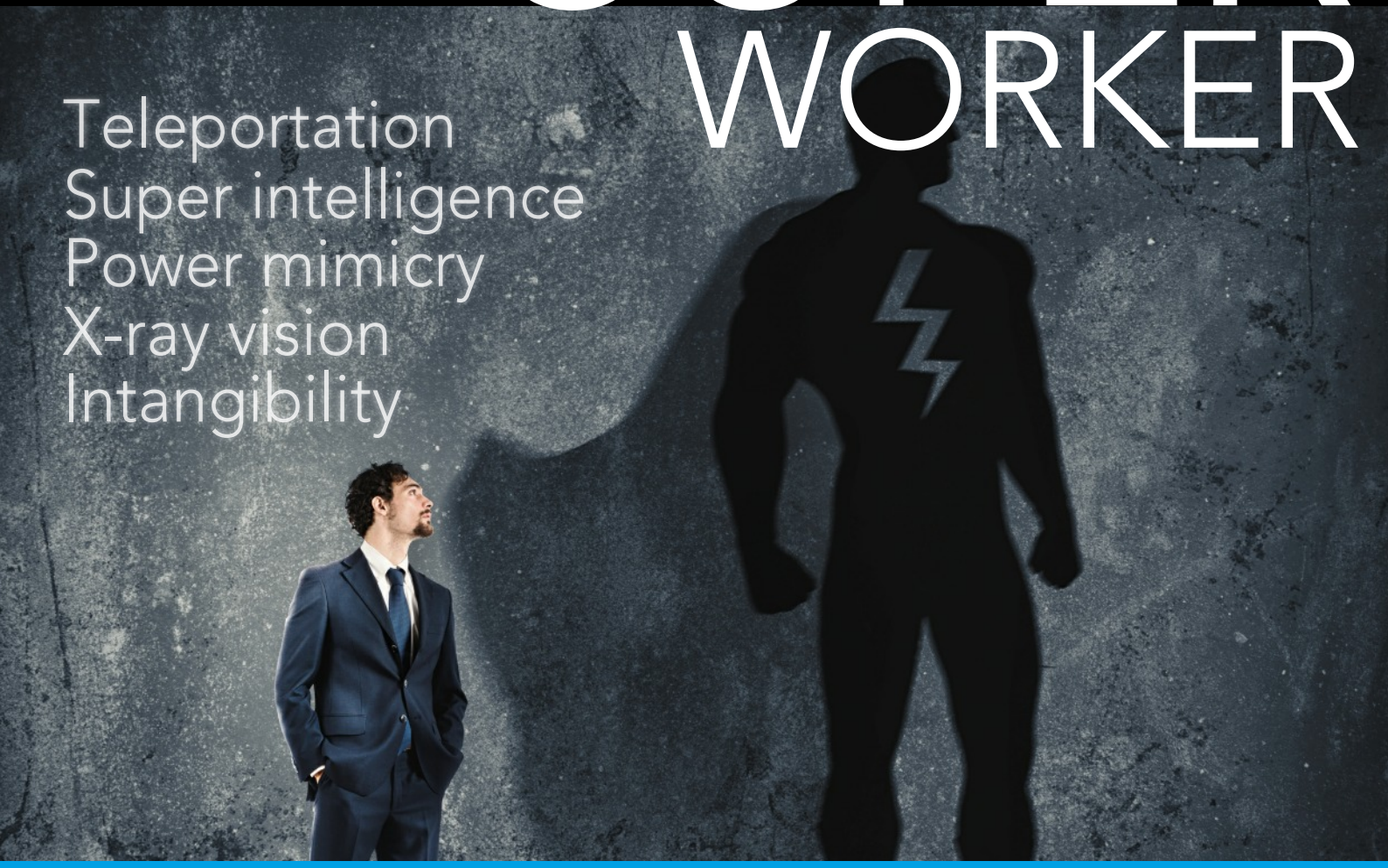
Jonathan Tustain
virtualrealityconsultancy.co.uk

THE SUPER WORKER



Learn from the experts how virtual & augmented reality can give workers superhuman qualities

MORE PRODUCTIVE. MORE SMART.

A special thank you to all the pioneering companies who were interviewed for this report.

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"I wanted to say that I had an EXTREMELY useful day at the VR Workshop – it covered all of the questions I had and I took away a lot of ideas as my knowledge about VR was greatly enhanced after this day. The VR Workshop has broadened my perspectives and awakened my imagination - it will certainly make a difference to my line of work"

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"Many thanks again for yesterday, it was a really good day and very thought provoking in terms of the future direction we take"

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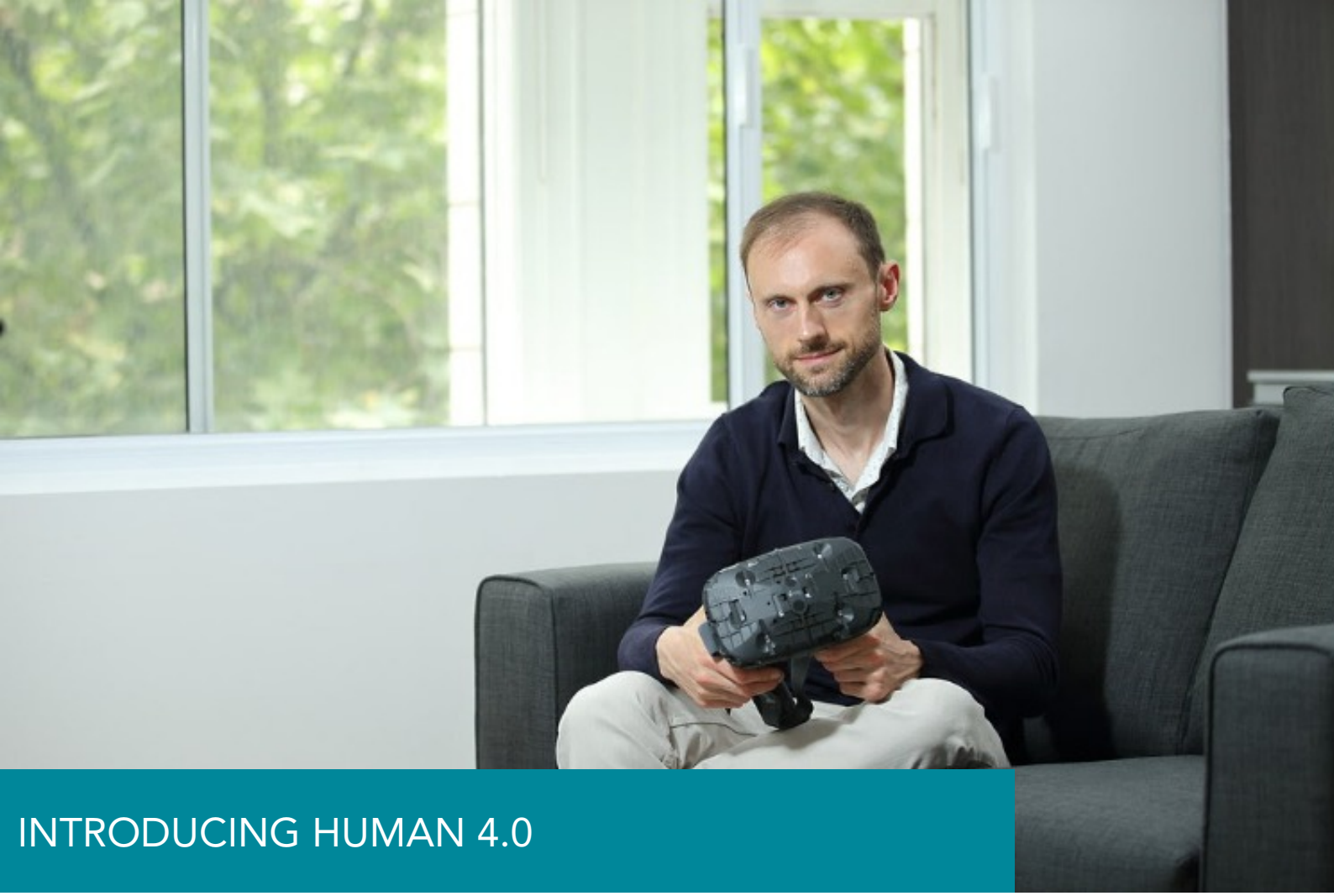
Let's Learn Digital Workshop



INTRODUCING HUMAN 4.0

FOREWARD by XR Consultant Jonathan Tustain

The industrialised world is going through a seismic shift in the way we design, manufacture, service, train, market and consume goods.

Increasingly our lives will be influenced by the cross integration of new technologies, such as IoT, 5G, machine learning, automation, big data and XR, as we head fast into the 'Fourth Industrial Revolution'. Such technologies are being touted as tools to not only make our lives better, but as solutions to serious problems facing global business.

There is a rapid obsolescence of know how, an ageing population and industrial equipment, systems and supply chains are becoming ever more complex.

Productivity is slowing down across most advanced countries and the UK is one of the least productive in Europe. Productivity may have grown 0.9% and 0.7% in the final two quarters of 2017, but that is still a quarter behind countries like France and Germany in terms of output per hour, meaning it takes British workers five days to produce what others achieve in four.

With Brexit around the corner, it will be vital for UK PLC to increase its game, but this is not just a UK issue. In the United States productivity growth averaged just 0.5% per year from 2011 to 2016, compared to 3% from 1996 to 2005, according to the Bureau of Labor Statistics.

The Super Worker

A new type of worker is needed - The Super Worker; one with a super computer brain, X-ray vision, photographic memory and the ability to teleport. One that is smarter, less accident prone, more productive and a true multitasker; their skills mimicking the powers possessed by some our favourite super heroes, to work alongside the machines and fill the growing pool of vacancies.

In the US, open vacancies in manufacturing are fast outpacing the supply of qualified candidates. According to a 2015 Deloitte study, there will be an estimated 3.5 million manufacturing jobs available over the next decade, 2 million of which will go unfilled.

Further to that, an Albion Growth Report found the biggest barrier to growth for SME's was finding skilled staff.

Rather than 'dumbing down' workers, these Industry 4.0 technologies have had quite the opposite effect. The demands from businesses and consumers consumers, from same day deliveries to highly personalised services, has driven the requirement of high-wage, high-productivity jobs. If we don't act fast to train and educate people to qualify to take on these exciting new opportunities, these demands won't be met.

The shortage of Science Technology Engineering and Mathematics (STEM) skills in the UK is alarming and there is the additional concern that businesses might not be able to freely access European skills post Brexit, as net migration is already declining.

The number of physicists currently graduating each year is around 3000, massively short of what is required in industries like automotive and aerospace.

Education and apprenticeships can grow the home pool of talent needed, but the results could take 10 to 15 years to make an impact, so technology needs to step in to fast track people to become super workers to remain competitive.

This will require investment in training and skills at a corporate and government level, to make up for the shortfall, as an investment for the future. The good news is the UK government has put Industry 4.0 technologies at the core of its Industrial Strategy White Paper.

Highlights of the white paper include a target of raising R&D investment to 2.4 % of GDP by 2027 and the raise of R&D tax credit to 12%, which is a great initiative for SMEs.

Reviatech

An investment of £725M has been set aside for an Industrial Strategy Challenge Fund and an additional £406m will be invested into STEM education. £176m has also been committed for 5G rollout.

More specifically to XR, the Audience of the Future fund is a pot of £33m that supports companies, businesses, researchers and technologists to develop new immersive experiences.

What is the solution?

The interviews in this report focuses mainly on XR (XR is an umbrella term for virtual, augmented and mixed reality), but it is important to note that XR will be integrated with a range of other technological aids in the workplace.

To summarise, XR will allow workers to better access, understand and utilise the data generated by AI, analytics and smart connected devices, by merging the physical and digital worlds through more natural interfaces.

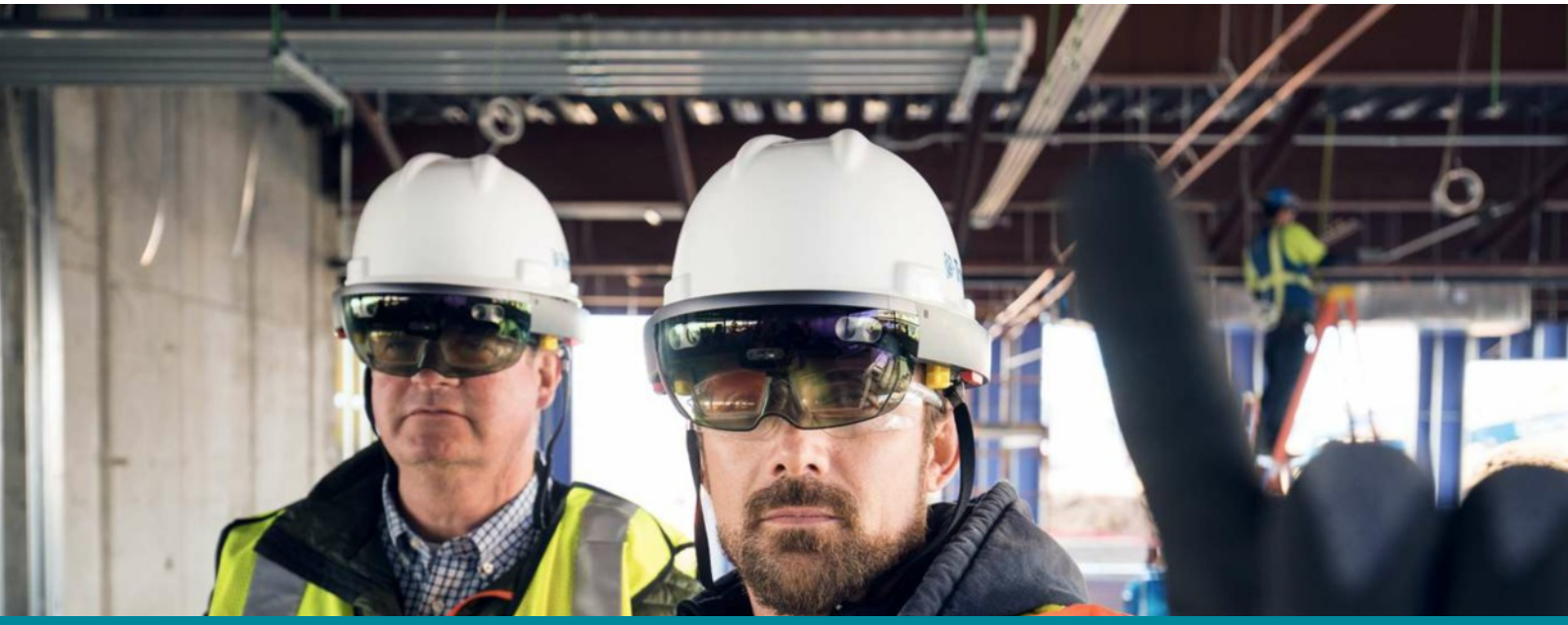
Just like fictional super heroes, workers will be able to accurately absorb information, make decisions, and execute required tasks quickly and efficiently.

