celebrities and posting their results to Instagram.

Persona is another app from the same developers. A selfie camera app, it provides photos and videos with AI-powered invisible beauty filters that greatly reduce editing time for uses. It is widely used by Instagram models and can be used during online streams.

100M+ people create unique content with Gradient and Persona.

STATE OF PHYGITAL

Case: Instagram filter "Tiara" by Sotheby's

Goal: Auction advertising and promotion

Tools: Instagram AR filter (platform Poplar Studio)

STATE OF PHYGITAL

Auction house Sotheby's has teamed up with AR and 3D platform Poplar Studio to launch an Instagram filter celebrating the auction of a historic royal tiara, passed down through generations of the Italian royal family.

The Instagram AR filter was created to allow 3.8 million Instagram followers to virtually 'try on' the diamond and pearl headpiece. The virtual tiara was modeled directly from the original, and using the filter, users were able to visualize themselves wearing it. The Instagram filter also included a 360º backdrop of the Palazzina di Caccia di Stupinigi in Turin, the former royal hunting lodge for the House of Savoy.

Results:
1 million impressions;
130,000 of those users engaged with the filter.

Use cases. Fashion & Beauty

Case: Personalized size recommendations

Goal: Reduce clothing returns due to unsuitable sizes

Tools: Computer vision, neural networks, and 3D statistical modeling (3DLOOK's YourFit)

STATE OF PHYGITAL
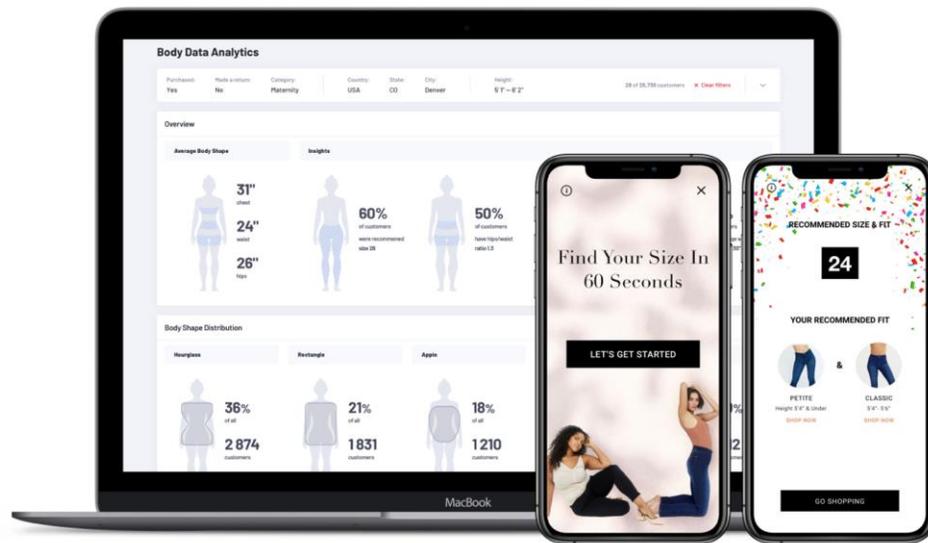
With the help of 3DLOOK's YourFit solution, 1822 Denim reduced returns by 30% and increased conversions by 400%. 3DLOOK's YourFit solution generates personalized size recommendations via a cross-platform, web-based widget that captures consumers' body data using just two smartphone photos to accurately determine the correct size for customers. Additionally, YourFit allows the brand to collect anonymized body data from its customers to analyze and leverage its manufacturing processes.

Results:
30% reduction in returns;
90% of the company's customers indicated that they felt confident that the fit recommendation they received was personalized;
70% of those who used the widget went on to purchase on the 1822 Denim website.

Source: 3DLook

Phygital Implementation: Gaming & Toys-to-life

Solution providers

MIRRORSCAPE

∞ Meta

EASTCOLIGHT [HONG KONG] LIMITED

EPIC GAMES

SONY

Unity

Microsoft

MISHKA AI

NIANTIC

UNREAL ENGINE

Shapes XR

EA ELECTRONIC ARTS™

SoapBox
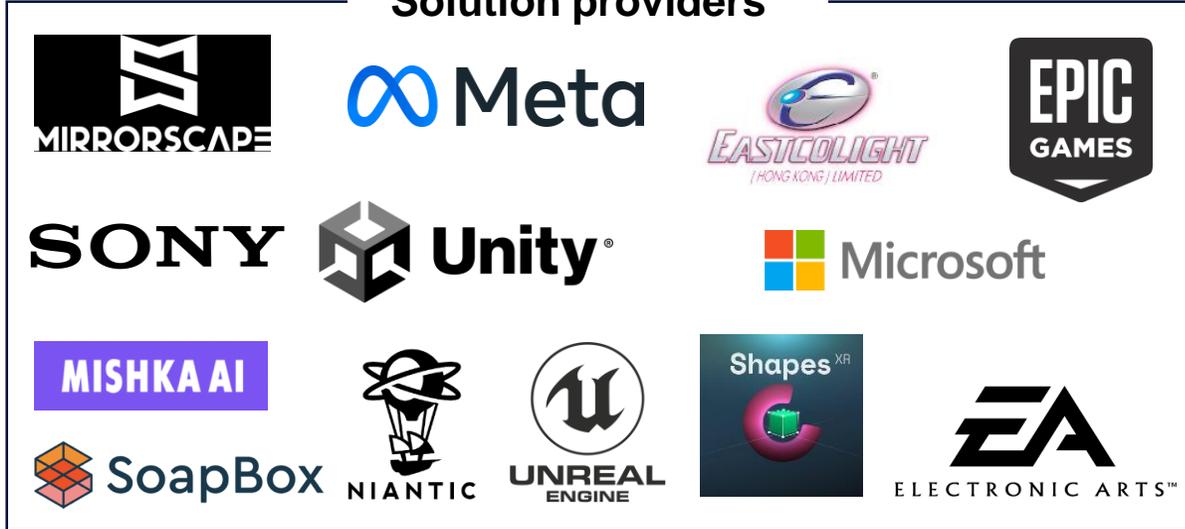
Tools

- Mobile AR apps
- NFC
- Speech-to-text & Text-to-speech
- VR headsets
- 3D engines
- 3D modeling software
- Mobile app builders
- Computer vision models
- Motion sensing input devices
- AI and cloud services

Problem solving / Goals

- Add a new dimension in interaction with tabletop games
- Provide customers with extra layer while playing with physical objects
- Bridge pen-and-paper play with digital gaming
- Engage with digital content during physical activities
- Provide better feedback on physical toys usage for manufacturers

Clients

LEGO

Disney

Hasbro

MGA ENTERTAINMENT

MATTEL™

STATE OF PHYGITAL

Use cases. Gaming & Toys-to-life

Case: Cars brought to life in AR

Goal: Create new ways to play with LEGO TECHNIC

Tools: AR technology

In February 2022, LEGO released two car sets which could be brought to life with the new LEGO Technic AR app. Those sets are the Formula E Porsche 99X Electric and the Ford Mustang Shelby GT500.

When combined with the app, users can take part in speed challenges, overlay virtual details to the play area, and learn more about both sets.

The technology allows the measurement of track time, expanding the possibilities of playing with Lego models. There are different tracks available.