Click to download the UK Government Industrial Strategy White Paper

Augmented reality is set to fundamentally change industrial jobs in the next 5 years according to IDC 2017 and research firm Forrester predict that by 2025, 8% of all US workers (2.6 million) will use smart glasses in their jobs. The firm also identified 14 skills and 264 job roles in which smart glasses hold the promise of assisting workers.

The good news is that XR can add enhanced capabilities to existing business processes, provide new and innovative ways for businesses to serve their customers, perform certain processes at a lower cost, and greatly increase worker safety.

Trimble Connect for HoloLens



XR can be introduced even before a worker has started their career, right at the recruitment process. According to an analysis from Oxford Economics, on average the cost to employers of replacing a single member of staff is more than £30,000.

Some surveys show that one-third of new staff quit within six months of starting, so more intelligent recruitment and onboarding could provide large cost savings for a company.

At the pre-selection process, XR can immerse candidates in realistic workplace scenarios to better gage how they would react in the real world. Contented Brothers worked with L'Oreal as part of their graduate recruitment process to identify candidates who were closely aligned with the company's values, through a series of multiple choice 360 degree scenes.

The British Army created four VR experiences based on combat training, adventure training, tank training and parachute training, which were then posted on YouTube 360 and resulted in a 65% increase in applications. Other companies such as Deutsche Bahn and Jet have had similar successes.

Once hired, XR can also make onboarding more fun, with guided virtual tours from the CEO, who can reassure the new recruit that their skills, abilities and potential will be fully leveraged.

According to a 2014 report from the Association for Talent Development (ADP), businesses with at least 100 employees spent roughly $1,200 on training per employee.

Again, XR can massively increase the effectiveness of training. In fact one source states 97% of learning and development professionals see XR as a way to enhance training

L'Oreal VR Graduate Recruitment by Contented Brothers

One example is Walmart who partnered with STRIVR to train more than 140,000 employees in XR, putting them in a virtual Walmart store where they were tasked to handle demanding shoppers and emergency situations. United Rentals instructed their sales reps how to rent construction equipment by placing them in virtual construction sites. STRIVR claimed United Rentals "increased in effectiveness while reducing time spent in that training by 40 percent."

XR can provide quality training at significantly lower cost than traditional methods allowing employees to be trained to perform dangerous tasks without exposure to risks enabling companies to train large numbers of employees in different locations simultaneously.

Gaming elements can be integrated too, to make training fun and accessible, increasing memory recall, either powered by adaptive instruction (through AI) or a remote instructor.

Data collected by day to day use of XR provides very powerful insight and can be used to personalise further training.

PLAY >>>

Japan Airlines at Microsoft Worldwide Partners Event

AR Air Traffic Control Training Concept by SITA and Fracture Reality

The learning outcomes of XR training will be increasingly compliant with xAPI - a new specification for learning technology that makes it possible to collect data about the wide range of experiences a person has, so learning and development professionals can integrate the wealth of data (such as time to complete an action, or how their gaze illustrates their awareness of hazards) into their existing LMS platforms.

I spoke about the issue of poor productivity earlier, and XR is starting to have positive effects here too. Augmented reality can provide step-by-step real time repair instructions and visual guidance hovering over a machine part, guiding a worker through the job, directly in workers' line of sight, while leaving workers' hands free so they can work without interruption, improving their performance at work. This information can be delivered via IoT or even live remote experts.

For example, Newport News Shipbuilding is using AR as an aid to inspect their ships. Rather than engineers having to constantly compare the actual ship with complex 2-D blueprints, using AR they can now see the final design superimposed on the ship, marking for removal steel construction structures that are not part of the finished carrier. Inspection time has been reduced by a massive 96%—from 36 hours to just 90 minutes.

Factories are using smart equipment to generate diagnostics and status reports. This information can be fed to the views of technicians to detect and predict defects, prompting proactive maintenance that may prevent costly downtime.

The super worker will effectively have a powerful computer brain, aided by IoT and 5G cloud services, which will make real time AR and VR cloud processing possible. The super fast connections will allow us to call upon and make sense of real time visual data as and when needed.

PLAY ›››

VR Learning Game by Designing Digitally

PLAY ›››

Upskill and Boeing use Skylight to Reinvent Wire Harness Assembly

Big data is expected to grow exponentially and companies like Kineviz specialize in converting large datasets into XR formats that can be visualised and manipulated in ways that make it easy to understand. Kineviz claim these methods increase efficiency by ten times compared to traditional solutions.

Artificial intelligence and deep learning (which mirrors the functioning of our brains) will further add to the intelligence of training. Feature extraction (image recognition) will eventually do away with markers, and provide contextual information via wearables.

Virtual environments will serve as the backdrops for AI testing, for things like smart cities and autonomous cars, as FiveAI are doing by creating virtual environments as testing grounds for their autonomous vehicles.

Bio-sensor technology, which incorporates technologies including ECG, EEG, EMG, fMRI, GSR and eye tracking, will further gather data from workers, allowing for personalised training and feedback, creating highly human centered work environments.

The "emotion detection and recognition" market size is estimated to grow from USD 6.72 Billion in 2016 to USD 36.07 Billion by 2021.

The Teslasuit Haptic Feedback Suit
Click to watch video

SketchUp Viewer for Microsoft HoloLens

Conclusion

This may all sound a bit dystopian and Big Brother, but with regulations such as GDPR able to provide frameworks for authorised data collection, the benefit for workers such as remote flexible working, faster skills development and promotion, higher job satisfaction, and safer environments, can outweigh any concerns and be a win win for both the employer and the business.

These technologies could provide many (but not all) the solutions to the current issues businesses face, building up a team of super workers to remain competitive and efficient in the changing environment.

To guide you through this journey, I have interviewed 15 of the finest XR experts who have shared their wisdom about how XR can effectively be deployed in an enterprise environment and provide advice as to how to plan your XR strategy.

The Super Worker Panel at Future Tech Now 2018

ACCENTURE EXTENDED REALITY

Accenture is a leading global professional services company providing a range of strategy, consulting, digital, technology & operations services. Their Extended Reality (XR) department supports companies who wish to leverage immersive technologies to improve their productivity and performance. To find out how, I talk to Go-To Market Lead for Accenture XR Nicola Rossa.

accenture.com

What does Accenture do and what is your role within it?

I am the go-to market strategy leader for Extended Reality (XR) in Accenture UK and Ireland. XR is the practice that covers AR, VR and everything in between.

Accenture has currently more than 370 people working globally in the XR practice; a global network of digital strategists, experience designers, developers, 3D modellers and change management specialists, delivering bespoke immersive technologies B2B, B2E and B2C solutions to clients.

In 2018 Accenture expanded its XR footprint of products and services through some strategic acquisitions like Mackevision that, apart from being one of the world leading companies in VFX and CGI, and high-fidelity 3D modelling, has a product catalogue that includes XR product design, review and visualisation solutions.

We also partnered with Upskill, and we are using their augmented reality authoring platform "Skylight" to deliver AR connected worker solutions through our proprietary Accenture Digital Distribution Service. And last but not least, we are also at the forefront of XR customer experience innovation for brands thanks to the recent acquisition of Karmarama, which is one of the most famous branding agencies in the world.

Nicola Rossa
Go-To Market Lead for XR
Accenture

Generally do your clients have a clear vision of what problems XR can solve?

It really depends. Some of our clients, like the ones operating in the automotive, aerospace and defence industries, have a more defined view of what XR can do for their business; clients from other industries are usually less aware with some exceptions.

The real problem though, and this happens across all industries, is that often some of our clients get excited by the XR hype and start building one off PoCs internally, or they buy tactical off-the- shelf XR solutions from XR startups, and they do this without having a clear vision or a strategy on how to expand and scale those solutions to provide real transformational value to their enterprise, accurately track the ROI, or create a cost-effective pipeline of immersive products avoiding massive duplication of costs.

For Accenture it is key to assist our clients to understand their level of maturity in the different parts of the value chain, for example in analytics, customer experience, 3D asset pipeline, and so on. Basically, to understand how mature and "ready" they are to embrace immersive technologies.

Many companies would love to use XR immediately but have some major problems that need to be prioritised and solved before being able to be fluent in the immersive technologies space. In Accenture we assist those companies to understand their level of maturity and we help them to grow where needed.

We use maturity assessment frameworks specific for XR to create, not only meaningful use cases, but also real XR technology roadmaps, with GAP analysis, timeline for implementation, and sounding value cases. Once we have a strategy planned we develop the solution with the right software, we distribute the solution to the right hardware, and we deploy it, usually running a soft launch with a limited number of users, to analyse the impact of the XR solution towards KPI's pre-defined during the co-creation phase, and finally we help our clients to scale up the solution throughout their enterprise using our Accenture change management services.

Is the technology mature enough right now to be beyond anything experimental?

I think the current level of XR technology is mature enough to provide great value for enterprise. We are seeing a lot of interest from our clients in using XR for enterprise transformation, and the ROI metrics of our deliveries are pretty clear about the value of immersive for technologies for the B2E and B2B market. The situation for consumer products is pretty different, and this is mainly due to the high cost of dedicated XR devices but also related to the user experience factor.

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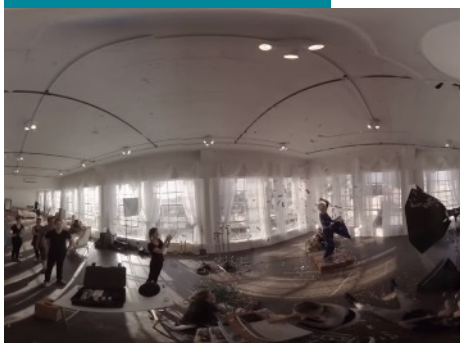

Accenture and Specular Theory Create Interactive Vcommerce Experience "Behind The Style"

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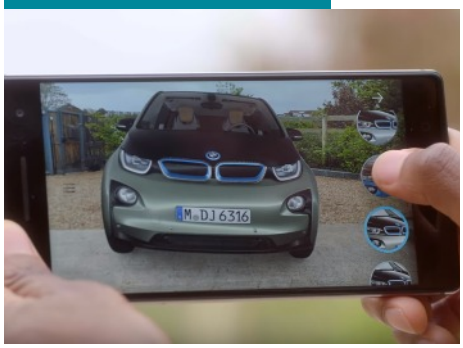

Augmented Reality BMW iVisualiser App for the i3 and i8 Series

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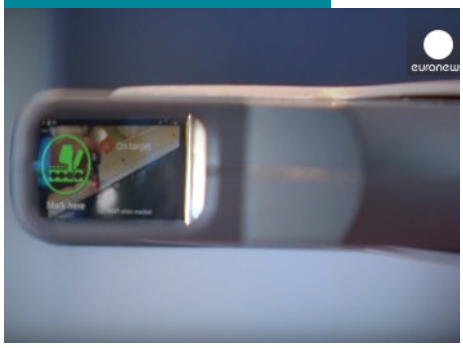


How Is Wearable Technology Helping To Build More Aircrafts?

If you remember, the first wave mobile applications were clunky, not very useful or particularly smart. Most of them were mainly simple ports of desktop applications not optimised for mobile. They were not taking full advantage of all the unique features and functionalities that mobile hardware could provide.

At the moment we are in a similar starter era for XR, however the ergonomics of the devices and usability of applications are slowly but steadily improving; devices are getting cheaper, smaller and more sophisticated.

I believe that all of this will come together along with other services like social features, cognitive, cloud and analytics, to provide the same level of engagement and transformational value that mobile applications are delivering to our everyday lives now.

Let's keep in mind that 2018 is the year of mobile platforms like ARKit and ARCore. They are becoming pivotal parts of mobile hardware companies' strategy. We've all seen the latest Google I/O. Also, self-contained devices like the Oculus Go, the Vive Focus and the Lenovo Mirage have already started lowering the entry point to the technology, providing pretty decent experiences at an affordable price.

In 2019 we will see a new breed of high quality AR self-contained glasses launched on the market, like the Microsoft Hololens 2.0, Magic Leap and possibly the highly rumoured Google AR HMD. This will drive the birth of new guidelines for the XR user experience that will be eventually be poured into ARKit and ARCore mobile based products, making mobile AR experiences more usable, useful and meaningful.

The HTV Vive Focus

By 2020, cloud computing along with 5G will play a pivotal role in the acceleration of XR market penetration. The ability to render XR in the cloud coupled with high bandwidth - low latency 5G networks, will enable a new breed of inexpensive "terminal" like devices to be launched. Any device equipped with a 5G modem, inside out positional sensors, a screen and highly optimised audio-video codec chips, to compress and decompress video rendered in the cloud; will be able to deliver high quality XR experiences to users with a motion to photon latency of just few milliseconds, at a fraction of the dedicated XR hardware cost.

A giant like Huawei have already announced a partnership with TPCAST to deliver 5G cloud rendered VR; while Amazon, that hasn't announced anything in that space yet, now has Sumerian which is an AR and VR 3D engine fully integrated with Amazon AWS; hence a move towards cloud rendered XR would make sense.

These three milestones are happening right now and in the immediate future, and they will potentially kickstart the XR inflation point that will drive mass market adoption, but the technologies involved are evolving very quickly.

VCs and investment firms are still funding many start-ups that are "experimenting" with XR, most of them will crash and burn spectacularly but others will emerge creating new breeds of products and use cases that we probably can't even imagine at the moment.

The bottom line is that nobody knows how the industry is going to look in five years from now. The fact is that it is evolving, exactly like the mobile industry before June 2007 when the iPhone kickstarted the smartphone that dramatically changed every aspect of our lives.

Changing the car buying game

What impact will analytics have for XR?

Apps like Uber or Shazam are all powered by analytics. They all have machine learning algorithms running in the background. Having an app that is just standalone self-contained service is not enough these days. The real magic happens when an app gets smarter as you use it, and provides a feedback loop of contextual information. This will make the output of the application more and more useful the more you use, also opening up new business opportunities.

In the future, complex behavioural analytics systems will be implemented into XR apps to understand user behaviour. This will help improve the user experience over time through new releases, but also provide a real contextual experience perfectly tailor made for the “cognitive setup” and “mood” of the user in order to make it comfortable, memorable, useful, meaningful, and of course enjoyable.

ADMIX

With the virtual reality home market being relatively small in comparison to the traditional home console market, very often the download revenues do not cover the development costs. Admix hope to change that, by offering developers advertising revenue via contextual non-obtrusive adverts that we are familiar with in the real world, as Admix founder Samuel Huber explains.

admix.in

Can you summarise who Admix are and what you do?

Admix is a monetisation platform for VR/AR. Web or mobile advertising doesn't work for VR/AR, so we want to build the right kind of advertising. We believe the future of advertising are non-intrusive product placements - sponsored 2D or 3D objects that developers can use as building blocks of their environment.

Today, we work with 130 VR/AR apps, from small indie developers to giants like High Fidelity or Somnium Space. Using our free plugin for Unity or Unreal, developers identify areas of their apps they want to sell to advertisers. We then sell this inventory programmatically to large ad platforms such as Yahoo or AOL, getting exposure to thousands of advertisers, guaranteeing instant revenue for our developers.

Samuel Huber
Founder
Admix

What are the potential sums of money a VR developer can make by incorporating Admix ads into their experiences?

Revenue is directly linked to the user base, and their engagement. For example, we work with an app that just launched and growing fast to 3500 hours of play per month. Because they positioned their placements in a clever way, they are able to generate 420,000 impressions per month, which at a $20 CPM equates to $6,500 in monthly revenue payable to them. It's a huge payout for an early studio that just launched. CPM's are high because of the novelty and restricted inventory supply.

How does it operate?

Right now we operate on CPM - the main reason is that we will never take users away from the experience. Interactions with the ads have to happen within the experience to maintain the immersion.

In VR/AR, gaze is the new click. By staring at a placement, you can trigger further action, but it will never take you to a different page or app. Like we say internally, it's VR first, ads second. We are currently working on developing more advanced pricing models beyond CPM.

Would it be financially feasible for a developer to make a game free, and fund it entirely by Admix?

Our pricing model is a direct relation to the number of users and retention (how many served ads per people per month). Developers can change position of the placements in the most popular areas of the app, as reported by early analytics, to maximise their revenue.

To break even on £100k over 6 months, you'd need £16.6k monthly revenue, which can be achieved with about 20k monthly playing hours. Based on the app engagement, it could range from 10k to 100k users. Luckily, engagement is generally quite high in VR.

Today, the global VR user base is still small, but our objective is to build a sound business model for VR developers so they can rely purely on advertising.

What assets are available?

We support 3 formats: display (banners), video (with spatial audio) and 3D assets.

How do developers obtain and integrate the assets?

3D assets are the most exciting format, but the most scarce at the moment since advertisers do not have 3D assets of their products. We are developing solutions to turn products into an ad unit seamlessly, using 3D scanning technology.

Our long term vision is to build a database of 3D products, sponsored by brands, for developers to use as the building blocks of their VR/AR experiences.

Are you planning to offer personalised adverts?

Working programatically with large ad networks, we can in theory do that. But we believe that in VR, contextual data will be a lot more important than personal data. This is because a lot of VR experiences will be shared - therefore, all users need to see the same ad, for the sake of consistency. So our focus is on giving developers the right tools to categorise their content to understand its context rather than intruding on users' privacy.

Could you move to a click through model/instant purchase and what issues need to be solved before that can happen? (so ultimately you can purchase without taking a headset off)

Yes, we want to make our ads shopable, in a move away from CPM. The idea would be to have a different level of engagement, from simple gaze all the way to buying the product. Using the controllers or with a prolonged gaze on an advert, users could trigger a payment gateway to buy the related product. We are currently exploring the best way to make checkout as easy as possible in VR/AR.

Can Admix do 'View-to-Play' ?(for example, watch a 30 second sequence before going to the next level)

Yes, developers can do this using our video ads. However, we do not believe this is the best way to advertise. Instead, we will be investing in building immersive ads where you can play a demo version of the VR app before buying it. This is tied to the Oasis, our proprietary technology enabling users to teleport between VR apps.

Is there any current research to back up the effectiveness of XR advertising in comparison to other forms of advertising ? (such as intention-to-buy, follow ups, brand memory recall etc)

We have done early measurement of engagement (active consumption of the ad) and brand recall (% users remembering the ad after an experience). The numbers are through the roof: 24% engagement (1% on the web) and 66% brand recall. This is because immersive advertising doesn't compete for user's attention like classic advertising does. Instead, it is integrated within the environment, is part of the discovery process, and therefore, we are not trying to avoid it. When the ads are relevant (which is our focus) they can actually contribute to make the experience more real.

Can your technology be used for non advertising applications such as in-store shopper analytics?

We did build a gaze tracking technology, but purely to validate ad impressions, so for those applications, you'd be better off using a tool like Cognitive VR, ObserVR or Retinad which has been built specifically for this use case.

ADVANCED MANUFACTURING RESEARCH CENTRE

The University of Sheffield Advanced Manufacturing Research Centre with Boeing helps manufacturers of any size to become more competitive by introducing advanced techniques, technologies and processes, many of those involve the use of mixed reality. I talk to IMG Theme Lead Christopher Freeman to explore how MR can play a role in digital manufacturing and contribute to the UK's competitiveness.

amrc.co.uk

What is the AMRC and what do you do there?

The University of Sheffield Advanced Manufacturing Research Centre with Boeing (AMRC) helps manufacturers of any size to become more competitive by introducing advanced techniques, technologies and processes. We specialise in carrying out world-leading research into advanced machining, manufacturing and materials, which is of practical use to industry. Our 100-plus industrial partners range from global giants like Boeing, Rolls-Royce, BAE Systems and Airbus to small companies. Businesses can work with us on a one-off project, or join us as a member for long-term collaboration.

The AMRC has always been at the cutting edge of technology. With a background in machining, robotics and automation, the AMRC is now embarking on digital transformation programmes. Working with companies large and small, helping them to understand how they engage with 4th Industrial Revolution (4IR) subject matters such as machine learning, artificial intelligence, internet of things, and advanced visualisation.

As part of Factory 2050 I lead an exceptionally talented team delivering AMRC Factory 2050's Digital Manufacturing capability, incorporating Manufacturing Informatics and Digitally Assisted Assembly, and developing work streams on the applied use of AR / VR, AI and IoT technologies.

Christopher Freeman
IMG Theme Lead
Digital Manufacturing / AMRC

How can immersive technologies fit within digital manufacturing?

The AMRC with the Boeing Factory 2050 digital manufacturing team recognises that the manufacturing environment of the future will be driven by a network of interconnected data systems all working towards delivering intelligent automation as part of the 4IR. In this information rich environment, the collection, exploitation and reuse of data is critical in order to maximise the knowledge you garner from it. Alongside enterprise IoT and informatics methodologies, mobile, immersive and augmented information are recognised by Factory 2050 as being central to UK PLC's 4IR manufacturing strategy. In line with Just-In-Time methodologies, immersive technologies can act as the conduit that enables operator, machine and system, to communicate more naturally, creating more advanced human / machine interfaces. As part of a suite of advanced visualisation technologies, immersive technologies can become the primary data delivery portals by which information can be delivered to the end user.

How ready is enterprise for this technology?

The AMRC with the Boeing Factory 2050 digital manufacturing team is currently engaged in multiple advanced visualisation projects covering AR, VR, MR, mobile and wearable technologies. They have programmes running with organisations which range in size from local SME's through to global OEM's. The creation of proof of concept applications and demonstrator systems, tested at scale, in real world scenarios, help move the technology applications towards adoption.

There are three pillars to deployment - *technology*, *integration* and *adoption* and each brings their own challenges.

Technology is all about the kit, and whilst VR has made huge strides in the past 5 years, becoming more affordable and accessible, at present the hardware to enable AR and MR applications is just not suitable for use in manufacturing applications. There are use cases and examples that demonstrate where the technology could add huge value but until the devices are suitably rugged and durable, there will be a huge barrier to widespread deployment.

Integration is where a lot of research is currently being invested - understanding how to fuse technologies together, recognising the importance of data integrity and creating robust methods for the handling, translation, and optimistaion of data for immersive applications. As well as the 'trust in data' aspect, one of the biggest challenges in this regard also concerns how to approach legacy solutions, fusing the new 4IR technologies with existing IT infrastructures.

Many current applications are recognised as being point solutions, widely used to fix a problem or implement a new application quickly, which have their place and are of value, but limit the true potential of integrated immersive applications.

The final aspect looks at adoption, which is the human response to the deployment which recognises the importance of human factors, and not just ergonomics and usability, but also the psychological and socio response's to the technology. Industry is littered with examples of companies putting technology out there that has not been suitably tested with the operators, causing applications to fail at the first hurdle. With immersive technologies being so human orientated, it's critical that interactions are as natural and intuitive as possible.

The creation of both stand alone and proof of concept immersive applications help identify measurable value, and allow investors to better understand and quantify the opportunity, but considering the above, much more work is needed to break down those barriers before enterprise can broadly adopt. This is where the team at Factory 2050 are working to overcome those barriers and are helping to de-risk an organisation's first engagement with the disruptive technology.

Has the UK fully embarked on the fourth industrial revolution?

Depending on the sector there are different levels of engagement. Some industries are really high on the fourth industrial revolution spectrum. For example, the most advanced aero engine suppliers know at any time where their plane engines are in the sky. They are getting live readouts from those engines 30,000 feet in the air, embracing 4IR technologies such as IoT and analytics, embracing 4IR methods such as Just-In-Time maintenance, but they have been doing this for a number of years, way before the 4IR term was coined.

In November 2003, Jim Pinto in the Automation World publication discussed the following:

"Imagine every piece of equipment monitoring its own operation, including uptime, downtime, dwell-time, energy usage, malfunction and repair-time. Usage can then be reported with an Internet connection. … Technologies exist right now that can do that in order to help end-users manage their assets."

So the fundamental technologies in 4IR are nothing new. The challenge comes when looking to address the broader adoption of the technology. A number of organisations will have pockets of very advanced applications and systems, well within the 4IR spectrum, but alongside that are processes that are yet to be transitioned to industry 3, let alone 4.

This issue is particularly pertinent in supply chains. It is all very well focusing on the OEM scale organisations but the majority of UK manufacturing capability sits within the SME dominated supply chain. For UK manufacturing PLC to truly reap the benefits of 4IR, all actors need to be on the same journey, and it is at this SME level where the barriers are most pertinent, and greatest support is required.

The primary driver should be our desire to retain our position in the global market. People come to the UK because of our excellence. They don't come here because we are the cheapest or most cost effective. The problem we are seeing, especially from the tiger economies, is the amount they are reinvesting of GDP into innovation is around 4-5%. Compare that to the UK that reinvests about 1.5% of GDP back into innovation. This is going to create a market that is very difficult to compete in because although we have that level of excellence, at that level of investment, it is not going to take them long to catch up.

We really need to be more productive, to drive down costs and become more competitive, so the headline OEM's we have in this country will stay here.

The UK manufacturing output as a % of GDP is very poor when compared against other developed nations. Digital manufacturing will assist us. The Made Smarter Review sets out how UK manufacturing can be transformed through the adoption of industrial digital technology (IDT). It found that over 10 years, industrial digitalisation could boost UK manufacturing by £455bn, increasing sector growth up to 3% per year.

This execution of this will enable UK manufacturing PLC to fully embrace 4IR.

FUTURE VISUAL

Brighton based Future Visual specialise in VR training, retail and behaviour change. They created SiP - the Shopping & Immersion Platform which can allow consumers to experience a retailer's brand anywhere in the world. With so many physical stores closing, I ask Future Visual founder Tim Fleming how the medium can reinvigorate the high street.

FUTURE VISUAL

futurevisual.com

What has Future Visual done in the retail space?

When we started working with John Lewis at the beginning of 2016, they were planning the launch of their "Design Project" range. This was the first furniture range that had been developed entirely using John Lewis in-house design talent.

Up until that point John Lewis had used 3rd party designed products. This internally based initiative allowed us to work closely with all the various teams including, design, marketing, research and of course the partners who would be customer facing.

We quickly established that there was a real business problem that we could solve here and that was giving access to the full range of products in all the various material configurations. As the Design Project was new ,there was not a full range of products available in-store for partners to demonstrate to customers, but by using VR we could fix that and provide the full range of product options in multiple locations.

We used our retail product SiP to bring the retail experience to life in VR.

Tim Fleming
Founder
Future Visual

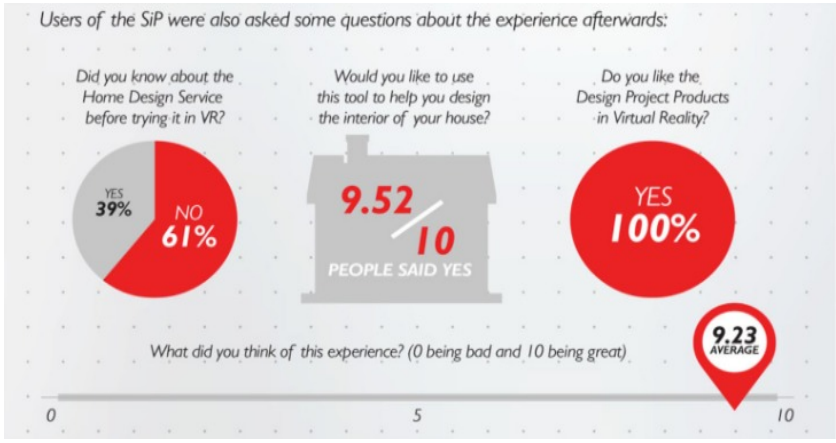
Every day we hear about another retailer closing down many of their physical stores. With online taking over, how can XR or SiP encourage people to return to the stores?

There are no hard and fast rules without experimentation. At Future Visual we think there is a real opportunity for retailers to re-think their physical space model. Traditionally if retailers wanted to create a big brand experience, they fall back to their default (but not working) thinking of "we need a big space and we need to do a flagship store" - the way they have always done.

Retailers are being disrupted but they don't know what to do. We think there is an opportunity for them to create physical locations that provide a "peak brand experience" in a third space environment - a much smaller physical footprint with 4 VR headsets, 2-3 staff and some product samples.

In 600 square feet you could create a really special retail experience.

John Lewis Home Design Experience



Are existing 3D assets transferable to XR presentation?

I think the assets your mentioning here are for the purposes of 2D presentation, which will need to be high-poly models. What is interesting is the digital lifecycle of a product, from .STL or CAD for the manufacturing into high-resolution FBX for print design or marketing animations and then into a low poly real-time assets which can then be used for either high-powered room scale VR systems or single object use for mobile AR.

Are you working on closer integration between viewing and manipulating products in XR, to instant purchase?