Source: Lego

Case: Augmented Reality Platform for TTRPGs

Goal: Bridge pen-and-paper play with a connection to digital gaming

Tools: 3D tabletop map builder, AR technology
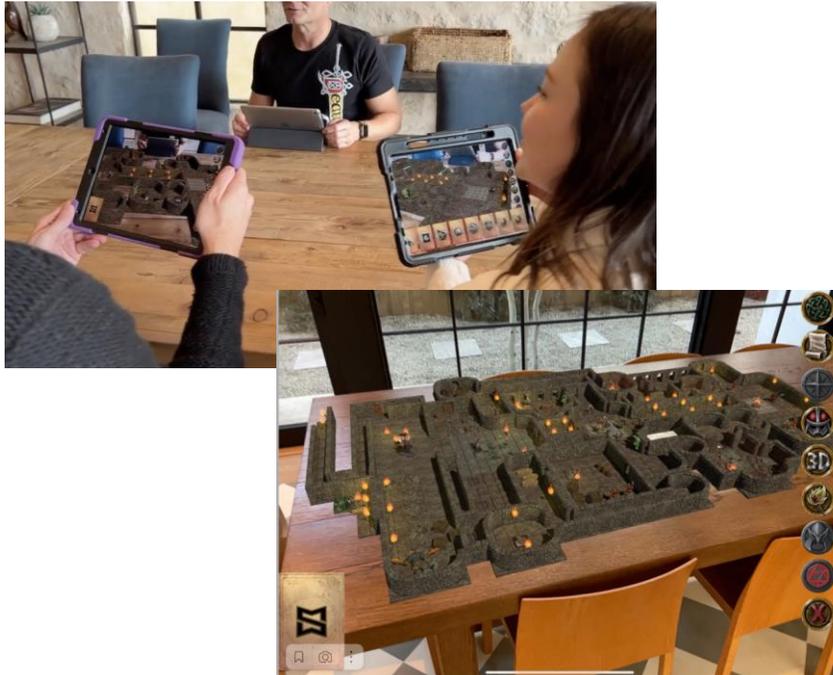
Mirrorscape is an AR platform bringing augmented reality to tabletop gaming. 3,719 backers pledged $418,091 (initially Mirrorscape claimed to collect an 8x smaller amount, $50,000) to help bring this project to life in May 2022.

At present, Mirrorscape offers a 3D tabletop map builder and interface the company says is fully compatible with augmented reality technology, online lobbies, editable assets, and various devices. In the future, the interface will feature animated character models and monsters, sparkling spell effects, and complex environments.

STATE OF PHYGITAL

Case: Mixed-reality trampoline game by Valo Motion

Goal: Create kid-friendly trampoline activities

Tools: Mixed reality technology

STATE OF PHYGITAL
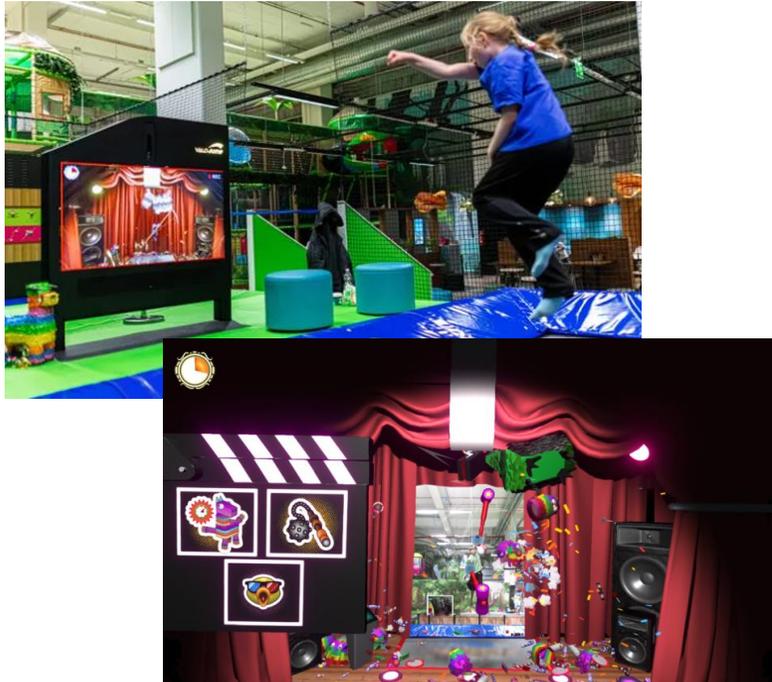
The 3D environment and the virtual effects are merged with the the physical environment, and players actively engage with the digital content. The use of augmented reality creates a magical feeling that everything is happening in the player's real physical space on the trampoline.

Jump Theater is inspired by traditional nostalgic gaming elements like piñatas at birthday parties and funhouse mirrors that distort the player's reality, making it feel new yet familiar and universal all at once.

Gameplay video recording creates a short clip for the players towards the end of the game. By using the mobile application ValoApp, players can save their gameplay experience and share the video with friends and family.

Case: A content delivery platform in the shape of a traditional teddy toy

Goal: Providing a soft toy with AI features

Tools: Mishka AI chip, a cloud platform

STATE OF PHYGITAL

Mishka AI has created a chip which can be integrated into any soft toy (bear, rabbit, cat, etc). The chip is connected to the cloud and provides updatable educational and engaging content.

The soft toy can teach children to brush their teeth or remind them how important it is to wash their hands. Another function is telling fairy tales.

These toys can create a comprehensive dialog. For example, when making a riddle, it gives clues, correct answers, and recaptures children's attention. Numerous scenarios for educational and entertainment use are available. Toy can interact with other objects with NFC tags, such as cards, books, cubes, posters, stickers, etc.

Source: Mishka_AI

Phygital Implementation: Space

Solution providers

VARJO

∞ Meta

SPACEX

Pale Blue

Ørsted

Microsoft

TUSUR — Tomsk State University of Control Systems and Radioelectronics

LOCKHEED MARTIN

Tools

- VR headsets
- VR interfaces
- 3D engines
- 3D modeling software
- Remote guidance software
- Video communication software
- Simulation platforms
- Immersive AR video clips

Problem solving / Goals

- Optimize spacecraft repair
- Optimize spacecraft design process
- Improve quality of communication with ground services
- Reduce mistakes caused by lack of knowledge spacecraft condition