Last year we ran a successful test integration between our retail shopping experience and Magento where we successfully hooked up our in-VR purchases to the Magento platform (which has just been purchased by Adobe). Of deeper interest to us is cross-reality ownership of objects which means objects that are highlighted or identified whilst using one piece of XR tech such as VR are then made available to the user when they use another device e.g AR on their mobile. This means you can curate the 3D objects you are interested in and carry them across devices.

What has Future Visual done in the training space?

We have built award winning training products for the International Air Transport Association, which have been used to accelerate the competency of high-risk high-value roles in aviation ground crew.

These behaviour change projects have been localised into Mandarin and been used in China and HK as well as across Europe. We'd love to tell you more about them but we can't!

How can XR training be closely integrated with AI and machine learning?

There is huge scope for developing AI within VR and immersive environments. A significant amount of R&D will be required as we move from existing patterns of game logic to actual reactive and instructional AI. In terms of the roadmap at Future Visual, we will likely allocate resources to the development of AI for natural language processing as a priority.

Is B2B XR the biggest growth area?

We see real growth in the B2B sector because the technology is ready to solve problems. By providing access to situations and scenarios that are either physically impossible or prohibitively expensive to re-create VR can be a real enabler of operational and training improvements thereby creating value and simultaneously providing new solutions to difficult problems.

So yes we are think B2B and particularly high-risk high-value training are the real opportunities.

IATA / Ramp VR

THE NATIONAL COLLEGE OF HIGH SPEED RAIL

The National College of High Speed Rail has been set up to provide training and work experience to learners in all aspects of high speed rail, from engineering to innovation and design. Having partnered with Microsoft, the college is using mixed reality as part of its approach to train a new generation of apprentices. To explore this further, I speak to Head of ICT & Facilities Daryl Unitt.

HIGH SPEED RAIL
The National College

nchsr.ac.uk

What is the goal of the High Speed Rail National College and what is your role within it?

I joined August 2017 and my role is to facilitate and maximise the investment in the IT infrastructure both for the faculty and for the learning environment.

The aim of the college is to provide a skilled workforce for High Speed Rail 2 which is currently Europe's largest civil engineering project. We have identified a skills gap and there is a desire to developed a young skilled workforce to supply this industry.

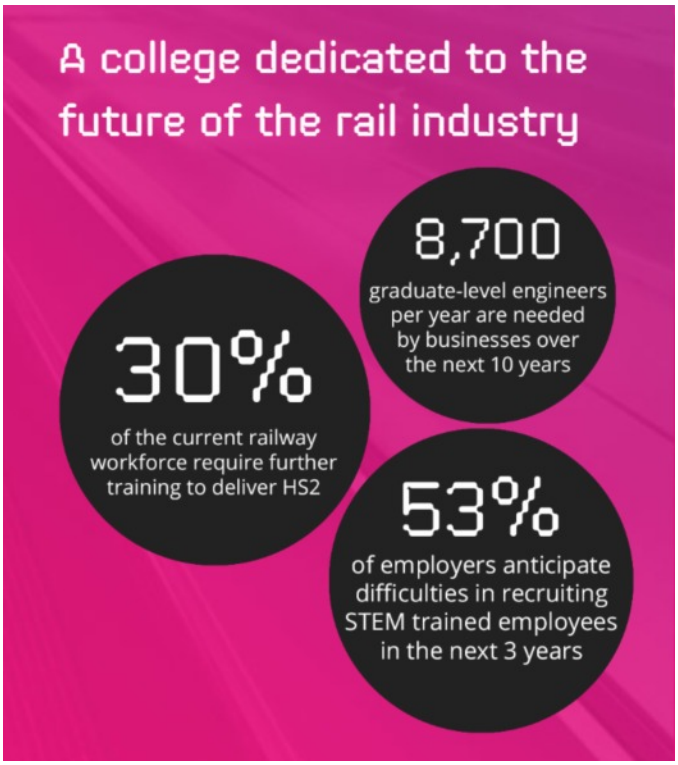
One of our objectives is to be a disruptive brand new FE college. Our Chief Executive Clair Mowbray is driven to put technology at the heart of the delivery of our education and is the reason for investing so heavily in a VR and AR infrastructure, partnering with Microsoft for our AR provision.

Daryl Unitt
Head of ICT & Facilities
National College of High Speed Rail

We have got about 17 Hololens headsets across the two campuses and 30 studios. We are working with excellent developers for the content side of things and we are always trying to deliver education differently.

If we can create a High Speed Rail gold standard qualification that is globally recognised, we can start to get a bit more national pride back. That has got to be a real advantage to the country and the industry. The learners would also have a whole new global job market available to them.

What is your concern about the much publicised engineering skills shortages?



Within our industry the majority of the skilled workforce are over 45. There is a diminishing appeal to work in the rail industry. The automotive and aviation industries are seen as 'sexier' and taking the limited number of skilled workers available in the UK.

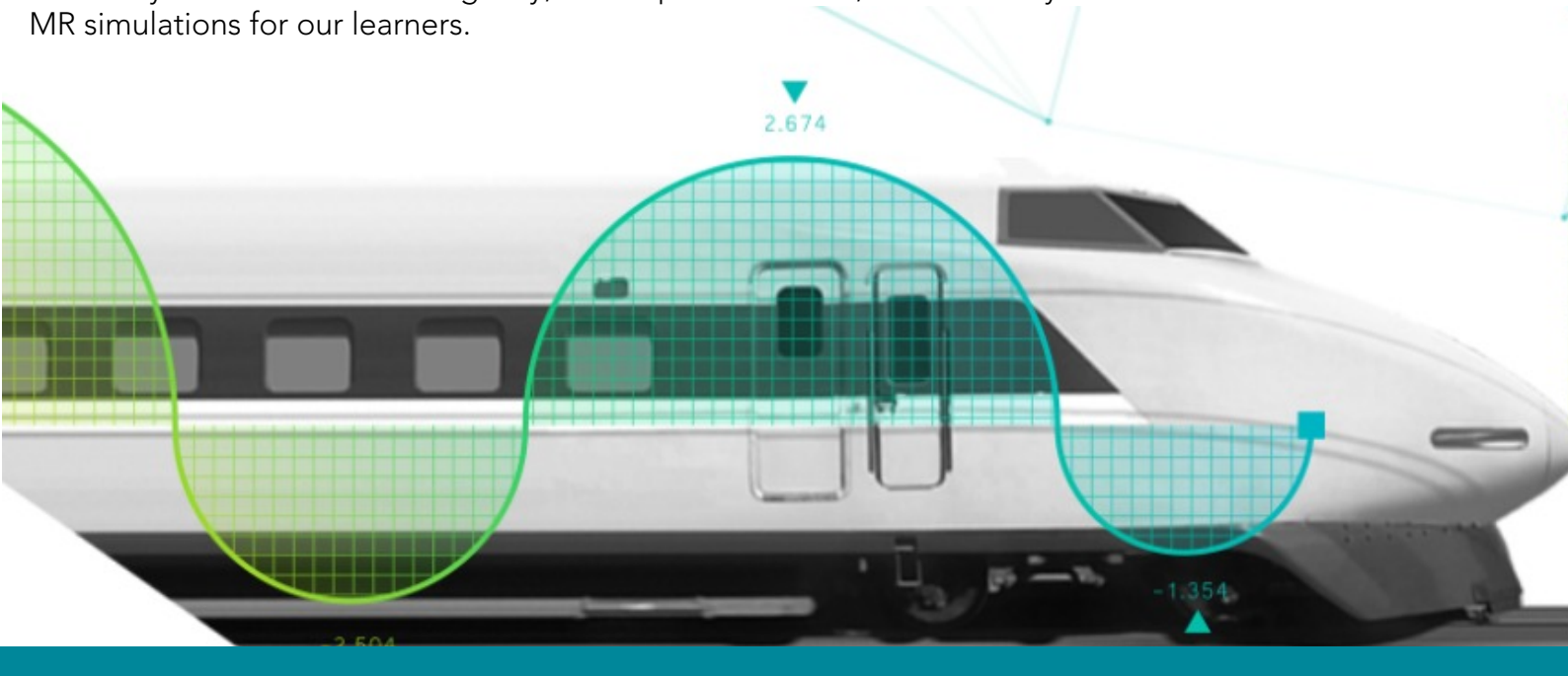
This skills shortfall is what motivated the rail industry to invest heavily in the college with kit, equipment and resources.

There is a public perception that the rail industry is not cutting edge and yet when you are dealing with the requirements of high speed rail, when you have trains running in excess of 200 MPH, the various engineering skills required are vastly different to the traditional rail industry. You are dealing with an architecture over 100 years old, with all the issues of non standards compliance across all the different rail companies with different tolerances, rail platform heights etc. This has driven the industry to invest in the college and curriculum to build this young dynamic workforce exposed to this cutting edge tech, including immersive technology, so when they go into the industry they are competent at using a Hololens to review BIM images, or cave environments to manipulate a design before taking it to an additive manufacturing process.

We want to make this technology the norm. If I took away Hololens headsets from Jaguar Land Rover, there would be an uproar, so we need to equally make this technology embedded in the rail industry to make it more appealing and effective for the millennials coming into this, who are a finite resource.

How are you using immersive technology to improve engineering safety?

Obviously in an industry such as High Speed Rail, there are concerns such as safety, especially for apprentices. With any civil engineering project there is a statistic that predicts how many injuries or fatalities will happen depending on the size of the project. You can imagine that it is not ideal to have apprentices exposed to dangerous environments such as heavy machinery and high voltage currents. It is not possible to test and build all environments, such as an £18 million mock control room, to test people what they would do in an emergency, on a repeatable level, so that is why we are so keen to use VR and MR simulations for our learners.



We are working with interaction with bogeys, the real system for our rolling stock. They weigh many tonnes, so we envisage using AR to disassemble and understand the construction of them. You can't 'explode' a 13 tonne product down to its individual nuts and bolts so using AR you can safely expose learners to the inner workings without heavy lifting and risk.

Are the high initial costs justifiable?

I think with anything related to Industry 4.0, if you are an early adopter you have increased costs, but if it gets you ahead of your competitors you can justify the initial investment. The content is not cheap to develop so it is important to work with the right partners who are willing to take that journey with you.

You have to make sure the content has a legitimate benefit and offers evidence based learning outcomes. At the college we are very lucky that everyone is onboard and has the vision to see the bigger picture.

HOLOSPHERE VR

Holosphere VR is a Birmingham based immersive content production company who's ethos is to make a positive impact. I recently visited their impressive studio to experience a handful of some of their experiences, including a 4D projection mapping system. Based in the heart of the UK's manufacturing scene, I spoke to Commercial Director Larry Brangwyn to learn how they plan to make a positive impact on local enterprise.

holosphere.co.uk

Who are Holosphere VR and what do you do?

Holosphere VR is a Birmingham-based VR Agency. We're a team of creative artists and pioneering technologists who feel passionately about the potential virtual reality has to promote positive change in the world.

We craft world-class, immersive experiences that make a positive impact, and we partner with clients of any size to achieve stunning results.

One of our dreams is to transform Birmingham into a centre of excellence for VR in the UK – the first place that comes to mind when you think about virtual reality and XR jobs.

Larry Brangwyn
Commercial Director
Holosphere VR

How do you envisage your tools/experience being able to enhance the productivity of manufacturers?

For manufacturers making use of XR, there are almost endless options for refining the process and making it more collaborative. The research and prototyping phases can be conducted partially or entirely in virtual reality. This allows quicker iteration and a more collaborative approach to design, not to mention a way to get more accurate feedback from investors and potential customers far earlier than might otherwise be possible. Engagement is all about telling the story of how products come together, something made even easier with XR. The efficiency of physical parts of the manufacturing process can also be enhanced through augmentation, for example projection mapping can highlight the correct components and parts of a product in sequence, reducing the need for extensive and time consuming training.

In your R&D, your prominent work has been in the wellbeing and medical field, using VR to alleviate physical symptoms and change perspectives. Can you go into more detail about how XR can improve the health of people?

XR has potential to not only to directly improve people's health, but to have a far wider impact on the healthcare sector as a whole.

Our recent work with Dr Sheila Popert, Medical Director at St Giles Hospice, has been credited with alleviating the symptoms of chronic pain sufferers in a palliative care environment. The virtual Forest of Serenity, narrated by Sir David Attenborough, was an exercise in using immersive technology to help patients suspend their disbelief and engage more successfully in guided mediation for pain relief.

Research already suggests that meditation and the visualisation of natural, calming environments can have a positive impact on your stress levels and overall mental health. VR for instance simply makes it easier for some people to visualise, and therefore the practice more effective. This opens up uses for VR in the context of exposure therapy, either to certain types of irrational fear or to calm and prepare patients for upcoming procedures.

In terms of people who are not necessarily ill, Holosphere VR is experimenting with the concept of introducing biofeedback to VR experiences - for example the ability to measure heartbeat and represent it in a virtual environment, providing users a better way to understand and control their body. This could lead to even more effective management of stress and for some, a path to mindfulness and overall wellbeing.

Finally, in the wider context of the healthcare sector, more experimental implementations of XR technology are already assisting medical professionals in training for new procedures, sharing knowledge and conducting remote surgeries. The possibilities are growing day by day.

Another area you have focused on is immersive education. Can you extend on this and explain how XR can be used to bring tangible benefits to learning, training, and education?

It's well known that people learn in different ways. Specifically, kinaesthetic learners retain information better from first-hand or physical experience as opposed to watching or listening to presentations or demonstrations. XR is perfect for these individuals as it offers a way to observe and interact which is more visceral to them.

We already see early examples of shared group experiences that make learning easier, in the form of Google Expeditions - a system that allows a teacher to take a whole class on a virtual, interactive field trip using existing photospheres such as Google Images and Street View.

Forest of Serenity Relaxation Experience

We believe that out-of-home, shared group experiences are one of the keys to the future of XR, and will only get more compelling as we add the ability to travel to inaccessible places, or even times in history.

VR specifically has also been shown to be really helpful in building a sense of empathy - being able to literally see something from the point of view of another person giving a user unprecedented perspective, something that can be difficult to simply explain.

Can you go into more detail about your real time projection mapping technology and what (mainly B2B) applications this can be used for?

Holosphere VR's projection mapping technology is designed to calculate in real-time, based on the position of physical objects and a theoretically unlimited number of projectors, the best way to map a virtual object to its physical counterpart.

This can be used to change, decorate and animate objects for display purposes. Some of the major applications include; product demos and configurators, real-time manufacturing collaboration, PR and brand engagement events, interior design and performance pieces.

How can XR be of a benefit to retailers and can you share what you did for GAME (and what results came out of it?)

GAME and their agency partners used our VR and 3D art capabilities to preview different options for the design and layout of their flagship retail store. This provided a more visceral experience taking into account not just the visual design of elements, but how they work together and feel in different lights, at different times of day, and how sound might work in the space. This made the process of making important decisions much easier and improved engagement with key stakeholders.

As the world of usability crosses naturally into the space, it also means that retailers can test different store and product layouts in VR combined with eye tracking technology, see which options are the most well-liked and effective, and replicate this in the real spaces. This can save a lot of time and expense, and makes iteration of ideas more rapid.

GAME Store Design

INNOACTIVE

Munich-based start-up Innoactive develops virtual, augmented and mixed reality enterprise software for automotive, manufacturing, pharmaceutical and medical industry. Recently, car giant Volkswagen committed to deploying their Innoactive Hub enterprise application platform to train over 10,000 staff. Innoactive CEO Daniel Seidl explains why VR can deliver better training results for less investment.

Innoactive®

innoactive.de

Are you finding businesses are becoming more open minded to using VR?

Somehow with VR, it seems to be an "enterprise first" adoption. Investment in the hardware and software content is required, and large corporations benefit from good economies of scale. Interestingly, it is the opposite of what happened with cloud technologies, which were"consumer first" and were quickly adopted by from SME's then later by large enterprises.

There are first movers out there, driven by the innovation or digitalisation departments, who are specifically evaluating and investing in VR, exploring how it will affect their business.

Have you worked in the retail space?

We have worked with Europe's largest consumer electronics retail company MediaMarktSaturn. We created a virtual shop tour guided by an avatar using the Microsoft HoloLens. The main objective was to enrich the in-store shopping experience with holographic content. What we learned is that people really like Paula, the little Avatar who guides them through the store. We plan to use such Avatars whenever possible, to facilitate learning and onboarding of new employees.

Daniel Seidl
CEO and Founder of
Innoactive

Will ARKit and ARCore speed up adoption in industry?

Cost is an issue, so ARKit and ARCore are an attractive prospect as the hardware is already there. I think that every phone will feature ARKit and ARCore in the next three years so that's why we are really keen to let our customers use this technology now and get inspired.

However, what enterprise really needs for ARKit and ARCore to take off, especially in workplace training, is for Apple and Google to add a persistence layer, that is the ability to link virtual assets to objects in the real world and save to that location for later recall, like the Hololens does. Once this is updated in their SDK's, real enterprise use is going to skyrocket.*

What are the barriers for uptake of XR in enterprise?

Each organisation has to estimate which use-case is right for the time and which needs to wait for the technology to develop. The headsets are there but the real issue is content creation. A lot of 3D content exists already – stored in various IT systems. Many companies are working on getting this content into VR, including both the big engines, Unity and Unreal. We are confident that this will be solved in the near future to make this content usable in VR.

We are also looking at how we can address the cost of content creation. Innoactive Workspaces is built using the Innoactive SDK for Unity3D – which is also available to our customers and partners to create collaborative, enterprise-grade VR simulations more affordably. When enterprises decide to use Unity3D for creating a training simulation, they pay for developer seats only, not for each user getting trained. So they can use that simulation on a huge scale This enables a huge scale or use. For example, our customer Volkswagen recently announced it will train 10,000 users with the system this year.

What evidence is there that immersive technology can boost productivity?

I will illustrate the current problem faced by the automotive industry which is going through big development changes with electric and autonomous vehicles:

A lot of cars are having to be redesigned, which leads to a huge need to redesign the manufacturing workflows. Today, car makers conduct most of their planning workshops literally with cardboard and duct tape. Once the production line has been planned, everyone working in the space has to be qualified for the new workflows – which is currently still dependent on the physical workplace. The result is that travel and prototyping costs rise significantly. The solution to this is doing both workspace improvement and qualification in Virtual Reality. Our tool Innoactive Workspaces can create a virtual workspace and validate the workflow in terms of optimum efficiency – both for process improvement and the health of the worker.

- Since the interview, Apple has announced support for persistent content in ARKit.

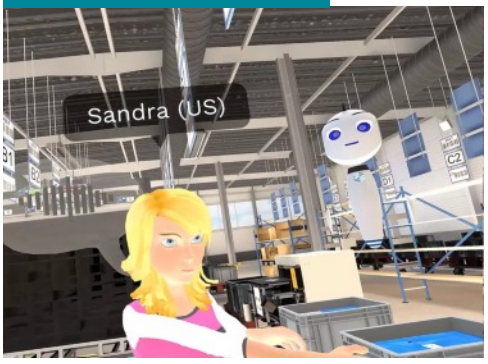
PLAY ›››

Volkswagen Group Uses Innoactive Hub for Global VR Training Rollout with HTC Vive

PLAY ›››

Virtual SATURN – The Virtual Shopping Experience Based on the Innoactive Hub

PLAY ›››



Innoactive Workspaces – Plan, Simulate and Train Industrial Workspaces in VR

Users can access and download VR training content in VR – using Innoactive Hub

This provides a massive saving in costs – both building the prototypes virtually and eliminating the travel costs for the staff who can now be trained using virtual data.

To scale VR to so many people, we created the Innoactive Hub platform. This is essentially a collaborative content management system to save all these workspaces, 3D assets and custom created applications with the SDK. It also acts as a middleware to integrate into existing enterprise IT infrastructure. This could be connecting to 3D pipelines, PLM systems or a LMS to directly refer to a training workspace.

The good thing is that you can start very quickly by deploying our software for a proof-of-concept and then invest in customisation, integrations and more when it has been validated as successful.

What are the future technologies that will enhance immersive applications?

We are taking a close look at 5G because in the mid-term future this could enable us to calculate all these training simulations in real time in the cloud. We could then stream them directly to mobile headsets – and this would really help us to bring high quality graphics to smaller devices.

AI is also interesting because we can use it to assist the trainee with a task. This could start with a simple chatbot, but in the long term we can imagine having a real intelligent assistant to not only explain each step but also identify ways to improve the trainee's workflow by analysing their behaviour and applying deep learning techniques in VR.

Immersive training will become more collaborative too, linking multiple people together in a shared VR space. You can use this space for showing products, training, management meetings and brainstorming.

Our goal is to be number one in this area, as the principle can apply to AR and MR too, across multiple devices.

MAJENTA SOLUTIONS

Majenta Solutions are a technology solutions provider, who specialise in B2B and B2E immersive technology sales and support. They have clients across digital design, engineering, manufacturing, and construction. I spoke to Industrial Design and Visualisation Manager Nicholas John to understand what benefits the technology is bringing to some of these sectors.

majentasolutions.com

What sectors are most embracing XR?

We are getting a lot more traction with regards to people who come to us but I guess the industries are quite different. Automotive is an established market where they have investigated things like big caves and power walls, but these are very expensive and hard to maintain. The launch of the consumer VR kit has meant more people are using the XR, which has led to more iterations and more investigations.

Nicholas John
Industrial Design &Visualisation Manager
Majenta Solutions

Manufacturing still lags behind a little and ironically they have the most CAD and 3D datasets. There is a big fear factor in terms of what VR going to provide them. However we have some great case studies on customers who have adopted the technology.

A good example is Swift Leisure. They are the biggest caravan company in the UK. Typically a caravan company would build a physical prototype of a new model, and then take marketing shots of that, so potential customers can get an understanding of the space and feel. Building prototypes can take a very long time and is expensive, so Swift Leisure have been building immersive experiences based on the CAD data they already own. They use these VR experiences for customer clinics and sales and marketing purposes. They can also leverage that for ergonomic studies so they are far more educated about their models before they actually go to production.

What benefits can immersive technology bring to the factory floor?

With regards to immersive technology I think one of the biggest opportunities and quick turnaround benefits that our customers have achieved is industrial machinery and factory design.

There are just certain things that can only be achieved with immersive technology. With industrial design you have complicated workcells and it is quite interesting to put someone into a workcell and see how they operate the machinery and modify the positions of their tools and equipment to optimise the space.

However it is still a physical cell, so you can't go through walls and make quick changes to a physical model. In VR, we can put an operative into one of these workcells and make quick adjustments to optimise things and see how their performance adapts.

An interesting case study for this was the company Ideal Boilers who did a VR workcell analysis on an existing factory layout. They were noticing there were a couple of workcells where the optimisation was dropping significantly and could not work out why. When their Operations Manager went into VR, did some quick tests and looked at where the equipment was positioned, he had realised the workcells in question had been optimised for right handed people and actually it was left handed people who were having the problems.

They would never of noticed that without putting people in these VR workcells and analysing their performance.

In a mock scenario, let's say I wanted to launch a brand new gym and I came to Majenta Solutions to guide me. What stages of the process, from planning the layout to attracting customers, could be improved by leveraging immersive technology?

Interesting you ask that because we have just worked with a client who was doing just that!

My part of the business is focused on automotive, but we have three specification divisions - Aerospace, BIM and Manufacturing and this particular project required knowledge from each of those.

We used BIM to provide reverse CAD data of the gym from the supplied architectural format, which would of typically been a 2D floor layout but now we can very quickly produce a 3D environment to investigate the scene and try and optimise the positions of the gym equipment. This could also be used to get staff familiar with the floor plan before there is anything financially committed to being built. Having that familiarity of staff means you can start to have build a bit of traffic with regard to employment, way before committing to any building works.

You might use that technology to engage with others, including staff who can comment on where the gym needs to be in terms of footfall, and where the equipment should be, sort of a crowd-sourcing design process, meaning you can go to market with more confidence in what you have produced.

Once it is built and open, you can build a more interactive version in Unreal or Unity, put that on a website and use that to drive a social media campaign for potential customers. For the staffing, you could create a VR onboarding process where employees can learn customer services skills in mock simulated scenarios.

MAKE REAL

Make Real have taken their VR gaming experience into creating useful learning and training applications for high profile clients including EDF Energy, McDonald's and Vodafone. Their goal is to revolutionise learning, work and play. I speak to Make Real Director of Immersive Technologies Sam Watts to understand what results their clients are getting.

makereal.co.uk

Who are Make Real?

Make Real is a studio based in Brighton, UK, specialising in all aspects of immersive technologies to create meaningful content for training, simulation, learning & development, change and serious fun. Our team background is a mix of full flight simulator development, elearning and AAA games titles, bringing all these elements together to create award-winning products for our clients and partners, such as McDonald's, EDF Energy, Vodafone and many more.

Sam Watts
Director of Immersive Technologies
Make Real

At what point did you enter the 'Enterprise' space?

The parent company of Make Real, Makemedia started in 2006 creating listings and classifieds websites for large scale publishing corporates but there was always a dedicated team of immersive technology specialists beavering away on simulation and training content using pre-VR platforms, until re-branding in early 2016 to make external communications and marketing clearer to existing and potential clients and partners of both sides of the business.

Can you briefly describe some quantifiable benefits of immersive technology?

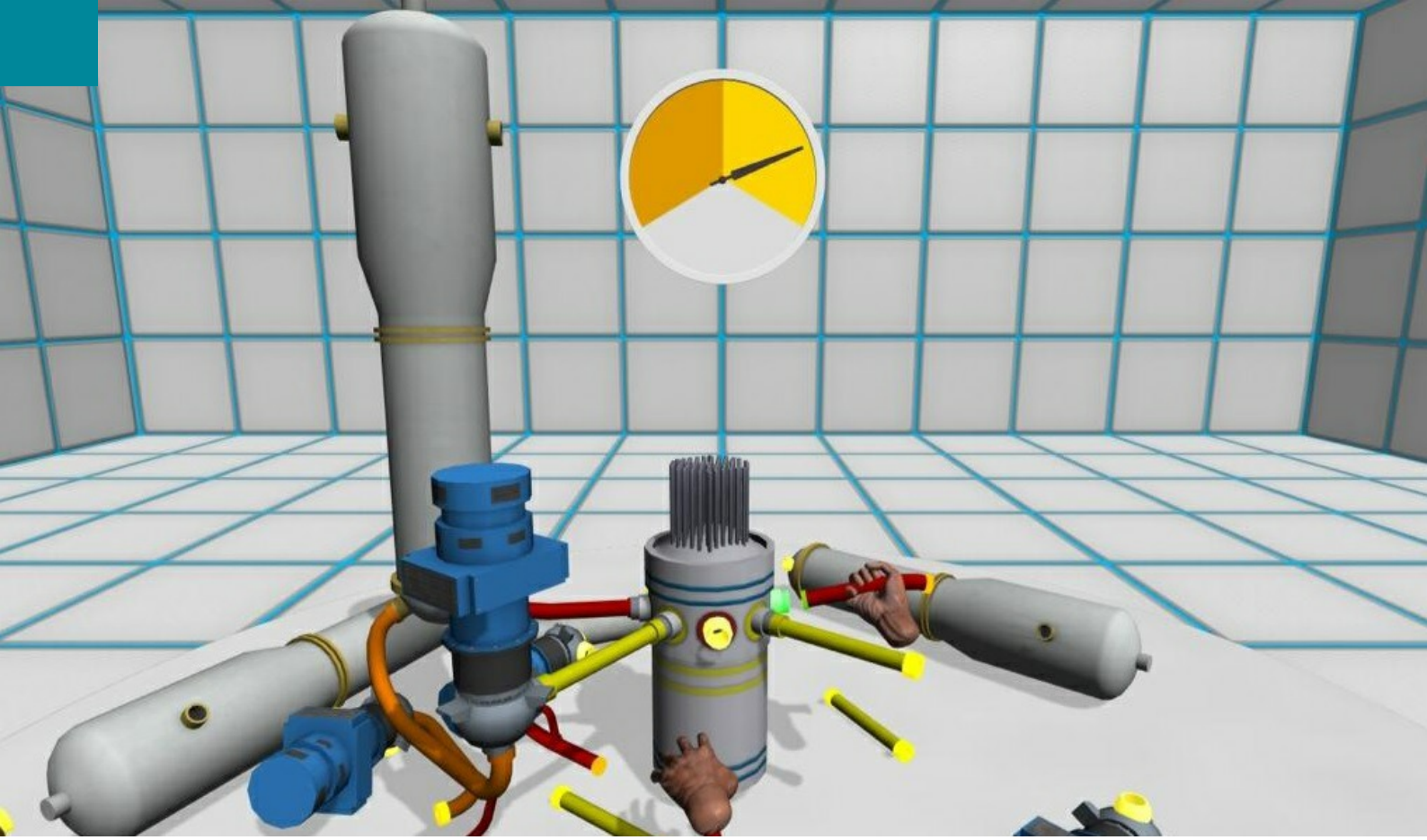
There are a number of benefits to deploying immersive technologies within the work environment, around the areas of training, learning and development. Some of these include:

Fail safely – By recreating real world environments that are highly interactive and realistic representations albeit virtually, training can take place in a safe environment allowing learners to fail safely without risking danger or harm to themselves or others. This is especially important for early stages of training where such incidents in the real world would have knock-on effects, not just personal injury to the learner, but also costs associated with delays to development or construction, or waste of materials. For example, the multi-channel projected CAVE-like hardware solution deployed at BLSC in Melbourne, Australia has seen a reduction of 90% of onsite avoidable incidents through the use of mixed reality training scenarios away from live construction sites.