Clients

NASA

BOEING

esa space solutions

CNSA

इसरो isro

JAXA

Use cases. Space

Case: Mixed Reality leveraged into military aerospace machines

Goal: Optimize spacecraft design process

Tools: Mixed reality technology
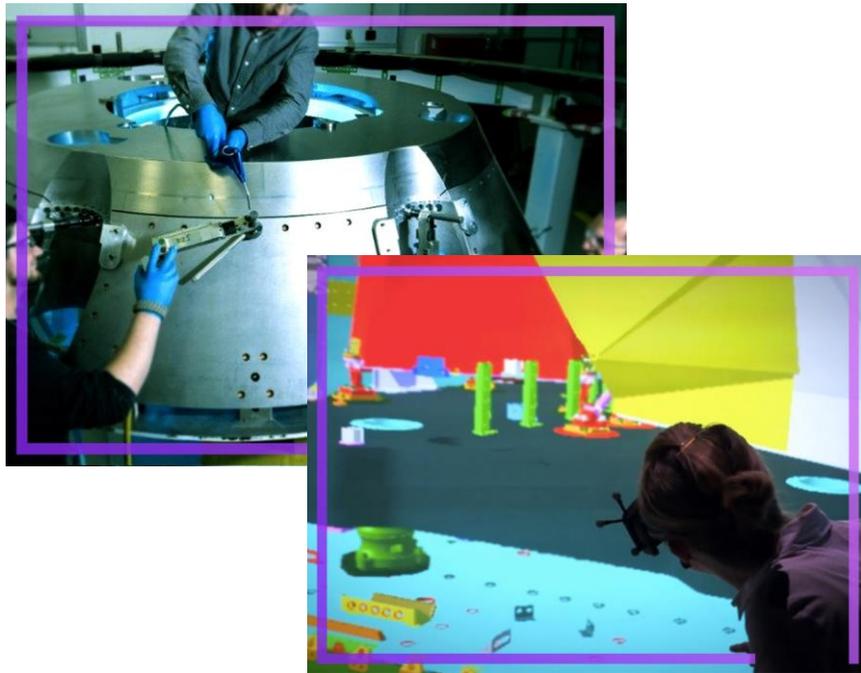
Drawings, models, and a great deal of data must be interpreted in order to design Lockheed Martin spacecraft. Experience has shown that processing all the data and ensuring that everyone understands it in the same way is difficult. Thus, Lockheed Martin created training manuals with mixed reality technology that provide animations for assembling spacecraft components.

Engineers who have been trained to use the maintenance and repair tools complete tasks much quicker than before. The resulting workflows have been used to minimize touch labor for Orion spacecraft components with tight tolerances, such as fasteners and accelerometers.

Results:
Overall ,AR technology has enabled engineers to work **30%** faster while maintaining **96%** accuracy.

Source: InfiVR

STATE OF PHYGITAL

Use cases. **Space**

Case: AR headset to assist NASA astronauts

Goal: Improve quality of communication with ground services

Tools: Microsoft HoloLens, VR interfaces

STATE OF PHYGITAL

NASA's Cold Atom Lab (CAL) is the first quantum science laboratory in Earth orbit, hosting experiments that explore the fundamental behaviors and properties of atoms. About the size of a minifridge, it was designed to enable in-flight hardware upgrades. The Cold Atom Lab team uses an AR headset to assist astronauts with upgrade activities.

Astronaut Megan McArthur donned a Microsoft HoloLens while she replaced a piece of hardware from inside CAL with a new one. A small front-facing camera on the headset allowed Cold Atom Lab team members to see what she was seeing, whereas normally they would rely on a camera positioned behind or above the astronaut. The CAL team also could add virtual graphics (text or drawings) to McArthur's field of view. For example, as she looked at a large cable harness, the team could add an arrow in her field of view designating a particular cable to unplug or a zip tie to cut.

Phygital Implementation: E-commerce

Solution providers

Unity · TRUE FIT · phygit · Snapchat (part/whole) · MYWEBAR.COM AR MADE SIMPLE · SAMSUNG · Poplar.Studio · Obsess · sayduck · 3D LOOK · fixtuur · nextech AR solutions

Tools

- Mobile AR apps
- Web AR-experience creation platforms
- Computer vision
- AR filters
- 3D modeling software
- 3D engines
- Virtual fitting & sizing
- RFID systems

Problem solving / Goals

- Product AR demo
- Increase sales with web-based product try-on
- Increase sales with in-app product try-on and in-app purchases
- Increase revenue per visitor
- Reduce product returns

Clients

DFS · IKEA · ULTA BEAUTY the possibilities are beautiful.™ · Alibaba · MSI · lamoda · FARFETCH · HEAD · NIKE · TENTH STREET

Case: Check if Samsung product suit the premises

Goal: Product AR demo

Tools: AR technology

STATE OF PHYGITAL

AR Demo allows consumers to experience products virtually in their homes, check product dimensions, and make informed decisions.

The AR demo can be accessed through a smartphone, allowing users to view products, such as a television or refrigerator, in their home environments and place them in the desired location using the smartphone camera.

The camera scans the space and digitally places the product to scale, providing a clear idea of how the product would look aesthetically in the home. In the case of a refrigerator, users can even open the doors and look inside for a holistic experience of the product.

Case: 3D & AR furniture visualization

Goal: Product AR demo

Tools: AR technology

STATE OF PHYGITAL

DFS realized early on that most of their customers (80%) were using the ROBO method: research online, buy offline. However, DFS recognized that they can better help customers answer common questions, such as what will this look like in my home; will it match my style; and will it fit in my space.

DFS recognized that 3D and AR would provide an immersive experience that went far beyond video or still images. They selected Vertebrae; its web-based model kept the clients on the product pages without having to leave the site and download an application.

Results:
For shoppers who interacted with 3D and AR, DFS has seen **a conversion lift of 112%** and **a revenue per visit lift of 106%** over shoppers who did not engage.

Use cases. E-commerce

Case: Product visualization by Tenth Street Hats

Goal: Increase sales with web-based product try-on

Tools: 3D & AR technology
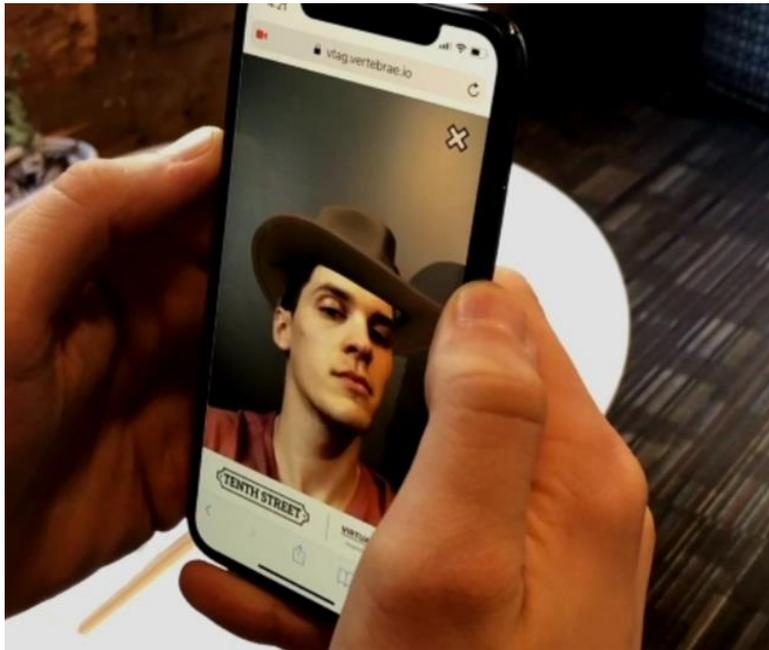
Many major brands have experimented with similar mobile AR tech and incorporated it into their marketing campaigns, either through apps, browsers, or social platforms like Instagram or Snapchat. 7-Eleven, Adidas, Coty, and Domino's have introduced immersive features for mobile users in recent years, pointing to the growth in the space as more on-the-go shoppers turn to smartphones to discover and research products.

Tenth Street Hats implemented web-based 3D & AR product visualization and try-on. Results include significant increases in engagement, conversion, revenue per user, and more.