Revenue generation – In cases where training revolves around requiring access to large scale, and often expensive hardware, i.e. a new train carriage or rolling stock, virtual representations can allow the real world versions to be out there generating revenue towards repaying the costs of acquisition, rather than being stuck in a maintenance yard whilst trainees crawl all over it. For example, full flight simulators exist because actual planes are very expensive and need to be flying between locations with paying passengers to generate revenue at all times. However, full flight simulators are also very expensive (although not as expensive as a plane) and need to be in operation all the time in order to be paying for themselves. They also take up a lot of space in a simulator training hall and there is a limit to how many can be installed at a location. By recreating the full flight simulator virtually, early stage pilot training and awareness can be carried out at much higher volumes with a simple PC and full VR setup, allowing greater scale and numbers of trainees trained, ensuring that the time they then go on to spend in an actual full flight simulator is a more effective and efficient use of the hardware.

Engaged learners – By replacing traditional flatscreen training with immersive technologies, training time can be reduced and effectiveness increased as a result as the content is made to come alive and engage learners at a higher level. By engaging more senses whilst learning, research shows that greater memories are formed and therefore as a result, greater data retention and recall occurs, showing that assessment scores increase too. This has been qualitatively demonstrated with the suite of learning content Make Real created for EDF Energy to replace a 80+ screen PowerPoint presentation on the Fundamentals of Nuclear Power to be delivered across all departments. By adapting it to an instructor-led networked-tablet series of 3D learning materials and associated gamified experiences, feedback shows that average learner time is reduced by two hours, with the average pass rate increasing from 50% to 75%, which across 16,000 employees, is quite a saving.

PROCAT Digital VR Applications



EDF Reactor Builder

Similarly, with PROCAT Digital VR Applications created for assessment of NVQ Level 3 certifications for electrical, plumbing and air-con & refrigeration maintenance, by placing the apprentice within a virtual environment, rather than at a line of dummy consumer units, the assessment is taken more seriously as they are immersed within the residential environment and concentrating, rather than looking over their shoulder to see what their mate is doing and not taking it seriously. Furthermore, for air-con & refrigeration, VR representations allow apprentices to understand some complete thermodynamics theory through animated visualisations around how a closed system can be low and high pressure, hot and cold at the same time across a variety of state stages, something that is difficult to convey in text alone.

How do you think 5G, IOT and AI will transform future enterprise applications?

5G, IOT, AI, machine learning and machine vision recognition will allow VR to transcend to the next level, allowing greater scale of experiences to be created with fewer development resources, with access to high-speed data networks and cloud-based databases of 3D objects that can seamlessly be pulled into an experience, either as a direct result of user interaction and action within the virtual space or by instructor-driven control.

Whilst developers will be able to create the known and correct path through an experience, AI will enable a more realistic experience, i.e. add an element of controlled randomness or real world immersion via edge-cases without each and every possible outcome having to be pre-programmed during development. This will further enhance and improve the training outcomes in order to maximise realism whilst remaining in a virtual, safe environment.

The introduction of blockchain technology will allow a learner to create a single profile and build upon it securely across learning products and create an indisputable personal digital profile of their capabilities and certifications, allowing employers to determine the most suitable candidates and roles accordingly.

How vital is it for immersive enterprise applications to be integrated into third party platforms ?

Every application and product needs to have metrics for impact and effectiveness, either for the end client or partner or for Make Real to be able to demonstrate the benefits of opting to use immersive technologies over traditional training methods and hardware.

Mixed Reality Construction Training

Similarly, any training product needs to be able to track user progression through their profile to track scores, time spent, courses completed etc. Currently most training and learning content plugs into a SCORM-based Learning Management System (LMS) but in future, technologies and standards like xAPI will become more commonplace, allowing greater metrics of 4D user actions to build up more accurate profiles with more meaningful metrics.

However we are limited by the speed at which the learning technology companies and sectors move, which are in turn limited by the speed at which corporates review and update their learning management platforms, who understandably, can be very risk averse.

What are your biggest growth areas at the moment in terms of verticals?

For Make Real, specialising in training, simulation and learning & development, the biggest growth areas are within energy services (i.e. multiple products deployed across EDF Energy, from nuclear power to task management to installation of smart meters), the construction sector (BLSC, CIOB and other products deployed that are currently under NDA) and automotive (new clients and partners of Make Real that can not currently be revealed until final contracts are signed).

Away from the corporate use, entertainment, experiential and education are also growing healthily, with Make Real's 2nd gaming title "Loco Dojo" slow-burning through the virtual storefronts but especially growing rapidly within the maturing VR Arcade sector. Related to this is interest around Make Real's first experiential educational content piece, building upon the team's knowledge of porting Apollo 11 VR from full VR to mobile VR, but again unfortunately at this stage, will have to remain a mystery until the fine details are finalised.

Where can serious gaming / edutainment fit into enterprise immersive applications?

Serious games have been making noises in the traditional elearning spaces for a number of years now, with some high profile success stories showcasing how gamified learning can greatly enhance, encourage and improve learner's outcomes, especially with future employees growing up with smartphones, touchscreens and the internet compared to the older generations. VR is a natural fit for this trend due to the increased levels of interaction making experiences feel more game-y, and the development pipelines and processes are very similar. However the main challenges are to a) ensure that key enterprise stakeholders are on-board with the technology and the potential advantages of using it, whilst also being aware of the current pitfalls and limitations and b) ensuring that the learning experience is meaningful and has the right impact beyond the wow-factor of users just being immersed in VR for the first time.

What are the main barriers for clients?

General level of understanding - As it's a new technology to most people, the potential use cases for implementation are not fully understood or appreciated by many decision makers. A lot of legwork has to be done to educate users around the benefits, current shortfalls and potential use cases of the hardware and technology.

Cost factor - VR hardware and 3D software is firmly planted in many minds as costing considerably more than traditional learning and training content, which today is incorrect. Again it takes a lot of educating and open honesty around development costs to change those minds.

Uncertainty - Many companies, and especially learning centres, have been sold expensive simulator hardware and software solutions in the past that have had specific, single use cases that now end up sitting in cupboards gathering dust. As VR is still an emerging technology, it is critical to educate the multi-purpose use cases around the hardware and future roadmap of features and functionality.

Scale - Many learning departments will need to understand how they can deploy and utilise multiple systems at once and/or distribute them to remote learning locations easily and effectively. Related to this point is the perception of the space requirement for room-scale and how to effectively multiply deployments without needing an entire empty warehouse to do so.

Fear - Many instructors or facilitators are generally towards the older end of the employee age scale and will be more comfortable using the tried and tested traditional methods of learning and training, without having to bother with new technologies and elements that make their lives, as they perceive it, more complicated and difficult.

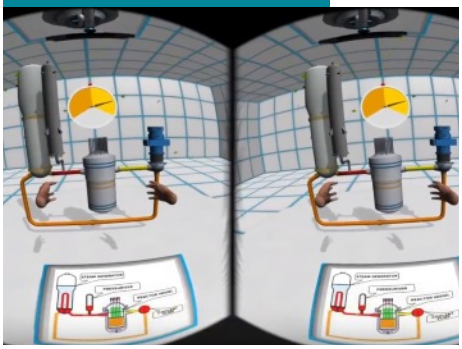
PLAY >>>

Make Real - VR Training Showcase

PLAY >>>

Make Real - Construction Showreel

PLAY >>>



Make Real - EDF Energy Super Reel

THE OPEN UNIVERSITY

The Open University (OU) is a public distance learning and research university, and one of the biggest universities in the UK for undergraduate education. Having long used new technology to improve learning outcomes, the OU has been experimenting with virtual reality to explore the medium's potential for improved memory recall and engagement. Leading the VR initiatives is Shailey Minocha who shares some of her findings in this interview.

The Open University

open.ac.uk

What were your findings with the Google Expeditions project and how can that be built on for the future?

As VR technology becomes mobile (available on smartphones and tablets), it will become more accessible and enable uptake in learning and teaching in schools, further education and in higher education.

We found that Google Expeditions, a 360-degree photosphere-based mobile app, can support the following educational theories or aspects.

a) Inquiry-based learning – formulating questions for scientific inquiry or in any other discipline/activity that requires a research investigation. Google Expeditions provide the initial stimulation that enable students to ask higher-order evaluative or analytical questions.

b) Learning through simulations – understanding processes, systems and concepts through simulations and visualisations that are not possible to view in the real world or are not accessible – e.g. the solar system, the process of rocket launch, the process of pollination, visiting hazardous sites such as Chernobyl, looking at the bleaching of coral reefs in the Great Barrier Reef, looking at an active volcano.

Shailey Minocha
Professor of Learning Technologies and Social Computing
Centre for Research in Computing
The Open University

Scene from Underwater Caribbean, one of over 800 Google Expeditions

c) Fieldwork education – in disciplines such as biology, ecology, environmental sciences and in history, virtual field trips such as in Google Expeditions can help support fieldwork learning and as a complement to physical field trips. Virtual field trips enable students and educators to visit places that may not be possible in the real world due to various constraints (e.g. costs, time, access). Virtual field trips support outdoor fieldwork – such as preparing for a physical field trip by carrying out a risk assessment in the virtual world, or comparing the location with another location when in the field, and for reflection and de-briefing in a virtual world after a physical field trip.

Would you say AR/VR are still at an experimenting stage? If so, when do you think the medium (if at all) will become a regular part of the OU's offerings?

VR has been around for a long time and is constantly improving, becoming mobile and accessible. AR is also constantly evolving and improving. I wouldn't say that these technologies are in experimental stage – but that they are constantly evolving as any other emerging technology and they will increasingly play a significant role in learning and teaching in schools, further education and higher education.

What are your thoughts on how immersive technologies could be needed in a post-Brexit future? What are the current problems with adult education?

Immersive technologies are another learning and teaching resource in the educator's toolbox. The main constraints that students experience, particularly in part-time settings and as adult learners (and not just in the current economic and political climate) are time (for travelling) and distance from tutorials.

Learning and teaching in virtual worlds has various pedagogical advantages: being able to collaborate with geographically distributed students, educators and experts; and visualisation to support learning – procedural learning (e.g. practising to use a complex instrument), inquiry-based learning (research investigations), interactive story-telling, studying complexity and inter-relationship between systems (e.g. human anatomy), accessing places that you may not be able to visit/access (e.g. Antarctica, International Space Station, bottom of the oceans, places that have restricted footfall such as conservation areas), and comprehending complex processes or processes that are difficult to see in real life (e.g. pollination, photosynthesis), etc.

Are you planning to trial AR/VR versions of your modules soon? Would you build in the delivery of a headset to the cost of a course? (Such as the new $199 Oculus Go Headset)?

We are already using VR in our modules at The Open University – desktop-based (virtual geology field trip) as well as mobile virtual reality apps (on oceans). We have provided virtual reality headsets or viewers (similar to Google Cardboard) to students.

Do you have any thoughts on how distant learning could be enhanced with not only immersive technologies, but 5G, IOT and AI?

5G: Fast wireless communication will facilitate faster downloads/uploads and smoother online video communications and interactions in virtual worlds. The 5G technology will support uptake of VR, AR and XR in educational settings - in schools, further education and in higher education.

The Oculus Go Headset

IoT: the data from the devices could serve as a useful way to determine the amount of study time (if low, how a student could be supported?) and providing personalised individual learning tips and resources; student projects: conducting individual or group remote investigations through collection of data from sensors – such as how many people are using public transport in an area; or the amount of recycling in an area.

AI: customised and personalised learning resources and assessment at a distance.

USEFUL LINKS

https://edu.google.com/expeditions/#about

https://www.theguardian.com/technology/ng-interactive/2016/nov/10/virtual-reality-by-the-guardian

https://www.economist.com/prospero/2017/03/08/dive-into-our-latest-vr-piece-about-corals

https://www.fieldscapesvr.com/

http://digitalexplorer.com/

'Role of Virtual Reality in Geography and Science Fieldwork Education' - https://bit.ly/2IeKVZL

OXFORD BROOKES UNIVERSITY

Dr Fridolin Wild is a Senior Research Fellow, leading the Performance Augmentation Lab (PAL) of Oxford Brookes University. With the research and development of the lab, Fridolin seeks to close the dissociative gap between abstract knowledge and its practical application, researching radically new forms of augmented reality powered learning, to create the 'Human 4.0'.

OXFORD BROOKES UNIVERSITY

brookes.ac.uk

What is the remit of the Performance Augmentation Lab?

We are looking at bridging the gap between theory and AR practical application. We try to put information where and when it is needed, directly into the perception of trainees in the workplace setting, to augment their performance with superpowers.

What is ARLEM ? (Augmented Reality Learning Experience Models)

We are putting together a new content standard for AR learning experience models, which is situated in the Learning Technologies Standards Committee. Having said that I think its capability is wider for a job performance aid.

Dr Fridolin Wild
Senior Research Fellow
Oxford Brookes University

Its advantage is it breaks away from the object centric cycle that mobile AR is known for, those applications where you point your mobile phone at the product label, and suddenly a cartoon character jumps out of the product. That is not really what AR should be about in my opinion. It should be a lot more about doing activities in the real world, with multiple objects and multiple locations.

There is currently no standard which is what we are trying to do with ARLEM. ARLEM aims to set standards for what people should be doing, how they should handle specific objects and what locations are related to what specific activity. We compliment the standard with a workplace description language so people can describe, objects, persons, places and other resources.

Is ARLEM still needed now we have ARKit and ARCore?

That is a different level. ARKit is an SDK as is the MS Holo Toolkit which provides high level computer vision in a high level accessible format, meaning you can scan an image and then train a marker on that image and then something happens, via your application. ARLEM works at a higher level, with semantic description of activities on top of these SDK's like ARKit, Holo Toolkit, Vuforia etc. and allows for a workflow execution.

The ARLEM player or recorder application means you can avoid writing a lot of code, and you can demo straight away what you want to do, press a button and you have the recorded sequence to deliver to your client or trainees.

How can ARLEM be integrated into existing learning platforms?

I personally come from that world. I was leading a network of excellence in the EU's Technology and Learning, so I am very familiar with the standards and systems world.

In one way new ideas standards are a good way of encapsulating knowledge and making it available for the people. At the same time, they make content more exchangeable. They provide customers more security and even if that company no longer operates, that content is so accessible that they have choice between platforms, which also works to the advantage of the software developers.

If you do not provide these standards, then you don't have the network effects and the market is simply not developing. Where we are with AR is the initial small market stage, which is largely putting out the cartoon character for branding experiences, but if you look at the plans of the tech giants and all the small startup companies, they say the next revolution in personal computing is coming, where we really will manipulate reality and where we treat reality as a medium with smart glasses. However, if we don't put the standardisation initiatives such as ARLEM in place, this market will not develop.

We of course looked into the learning technology world when we were building the technology specification, and identified the shortcomings of the ability of learning content to be executed in the real world. I don't think we are at a stage yet where, when you are handling an object, your computer vision system can recognise it.

We lack the abilities but in a way it also allows content conversion from existing content, especially professional learning content such as instruction manuals. In the technical document world there is a lot of existing content around. A great example is the aviation world where there are standards for books and how to express actions sequences in pictorial form.

It might be possible to transform existing content into ARLEM and the handbook of the future to be directly executable and not just readable.

What could the super worker of the future look like?

An expert is still an expert in the future. I don't think this will change a lot, even if the devices we build get smaller and less clunky.

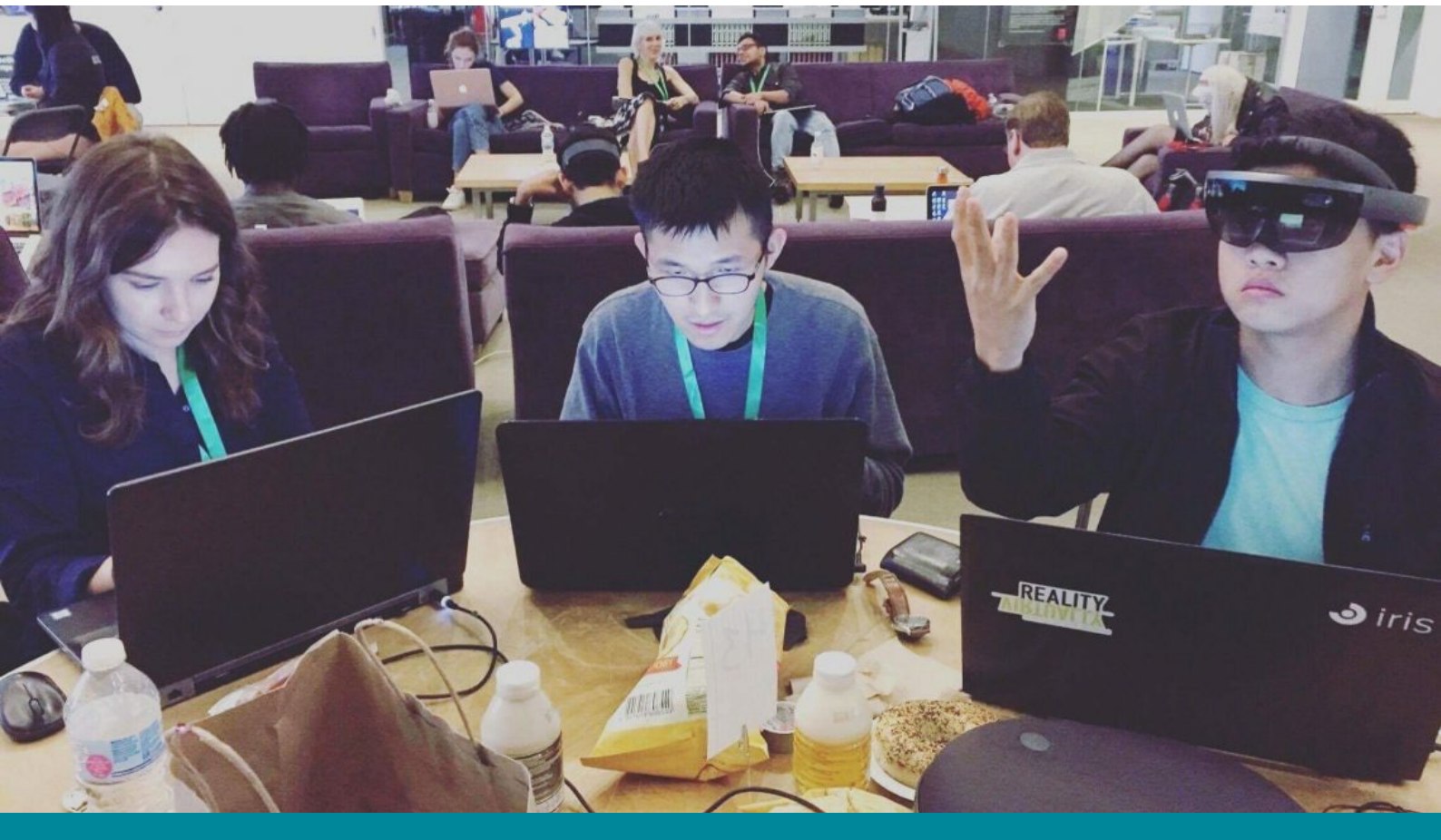
A lot of the stuff they do can be done confidently without any aids, and I think that is what makes an expert. It is a different question when you look at how people train in the future. To become an expert maybe more quickly, those XR job performance aids can give a strong advantage.

The super worker of the future would train by following the footsteps of an expert. They would literally see a ghost representation of an expert through smart glasses, whilst receiving gentle nudging haptic feedback, to push them in the right direction, replicating the same movements of the expert.

There is experimental hardware out there, where electro muscle stimulation is used to actually make people move in a specific way, stimulating their muscles directly like how the Teslasuit worlks.

Suits with sensors will provide intelligence in the workplace environment and then we can proactivity react with performance support. We can create virtual user interface elements 'on the fly', so when people talk to the machines, they can looking up historical data in a chart.

The trend in industry is towards predictive maintenance to find out when a machine is likely to develop a fault using artificial intelligence. For example, algorithms could detect when machines will need to be maintained.



Is gamification important?

Certainly from the do work with AR and wearables, we see people do enjoy the immersion which results in higher engagement. It is important that people do not get frustrated and end up dropping out. It is getting that balance between the sense of achievement and tackling a situation you have not encountered before. It needs to oscillate between both and not become so frustrating that they get disengaged.

Do you personally think Brexit will drive an uptake in immersive technologies being used by enterprise?

Personally I think Brexit is the worst political decision that this country could ever have made. To a certain extent I think the UK was in a pickle already and that's why we have this populist scaremongering about Europe.

We clearly have a skills shortage situation. About 25% of all jobs are not filled so it is a state of a emergency and 22% of this is a result of skills shortages. It is not just a problem in the UK, there is a similar issue across Europe, the US and developed parts of Asia.

It is a problem with our educational systems and I think we will see the results of these severe cutbacks only in the future. The lack of investment in primary and secondary education as well as universities will come to the surface in the next 5 to 10 years. Saving money on education will not put us in a better situation in the future. On top of all that, we are now leaving a political union of nations facing similar challenges and going it the alone, dropping out of the biggest market in our neighbourhood. I don't think it is ever too late to admit a mistake and turn it around.

Can immersive technologies offer a solution to these problems?

I think this new medium can play a role in tackling the skills shortages issue but not without the professionals. We won't replace professionals or experts with any of these guidance systems such as schools or universities like the Open University or Oxford Brookes. Immersive is a medium, not the solution. The solution is the content and that is why we are building standards. We have identified the lack of content is the biggest problem and the content is not going to get there without the professionals who know how to deliver high quality education.

The technology is a very attractive one however - it allows us to create a level of immediacy of the interaction with the environment that we have not seen in the consumer market before.

RE'FLEKT

Re'flekt enables any business or industry to create their own in-house augmented and mixed reality applications. Their goal is to make AR and VR affordable and scalable for business, and providing 'upgrade' tools for their workers. They also carry out scientific research to understand how our brain operates in VR to design effective training programmes.

RE'FLEKT

re-flekt.com

Who are Re'flekt?

We started in 2012, developing AR applications, especially for the police sector.

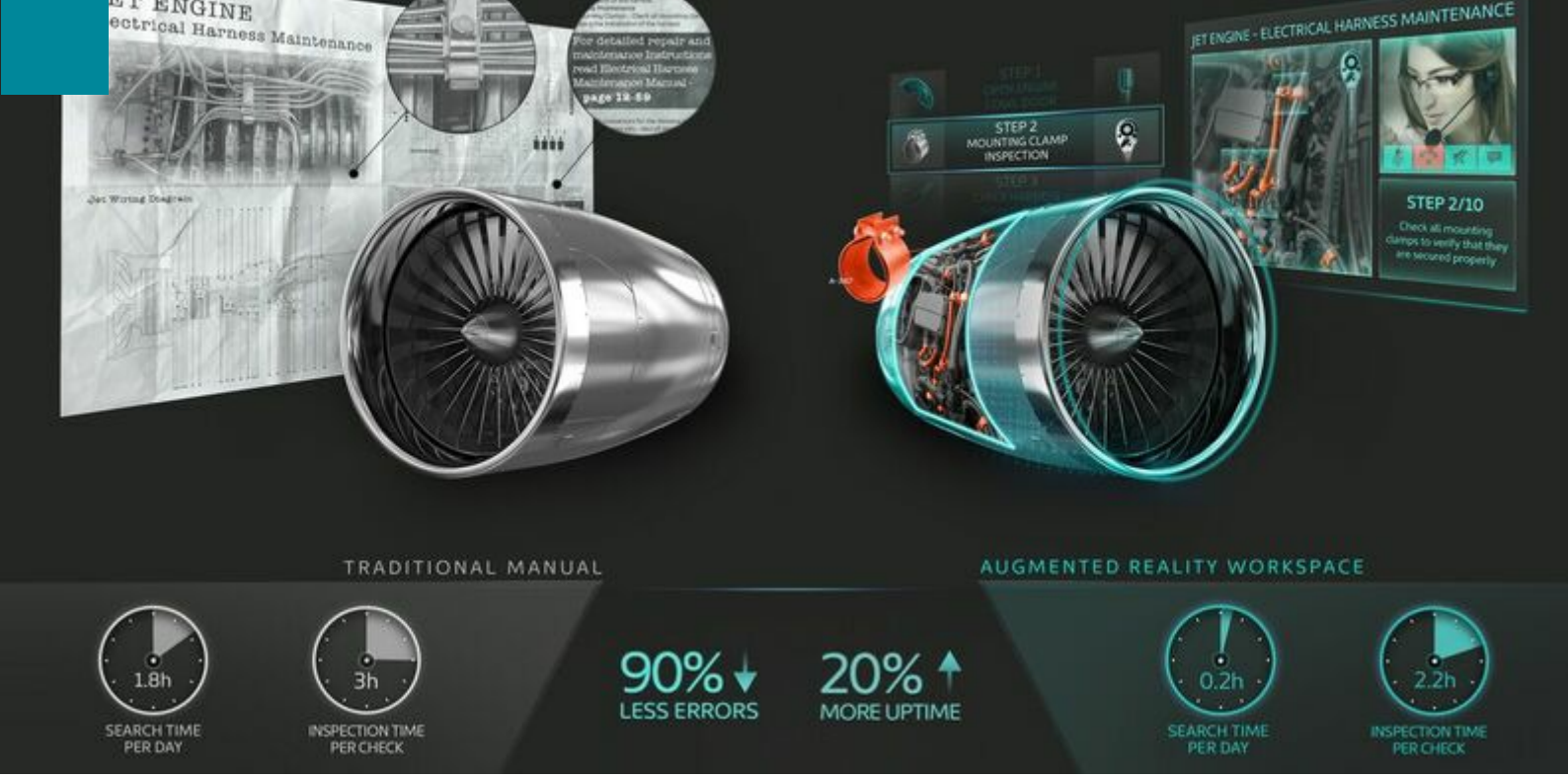
Working with our partner Bosch, we developed the 'workshop of the future'. One of the first things we did with them was work on repair instructions for a fuel return line for a Range Rover because they were finding their mechanics would consistently destroy the fuel return line when reinstalling it. It is quite complex and not something you do every day.

The instructions themselves were based on paper manuals and they asked for a more effective solution. We worked with Bosch to create an application for them.

They tested it and we continued to do a lot of applications like this. We figured out quite quickly that you cannot tell the industry to develop each app individually; It is too time consuming and expensive and not very flexible; so we developed our platform RE'FLEKT ONE. This allows enterprise to enjoy the benefits of AR in a scalable way. With the platform they can create AR applications in-house, in the same way as they do to create a video or other kind of materials.

Dirk Schart
Head of PR and Marketing
Re'flekt

One of the key features of RE'FLEKT ONE is that it can extract existing 3D or 2D data the company has in their repair manuals, so the idea is to enable enterprises to create their own maintenance training. The goal is to make maintaining a machine as easy as using a simple kitchen appliance.



What skills do you need to use REFLEKT ONE?

You do not need to be a developer and no programming skills are required. It is useful to have a background in producing technical documentation. Also it is useful to have experience in 3D modelling, but even if you only have experience in 2D graphics and media, that is fine, because we can educate you how to use it. I am not an engineer but I am able to create applications with the system.

Are you finding ARKit and ARCore are speeding up adoption?

On one side, for the corporates, even though they are aware that technologies such as Hololens and Vuzix exist, they also know how long it takes for the IT departments to test everything.

However, the workplace mobile era has just arrived. Companies like Bosch are working with tablets and smartphones now.

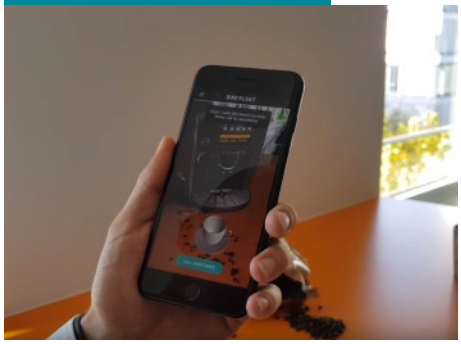
The 3D tracking of ARKit and ARCore can work well, but when it is something very precise or you are dealing with very reflective materials, you must use markers which is fine for industrial uses. It is about the results and not how it looks. ARKit and ARCore have a lot of potential but not ready for industry, which needs good stable 3D tracking or good marker based tracking. ARKit may provide that in one or two years, because Metaio is behind it.

What will the workplace of the future look like?