Results:
52% increase in conversion
42% revenue per visit lift
220% more likely to purchase

STATE OF PHYGITAL

Use cases. E-commerce

Case: Creation of AR-powered product trials

Goal: Increase sales with in-app product try-on

Tools: Shopping Lens
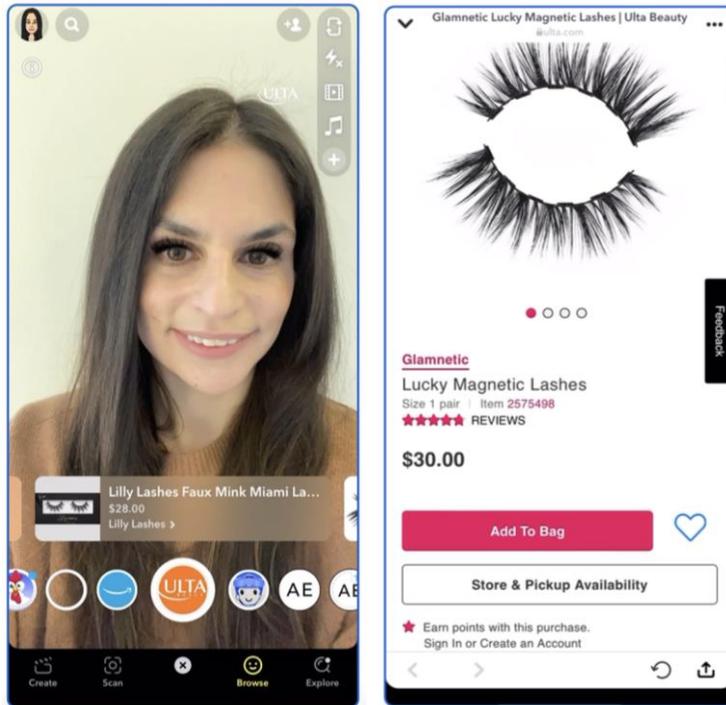
Ulta Beauty partnered with Snapchat and their agency partner Rise Interactive to build a holistic AR shopping strategy with an always-on approach.

They used Snapchat's catalog-powered Shopping Lens format to seamlessly transform their product catalog into always-on AR. These Shopping Lenses included product SKUs and drove Snapchat Users directly to each product page to purchase all in one Lens experience.

Ulta Beauty complemented their AR Lens strategy on Snapchat with video Snap Ads and Collection Ads to drive additional reach across the Snapchat platform.

Results:
>30 million times AR was used to try-on Ulta Beauty products
The catalog-powered Shopping Lenses also led to sales, driving **$6M** in attributable revenue.

Phygital Implementation: Food

Solution providers

Zappar · Unity · wikitude · ROVIO ANIMATION · Snapchat · Menu AR · blippAR · iFarm · Poplar.Studio · ZealAR Augmented Reality · BOWERY · MYWEBAR.COM AR MADE SIMPLE · overly · meero

Tools

- Mobile AR apps
- AR filters
- 3D modeling software
- 3D engines
- Web AR-experience creation platforms
- Computer vision models
- Mobile app builders
- Motion sensing input devices
- Interactive AR real-time games
- Simulation Software
- IoT
- Digital Twins

Problem solving / Goals

- Product launch and promotion
- Boost viral marketing campaigns
- Augmented packaging
- Track plants and their growth stage
- Follow interactive recipes
- Add interactive elements in communications with customers (f.e. augmented menus)

Clients

Pizza Hut · WAHACA · TACO BELL · Wendy's · McDonald's · SLUG & LETTUCE · BURGER KING · PEPSICO · Starbucks · Domino's Pizza · HEINZ ESTᴰ 1869

Case: WebAR experience turns pizza boxes into a playable Pac-Man game

Goal: Entertain customers and attract attention on Twitter

Tools: WebAR

By scanning the QR code on the side of the pizza box, customers aim their smartphone at the box to watch the Pac-Man maze come to life and turn into a playable 3D game. The augmented reality game uses 8th Wall's image target technology which makes it possible to trigger and track the 3D Pac-Man game 1-1 with the physical design on the box in real-time.

The game was an instant hit, inviting customers to have fun with their packaging before even enjoying their dinner. Pizza Hut also tapped into nostalgia for millions of Pac-Man enthusiasts who could relive favorite arcade memories.

To further incentivize customers to play the AR game, Pizza Hut encouraged customers to share their scores on Twitter to be entered into a sweepstakes to win an Arcade1Up Pac-Man game cabinet.

STATE OF PHYGITAL

Case: WebAR lottery by Doritos

Goal: Boost viral marketing campaign

Tools: Poplar Studio's WebAR

STATE OF PHYGITAL
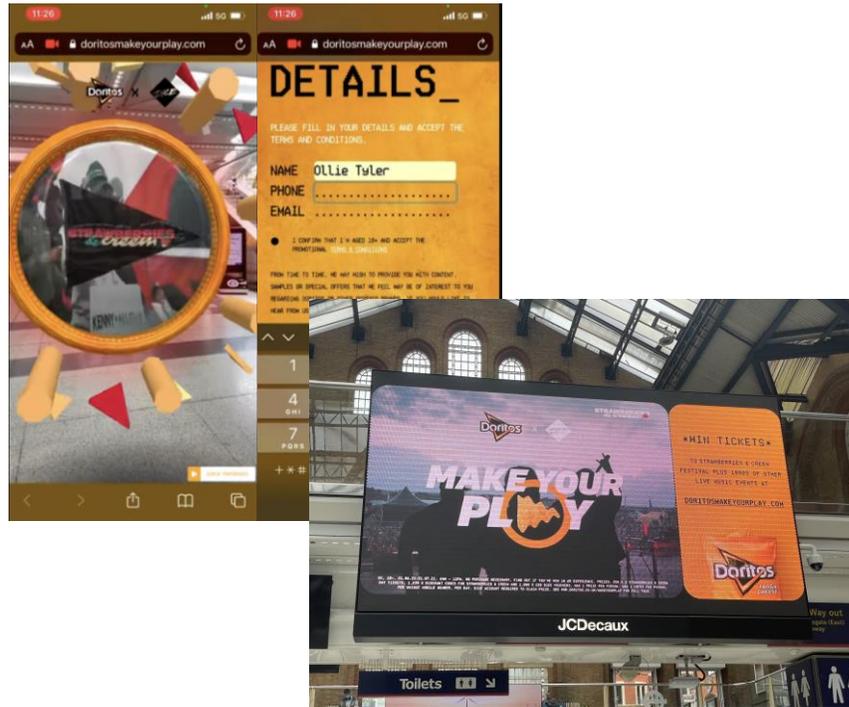
Doritos devised a marketing campaign powered by an interactive WebAR experience that could be activated either directly through a promotional website or in-person by scanning a QR code found on a promotional poster with a smartphone camera. This campaign allowed fans to enter into a competition to win tickets for festivals, events, and discounted tickets.

After accessing QR codes on posters across the UK, users were presented with the aptly-shaped Doritos chip which was repurposed as a play button that could be placed anywhere in their surroundings with their camera.

With no app required, users were able to see the Make Your Play buttons pop up physically and virtually, unlocking a summer full of live music events.

Use cases. **Food**

STATE OF PHYGITAL

Case: AR Angry Birds game

Goal: Engage a tech-savvy generation of consumers

Tools: WebAR game by Rovio and Zappar

Rovio has partnered with Burger King to offer Angry Birds plush toys and an immersive new augmented reality experience with King Jr. meals in the US and Canada.

Guests needed to scan the QR code on their meal box and select a virtual Angry Birds plush toy based on their meal's toy.

The goal of the game was to protect the three eggs they find during their augmented reality experience.

The game helped to reinforce the idea that Burger King is a fun and welcoming brand for families, especially as more regions lift lockdown measures on restaurants and many people return to pre-pandemic behaviors.

Phygital Implementation: Construction & Logistics

Solution providers

VISUAL LIVE · AUTODESK REVIT · Air Measure · vGIS · ClipDrop · realwear · ptc · DALUX · JBKNOWLEDGE · arvizio · AUGVIEW augmented technology · THE WILD · GAMMA AR · AUGMENT · ICT TRACKER · morpholio · FOLOGRAM · AKULAR

Tools

- VR/AR headsets
- 3D modeling software
- 3D engines
- Computer vision models
- Video communication software
- Remote guidance software
- Interactive AR applications
- IoT systems & IoT device management software
- Robots
- Digital Twins

Problem solving / Goals

- Optimize construction process
- Determine need for repairs
- Increase performance in picking
- Decrease average order processing time
- Provide new ways to co-work
- Optimize business by facilitating remote interaction
- Optimize project auditing

Clients

ATKINS · KCI · wälli Ingenieure · wsb · HOCHTIEF · VICTORIA State Government · Mercedes-Benz · STRABAG · SKANSKA · SRV · BNB BNBuilders · BOUYGUES · Turner · 中国电建 POWERCHINA · TechnipFMC · Balfour Beatty · BECHTEL · Tighe&Bond · Tauw

Case: Transferring objects from the physical world to the digital one

Goal: Make deep-etching easier

Tools: Smartphone & desktop apps

ClipDrop lets the smartphone's camera quickly grab objects from the environment and place them into desktop apps. It makes the physical world digital, instead of projecting digital images onto the world around you.

While eleven steps are typically required to take a picture from a device and transfer it to a desktop for manual editing, ClipDrop brings this number down to just two and provides a high-quality and accurately cut-out image ready for immediate use.

Deep-etching is one of the banes of graphic designers' lives. It is the process of removing an object in an image from its background and can take hours. ClipDrop is also useful for architects who can visit areas near their projects, snap photos of vegetation, and add to their elevations.

STATE OF PHYGITAL

Use cases. Construction & Logistics

Case: Digitalizing daily operations by means of digital FM tools

Goal: Optimize the construction process

Tools: Dalux Augmented Reality

SRV, a Finnish leader in the development of innovative construction projects, is using Dalux Augmented Reality on a complex construction project with over 250 users in the system.

Dalux is a management system that unites all BIM & Documentation in one platform. It also allows viewing BIM models in augmented reality and includes HelpDesk and other features.

SRV has used Dalux since 2019 and now has over 120 active projects with Dalux. One of them is Tampereen Kansi and Areena in Finland, which includes a hotel building with 105 rooms, 148 apartments, and a casino, as well as a new sport and concert arena which can seat 15,000 people.

STATE OF PHYGITAL

Case: Fibre optic sensors on bridges across Australia's Victoria State

Goal: Determine need for bridges repairs

Tools: Xerox Industrial Internet of Things

STATE OF PHYGITAL
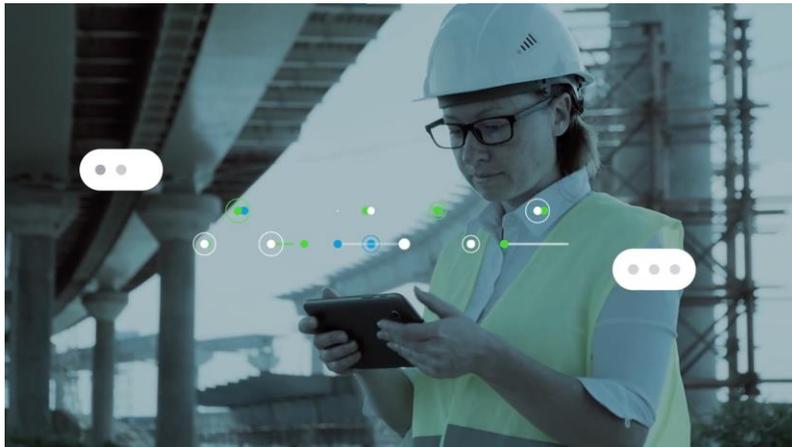
The Victorian Government of Australia has committed AU$50 million to deploy tiny optical sensors onto bridges across the state for early detection and prediction of problems, thus reducing costly repairs and helping bridge operators to efficiently manage maintenance budgets.

In the United States alone, **42%** of all bridges are at least **50 years old**, and nearly 231,000 bridges need repair and preservation work. **70%** of Australia's bridges are more than **50 years old**, **~11,000** of Germany's 25,000 rail bridges are over **100 years old. 7%** of bridges in France are already at risk of collapse.

The state government has partnered with technology vendor Xerox on a joint venture named Eloque to commercialize the new technology that will remotely monitor the structural health of bridges.

Source: FutureIoT

Case: Real size simulation of ideal POS placement

Goal: Increase in-store sales of POS materials

Tools: Augment AR Viewer, 3D Vault, 3D Factory

STATE OF PHYGITAL

Coca-Cola Hellenic is one of the largest bottlers for the Coca-Cola Company operating in 28 countries.

To sell in new coolers and equipment at the point of sale(POS), their field reps used to rely on standard PowerPoint presentations with 2D images of the proposed materials. This process created uncertainties as the buyer had trouble figuring out where the point of sale would best fit.

Augment completely revolutionized the sales process by allowing reps to create a real size simulation of the ideal POS placement and share it with their clients. Their sales reps can now close deals more efficiently and secure the best placement for their equipment, and their buyers can make more informed decisions.

Case: Creating a warehouse management system

Goal: Increase picking performance to decrease average order processing time

Tools: Aptus ExpertVision, Vuzix smart glasses

STATE OF PHYGITAL

Global Shipping & Logistics LLC is one of the leading logistics providers within the UAE. GSL partnered with Aptus to develop the pick-by-vision technology, combining voice with vision to great success.

GSL's warehouse management system provides capabilities that include inventory management, picking slot replenishment, distribution optimization, order planning, labor management and forecasting, slotting optimization, and Radio-Frequency Identification Device management, which in most cases are accessible by employees wearing Vuzix smart glasses by AR and voice recognition technologies.

Results:
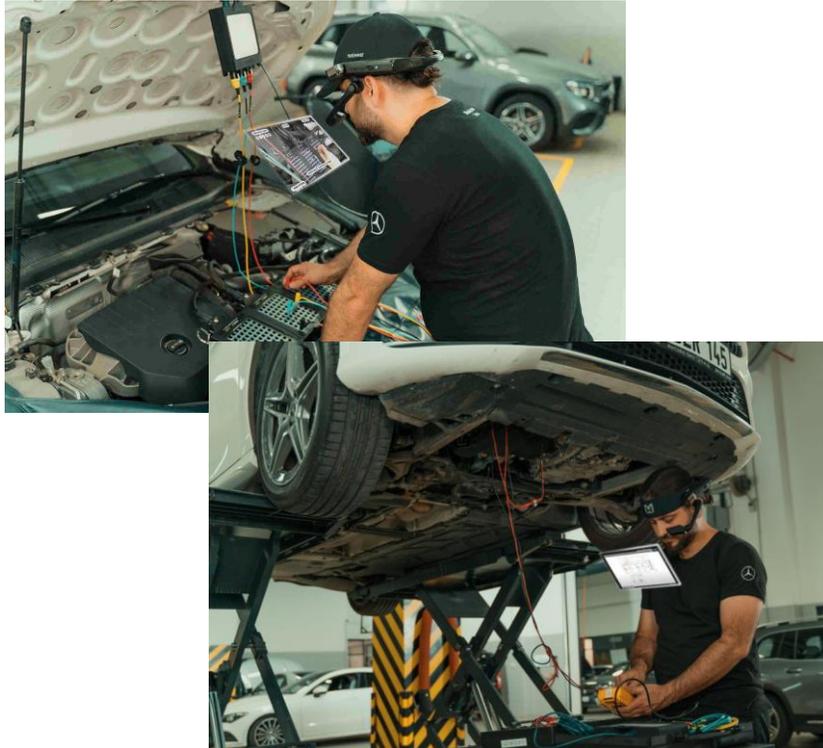**15%** performance increase due decreasing the average depalletization time by four minutes;
20% performance increase in picking, decreasing average order processing time by 16 minutes.

Use cases. Construction & Logistics

Case: Using wearable devices for work synchronization

Goal: Optimize business by facilitating remote interaction

Tools: RealWear headset

In February 2022, Mercedes-Benz Otomotiv, based in Turkey, selected and deployed RealWear's rugged wearable devices across its 56 authorized service centers. Prior to that, the process included hundreds of in-person trips, emails, shared photos and videos, and over-the-phone collaboration with subject matter experts. With more than 240,000 customer vehicles on the road and the company's commitment to high-quality service, the RealWear deployment immediately resulted in wide-ranging positive impact from cost savings and carbon footprint reduction to efficiency and worker empowerment.

Results:
80% performance increase in customer service center technical problem resolution from the RealWear deployment;
expecting **$100k** saved per year;
reduced **500 tons** of carbon emissions per year;
25% jump in ROI for on-part training scenarios.

STATE OF PHYGITAL

Use cases. Construction & Logistics

Case: Enabling on-site technicians to stream content to remote experts in real time

Goal: Optimize object auditing

Tools: Mira AR headset

Cogentrix, an industry-leading power generation organization, partnered with Mira to reimagine its approach to site audits and explore different strategies and solutions.

Mira's AR headsets enable on-site technicians to stream audio and video content to remote subject matter experts in real time, who can perform a complete audit without the need to visit a facility. The off-site auditors can communicate with technicians through a live feed and share media, such as facility photos, live video, and procedures. The Mira Flow tool can also be used to capture and analyze audit data, such inspection results, compliance status, and supporting photos to generate pre-populated reports, saving time.

Results:
$270k saved per year with remote audits;
27 sites Deploying Mira Headsets;
$10k saved per remote audit.

STATE OF PHYGITAL

Use cases. **Construction & Logistics**

Case: Guiding mechanics in aviation construction

Goal: Optimize jet engine maintenance

Tools: Upskill & Google Glass Enterprise Edition

Mistakes can be costly when building aircraft engines. For that reason, aerospace companies put a tremendous level of emphasis on quality control.

One error-prone area for GE is with B-nuts, which provide the necessary seal in aircraft engine-fluid lines to ensure proper flow and containment. This seal requires a specific level of torque. If too loose or too tight, it can lead to many costly scenarios. Given this ongoing pain point, GE went in search of technology that can empower mechanics to get it right the first time. AR became a logical answer given its line-of-sight annotations that could guide mechanics in various ways.

Results:
GE's Initial deployment achieved **8-11 %** efficiency improvements in terms of time to task completion. In some cases, it achieved **38-minute** completions, down from 51 minutes — a **25%** improvement.

STATE OF PHYGITAL

Phygital Implementation: Travel & Entertainment

Solution providers

Meta

Shapes XR

Microsoft

Poplar.Studio

Google

BRINK

RENDEVER
expanding worlds.

BLEND
MEDIA

Qualcomm

sensetime

VARJO

Tools

- VR/AR headsets
- 3d modeling software
- 3D engines
- Computer vision models
- Cloud computing services
- Interactive AR applications
- AR lenses
- Remote communication software
- Geo-positioning technologies

Problem solving / Goals

- Digitalize open space maintenance
- Increase efficiency of working inside VR projects
- Provide customers with new entertainment options
- Present travel experiences from any place
- Provide any cultural experience in 3D virtual world

Clients

Arksen

Marriott
HOTELS · RESORTS · SUITES

lumo

Alaska
AIRLINES

Leipziger
Verkehrsbetriebe

KLM
Royal Dutch Airlines

Disney

Hilton
HOTELS & RESORTS

westbund
西岸艺术与设计博览会

Case: Managing a wide and open area of public space with massive traffic in Shanghai

Goal: Digitalize open space maintenance

Tools: SenseTime's AI models, Computer vision

Shanghai West Bund manages an open zone consisting of a comprehensive business and industrial hub, extending along a shoreline of 8.4 km. The management team faced the difficulties of managing a wide and open area of public space with a variety of commercial and industrial formats and massive traffic flow in the absence of entrance control.

SenseTime has digitalized the client's open space, and their AI models enable ongoing maintenance of the more than 6,800 specific commercial assets in the area, such as trees, streetlamps, paths, and facilities by computer vision. It automatically triggers alerts upon detection of anomalies, dispatches staff, and further tracks the process, all empowered by AI models with decision intelligence.

Results:
Over 98% of anomalies can be resolved within **20 minutes**, providing high-value comprehensive management services to the customer and significantly enhancing resident and visitor safety and experience.

STATE OF PHYGITAL

Case: Designing a 3D model of a cave

Goal: Increase design phase efficiency

Tools: VR Creation and Collaboration Platform for Remote Teams (ShapesXR)
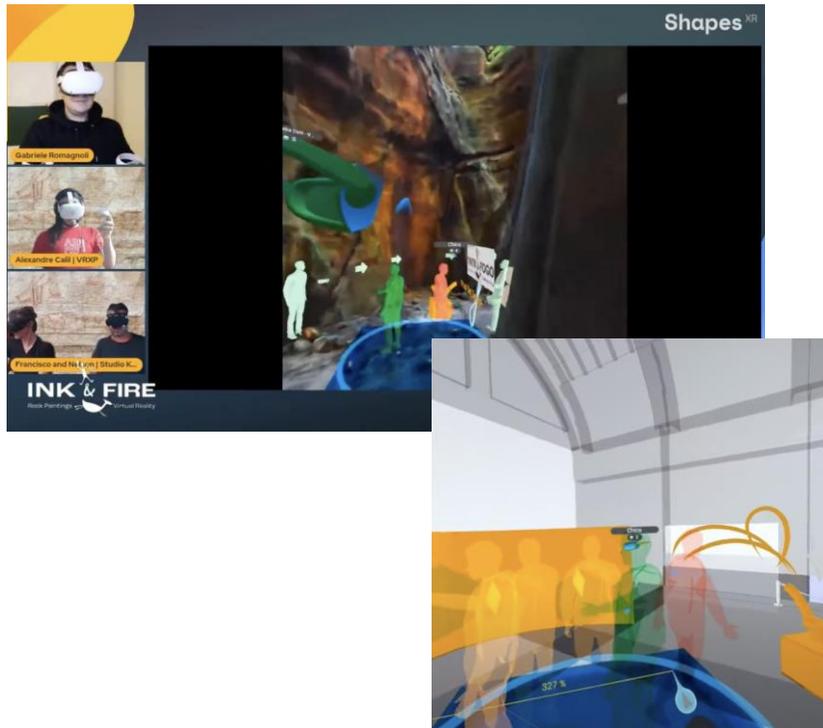
Ink & Fire is a VR narrative experience that revolves around 3D scans of prehistoric cave painting sites in Brazil. ShapesXR allowed the remote team to import the 3D models and design the whole flow of the application at 1:1 scale.

ShapesXR was used to align early decisions during the design phase. The director's written scripts and vision could be easily translated into spatial mockups and presented to the rest of team. New ideas and concepts were immediately choreographed in real-time.

Results:
Design process became **60%** more efficient;
The ability to receive immediate feedback during the design phase despite the team being fully remote allowed **3x** faster iteration.

STATE OF PHYGITAL

Case: A virtual mural at Walt Disney World's Magic Kingdom Park

Goal: Provide customers with new entertainment options

Tools: Snap Camera technology

Snap and Disney announced a new collaboration to create a virtual mural at Walt Disney World's Magic Kingdom Park using augmented reality.

The mural uses customers' Disney PhotoPass photos, which are taken by designated photographers at the park, or visitors can choose a photo from a collection of Disney characters and icons. Visitors can then add to the mural using the My Disney Experience app when they're in the "Magic Kingdom Park".

Visitors can view the full mural with photos from other guests using the Snap Camera technology built into the My Disney Experience app using Snap's Camera Kit developer tools.

STATE OF PHYGITAL

Case: A virtual travel experience by BRINK Traveler

Goal: Present a travel experience from any place

Tools: AR and VR technologies

STATE OF PHYGITAL

BRINK Traveler
for Phones & Tablets (AR)

BRINK Traveler
for Virtual Reality (VR)

BRINK Traveler is a virtual travel experience that takes users to different locations in full 3D to feel like they are really there.

BRINK Traveler provides detailed 3D images of different natural landmarks available in the photogrammetry-based AR and VR app and serves many useful purposes:

- **Education** – teachers can make their geography lessons more exciting by taking virtual walks with students in areas being studied;

- **Virtual travel** – restrictions of any kind (including those related to tourists' available budgets) mean that many people cannot experience the beauty of many amazing places on Earth. A photogrammetry-based AR/VR app solves this issue.

Source: BrinkXR

Case: A virtual concert of Nightwish

Goal: Attract more people from around the world in a joint activity
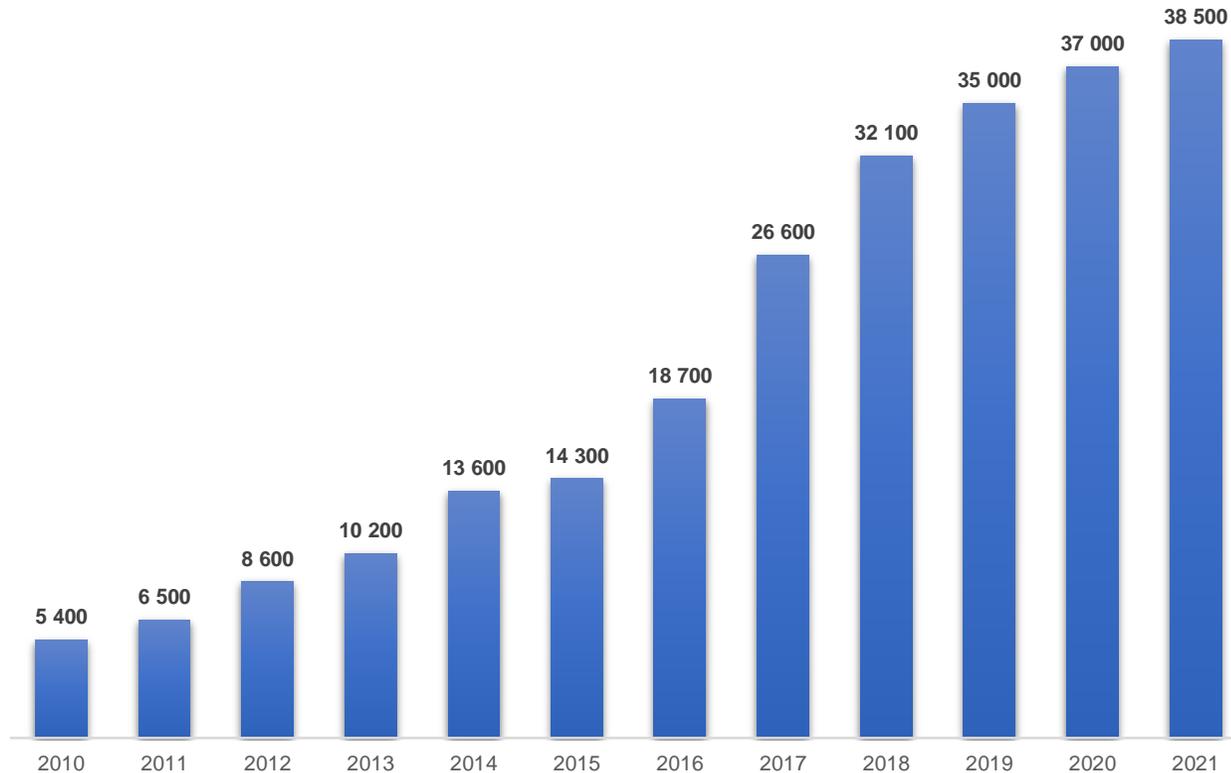
Tools: 3D modeling

STATE OF PHYGITAL

Nightwish, Finland's most internationally successful band, treated their fans to a spectacular virtual experience. Set in a 3D-world, 'An Evening With Nightwish in a Virtual World' gathered altogether over 150,000 viewers. Tickets were sold to 108 countries. The price range of the tickets was €25 - €109, and the ticket income corresponded to a large stadium-sized concert.

When Nightwish's world tour was canceled due to the pandemic, the band wanted to offer fans something unprecedented. Half a year in preparation, the team, comprising Nightwish, promoter Fullsteam Agency, technical producer Zoan, and management company Till Dawn They Count, put together an exceptionally ambitious production, the like of which had not been seen before. Fans were able to follow the band playing live in the astonishing 3D world, designed according to the band's vision, while interacting with each other.

AR/VR Patents Outlook 2022

STATE OF PHYGITAL

AR and VR patent applications per year worldwide*

Chart: AR and VR patent applications per year worldwide
- 2010: 5 400
- 2011: 6 500
- 2012: 8 600
- 2013: 10 200
- 2014: 13 600
- 2015: 14 300
- 2016: 18 700
- 2017: 26 600
- 2018: 32 100
- 2019: 35 000
- 2020: 37 000
- 2021: 38 500

Leading global AR/VR patent owners and amount of patents owned**

Owner	Patents
Microsoft	10,400
Meta	8,800
intel	7,190
SONY	5,950
SAMSUNG	5,500
Magic Leap	4,600
Qualcomm	3,800
Google	3,300
LG	2,700
Canon	2,300
HUAWEI	2,000
IBM	1,900
Apple	1,600
PHILIPS	1,400

* Aggregate from USPTO, CNIPA, KIPO, JPO, EPO, WIPO; 2021
** Statista

Augmented Reality Penetration 2022

6.64 billion

total number of smartphone
users in the world*

1.5 billion

total number of ARkit devices
(iOS)

1 billion

total number of ARCore
devices (Android)

3.5 billion

total number of devices
globally that support WebAR

1.07 billion

total number of active AR
mobile consumers worldwide

2.7 billion

total number of videos created
with Snapchat Lenses**

STATE OF PHYGITAL

* https://www.bankmycell.com/blog/how-many-phones-are-in-the-world
** Snap newsroom

About Us

STATE OF PHYGITAL

✛ LETA Capital

LETA Capital is an early-stage venture capital firm. We are generalists with the focus on entrepreneurs with strong anti-crises experience who are disrupting their industries and see the new opportunities and the new ways of scaling startups.

LETA's investments cover a wide range of software startups. Our portfolio spans 40 companies including inDriver, Novakid, 365Scores, Buddy.ai among others.

LETA Capital is founded by a serial IT entrepreneur Alexander Chachava. To learn about LETA Capital investment approach, feel free to read our Manifesto.

For more visit https://leta.vc/.

Contact us via email info@leta.vc.

✛ Special Thanks to Contributors

LETA Capital wants to express thanks to its partners and ecosystem players, who contributed to this report. This report could not have been produced without the generous input from the following companies:

1. DEVAR
2. ShapesXR
3. Phygitalism

Disclaimer

STATE OF PHYGITAL

Definitions

Augmented Reality (AR) - interactive experience of a real-world environment that overlays digital content and information onto the physical world by using the camera on a smartphone or Snapchat lenses. A system that incorporates three basic features: a combination of real and virtual worlds, real-time interaction, and accurate 3D registration of virtual and real objects.

Extended Reality (XR) - umbrella term that covers all of the various technologies that enhance our senses, whether they're providing additional information about the actual world or creating totally unreal, simulated worlds for us to experience. It includes Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (MR).

GDP (Gross domestic product) - a monetary measure of the market value of all the final goods and services produced in a specific time period.

GDP Per Capita - measures the average income earned per person in a given area in a specified year.

Mixed Reality (MR) - combines elements of both AR and VR, where real-world and digital objects interact. Example: Microsoft's HoloLens.

Patent — the granting of a property right by a sovereign authority to an inventor. This grant provides the inventor exclusive rights to the patented process, design, or invention for a designated period in exchange for a comprehensive disclosure of the invention.

Phygital – set of technologies which enables the close integration of the virtual environment (digital) into real human life (physical).

Virtual reality (VR) - implies a complete immersion experience that shuts out the physical world.

References

https://unsplash.com/@rainrainbowchou?utm_source=unsplash&utm_medium=referral&utm_content=creditCopyText

https://parisgoodfashion.fr/en/news/purchased-and-worn-virtual-fashion-is-booming-255/

https://bill-malloy.com/a-look-at-fintech-startup-revolut-mobile-only-bank-launches-in-the-us/

https://www.mobilesportsreport.com/2021/01/zippin-checkout-free-system-debuts-at-stadiums-in-sacramento-denver/

https://www.facebook.com/mywebar/

https://m.facebook.com/morozzi.lab/posts/

https://www.thedrum.com/news/2021/11/04/gameloft-bringing-kinder-surprise-toys-life-with-ar

https://www.pitchonnet.com/amp/marketing-moments/nestl-milkybar-uses-immersive-augmented-reality-technology-28251.html

https://www.bench.com/hubfs/Benchmark%20Collateral/Case%20Studies/AccuVein-Vein-Finder-Case-Study.pdf

https://www.xrtoday.com/augmented-reality/nreal-microsoft-support-blind-children-with-ar/

https://go.vive.com/rs/058-SUW-894/images/VIVE_Case_Study_ORamaVR.pdf

https://www.ocregister.com/2022/03/28/an-augmented-reality-bear-helps-young-choc-patients-through-mris/

https://newsroom.snap.com/en-GB

https://unigine.com/news/2022/smart-simulations-metro-simulator-powered-by-unigine-2-sim-save-lives-time-and-money

https://link.springer.com/article/10.1007/s11042-021-11164-9#Sec38

https://www.stateof.ai/

https://www.magicleap.com/manufacturing-webinar-01262022

https://aws.amazon.com/ru/solutions/case-studies/coca-cola-iot-sitewise/?did=cr_card&trk=cr_card

https://futureiot.tech/lg-smart-park-gets-wefs-lighthouse-factory-nod/

https://www.ansys.com/resource-center/case-study/red-bull-racing

https://customers.microsoft.com/en-us/story/1470455484645794351-renault-group-automotive-hololens-dynamics-365-fr-france

https://www.zerynth.com/customers/case-studies/armal/

https://www.ray-ban.com/usa/ray-ban-stories

https://persona.camera/

https://poplar.studio/case-studies/sothebys-royal-tiara/

https://3dlook.me/content-hub/case-study-how-1822-denim-reduced-returns-by-30/

https://www.lego.com/en-us/themes/technic/ar-app

https://www.wired.com/story/mirrorscape-tabletop-games-augmented-reality/

https://vrscout.com/news/mixed-reality-trampolines-look-like-an-insanely-good-time/

https://mishkaai.com/

https://infivr.medium.com/-d0d3055bee8b

https://www.nasa.gov/mission_pages/station/research/news/nine-ways-we-use-ar-vr-on-iss

https://news.samsung.com/in/get-a-life-like-virtual-shopping-experience-from-your-home-with-augmented-reality-demo-for-samsungs-flagship-refrigerator-tv

https://www.vertebrae.com/customer-stories/dfs/

https://www.vertebrae.com/customer-stories/tenth-street-hats/

https://forbusiness.snapchat.com/inspiration/ulta-beauty-generates-product-trials-and-incremental-purchases-with-snapchats-new-shopping-lenses

https://www.businessinsider.com/pizza-hut-augmented-reality-boxes-play-pac-man-on-newstalgia-2021-3?international=true&r=US&IR=T

https://poplar.studio/case-studies/doritos-make-your-play/

https://www.marketingdive.com/news/burger-king-urges-kids-to-guard-virtual-eggs-in-new-ar-game/600014/

https://www.theverge.com/2020/10/23/21530042/clipdrop-app-copy-paste-real-world-objects-people-animals

https://www.dalux.com/srv-uses-dalux-on-a-large-project-in-finland/

https://futureiot.tech/fibre-optic-sensors-on-bridges-across-australias-victoria-state/

https://www.augment.com/customer-stories/coca-cola/

https://www.industrial-compliance.co.uk/mercedes-benz-turkey-selects-realwear-for-large-scale-deployment-across-all-56-service-centres-with-microsoft-teams/

https://www.erm.com/projects/cogentrix/

https://arinsider.co/2021/06/29/case-study-ge-streamlines-jet-engine-maintenence/

https://www.sensetime.com/en/case-detail/?categoryId=1182&gioNav=1

https://www.shapesxr.com/case-studies/vrxp-studio-kwo-xr

https://techcrunch.com/2022/04/22/snap-and-disney-team-up-to-create-an-ar-cinderella-castle-mural-at-disney-world/?guccounter=1

https://www.brinkxr.com/

https://www.iq-mag.net/2021/06/150000-buy-tickets-virtual-nightwish-show/

https://www.statista.com/statistics/963685/worldwide-augmented-virtual-reality-patent-top-owners/

https://www.bankmycell.com/blog/how-many-phones-are-in-the-world

https://newsroom.snap.com/ru-RU/#:~:text=By%20Team%20Snap,2022%20at%209%3A30%20AM&text=The%20community%20has%20tapped%20into,viewed%20over%205%20trillion%20times.

STATE OF PHYGITAL