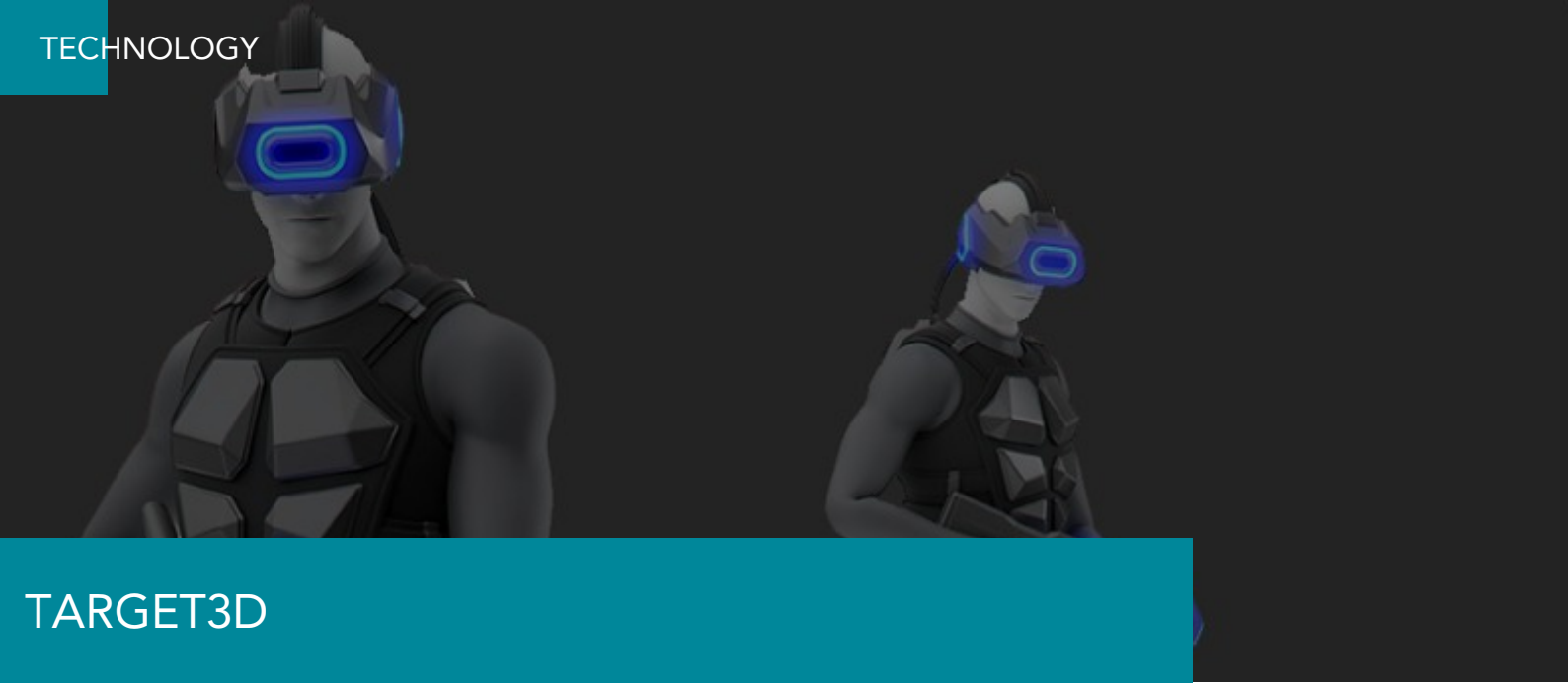
In the future you will be able to train people on the job; you won't need to separate the training.

This is what Bosch wanted to do. Imagine a scenario where you arrive you at a workshop and a mechanic is showing you around and talking to you about issues you might not understand. Wearing your smart glasses you could see what the mechanic is talking about as a live visualisation and you could authorise the ordering of the parts needed straight away.

PLAY ›››



The RE'FLEKT Augmented Repair App



TARGET3D

Target3D are primarily a 3D tracking and motion capture specialist who provide high accuracy, low latency, tracking solutions for application in many fields including games, VFX, animation, engineering, robotics, research, simulation and training. This naturally applies to many sectors and industries. I catch up with Managing Director Allan Rankin.

target3d.co.uk

What applications have you worked on that involved multi-user VR tracking environments?

We have helped clients setup multi-user VR environments for VR entertainment spaces and in education and training for industry and education. Multiple universities have adopted our OptiTrack range for teaching motion capture in gaming labs and then integration into VR. We worked with the creators of the Somnai London experience delivering multi-person VR space.

How can motion tracking drones assist in enterprise applications?

Our tracking technologies for drone robotics research is important for programming and validation. Once proved, we anticipate drones to work autonomously in spaces. Drone research is a huge market. Our systems providing sub-mm and 360fps accuracy which means engineers can control and understand the vehicles they are manipulating.

These are used in many areas including autonomous vehicles, assembly robotics and collaborative "co-bots" in manufacturing.

Allan Rankin
Managing Director
Target3D

Can your technology assist robotics in manufacturing and factory shop floors and in what way?

Yes, so provision of position validation, collision detection and location confirmation enables engineers to program robots in architecture, engineering and providing repetitive operations which may cause humans injury or in environments which can be hazardous.

Where does motion tracking fit within training and simulation?

The backbone which provides positional accuracy for people within VR training environments, motion tracking enables full VR immersion whilst removing motion sickness. Adding in realism with the ability to track multiple objects quickly is a key feature of optical tracking systems like OptiTrack. Finally scaling is possible by adding cameras to expand into larger physical training spaces. Training and simulation content is then grounded by high end tracking systems providing compelling realism to the virtual worlds.

Do you have to build the systems onsite or can clients come to you to capture the data?

We offer flexible services, onsite capture at our studio, portable systems for hire and full installation and fabrication. If you know how to use the system, you can hire it stand alone but if you need support we can provide an experienced technician to speed your journey through setup and data cleanup.

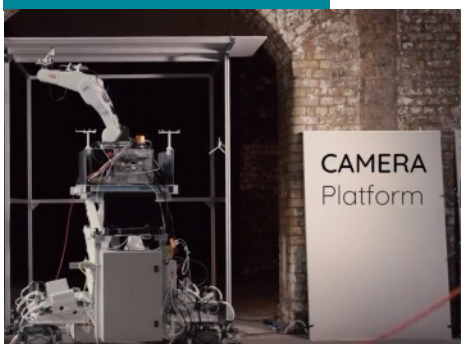
How can motion tracking be used for safety and ergonomics?

With the ability to track accurately full skeletal data, coupled with full bio-mechanics feedback software, you are able to analyse human movement and forces like never before. This can be applied for ergonomic analysis, employed for physiotherapy rehabilitation and utilised as a warning tool if boundaries are breached, physically or environmentally.

PLAY ›››

Ellipsis installation
DOTDOT.London
Somnai

PLAY ›››



Mobile Robot for Construction -
CAMERA Project

TSUKAT

The TSUKAT studio specialises in design and development of VR/AR applications and interactive visual solutions for architects, designers and companies from various domains. I was highly impressed by their CASA piece, a photo realistic VR tour of an apartment and chatted to founder Taras Onyskiv to learn more.

TSUKAT

tsukat.com

What is your background?

Hey, I'm Taras Onyskiv, Creative Director and Founder at TSUKAT studio. I've been involved with CGI either as an artist or on a various managing roles for about 13 years already. It's kinda crazy to look back and see how this field evolved during this period and how the changes have become more and more rapid.

Speaking about TSUKAT - we are a team of seven people specialising mainly in creating VR/AR applications and immersive experiences for architects, designers and digital agencies. Our team members come from various fields like architecture, game development, design and enterprise software development which gives us a great opportunity to approach the challenges of our clients from different angles and perspectives.

Taras Onyskiv
CEO of TSUKAT

Tell me about the CASA FWH interactive piece

We do a lot in architecture and Casa FWH interactive was one of our first showcase projects.

We decided to do this as an exercise with heavy focus on the realism aspect of the architectural interactive visualisation. It is a VR project of an apartment that is located in South Tyrol, Italy made by Italian architects from JAB Studio. As the input source, we've used photos of existing space and section plans.

We spent a lot of our efforts on polishing materials and light and in the end we were lucky to get this project featured by Unreal in their Enterprise Summer 2017 Sizzle Reel among other projects for brands like McLaren, Lamborghini, Discovery Networks, Zaha Hadid and many others.

Recently we were showcasing this and other projects at the Future Tech Now event in London and got truly amazing feedback. We are excited to see how immersive technologies change the way people interact with brands and are happy to be involved in this change.

Where does the data come from for a VR architectural experience?

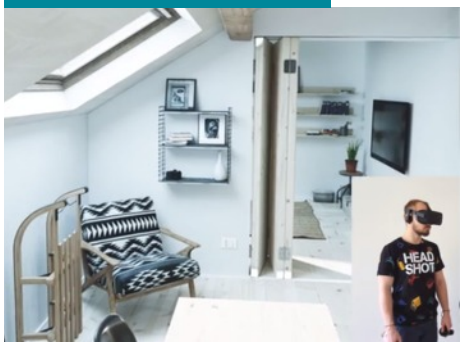
As we work with architects and real estate developers, they have the CAD data in the majority of cases. In addition with the design directions we use it to create interactive experiences with Unreal Engine.

Virtual reality solutions enhances the sales process of real estate. It truly gives a potential buyer a feel of presence and space of their future apartment which is hardly possible to achieve with traditional renders and animations.

We are looking at additional services to increase the value even more, one of those being using drones to capture the panoramas of the real views you would get from inside your future apartment. As I like to put it - you can eventually change everything in your apartment, but it is not possible to change the outside view. That's why it is crucially important in the selling process.

Another interesting development is introducing interactive elements in our VR and immersive solutions. CASA FWH is quite a static simulation, meaning that you can only walk around and experience the design, but we also create a lot of demos for our clients where the user can switch between different set designs, change materials, change light scenarios and the surroundings.

PLAY >>>



Real-time visualisation of an apartment in South Tyrol made with Unreal Engine 4 in VR

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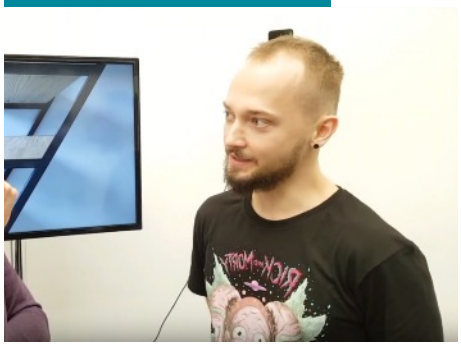

Interview with Taras Onyskiv at Future Tech Now Show 2018

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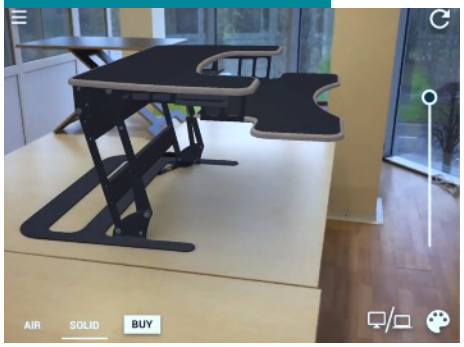


TSUKAT's AR project gives users simple and convenient way to check StiyStil devices in real life

Are you looking into Mixed Reality / AR?

Sure, we do see a huge interest from businesses when it comes to augmented reality solutions. The general concept of augmented reality is easy to understand for the end client. In addition, there are now millions of devices currently supporting the latest ARKit / ARCore technologies for markerless AR, opening up a huge potential audience.

At TSUKAT, we've been working on several AR applications for furniture and automotive companies that will provide user interaction with the brands.

VISYON

VISYON are a company who not only produce 360 degree content, but have been exploring how other technologies such as artificial intelligence can take immersive experiences to the next level. I chatted to CEO Pere Perez to understand what AI will mean for immersive enterprise applications.

visyon360com

What was the Revelectric project ?

Revelectric, which we did with the UCL, was an exploration into neuroscience which evolved into true AI and machine learning projects, one of which being how we quantify the essence of art.

Art is so subjective so we wanted to find the patterns, or certain images that humans consider art over other pieces and whether that analysis can teach machines to appreciate art themselves. We created an interface that presented many images to users, and ask them two or three questions about what they thought. We accumulated opinions of over 500,000 images with this feedback which was used by the AI to create its own human appreciated artwork.

Pere Perez
CEO of Visyon

Another project we did related to AI explored the learning capabilities of humans, with a game based on Snake called Aptoware.

If you are stuck on level 4 for example, you have to keep trying. A machine is not able to collaborate or assist you, in terms of that learning process, so what we have seen today is the games industry using devices that detects when a user is having difficulties, and makes it easier for them to achieve the next level, keeping them making purchases, like on Candy Crush Saga. However, this is not actually teaching you, it is just making sure you feel more rewarded and end up spending more money.

The majority of games are based on linear increases in difficulty. If you look at a game like Tetris, it gets harder and harder over time.

What we are doing with this project is to analyse the way the user is engaging with that game. It understands which pieces you are struggling with and then creates a dynamic training activity without you even be aware of it.

For example, on a Tetris style game, if you always struggle with a particular shape, the machine will start using that shape in different combinations, so you can learn to use it quicker. You will reach level 9 a lot faster, but without making the game easier for you, just speeding up the learning curve.

How could that technology apply within immersive applications ?

One of our goals of understanding AI is using it as a way of enhancing training programmes. At the moment, when we use VR for enterprise training, everything is either pre-recorded or real time interactive experiences. They are all static or offer a fixed tray of options, so we expect a convergence between these two technologies.

For us, full immersion in VR is not so much dependant on the quality of the graphics. You can have a low quality avatar that is assisting you through a process, but if the way you interact with it feels more natural then you are going to feel a lot more immersed. Therefore we are trying to create these avatars with a lot more intelligence and more natural voice recognition abilities.

We are also looking at how we can combine voice input with behaviour analysis. We can see how long people look at particular things, and what sort of areas they are missing or focus too much attention on, within a 360 degree environment, and use that data to dynamically build the next environment within a training scenario, so it is more optimised as a tool.

This could be great as a virtual reality experience to upskill people, but also to better prepare users taking on a risky job, such as policing officer, adapting scenarios according, possibly driven by analysing their brain stress levels, via a wearable to judge whether they are ready for such a demanded job.

What will 5G bring to immersive applications ?

5G is going to be highly useful. All the experimental dynamic learning experiences we have been talking about need to be rendered in the cloud.

There is a lot you can do locally, but cloud based rendering can deliver much faster processing for dynamic learning compared to a pre-recorded environment. On the AR side of things, 5G will be a boost to all the location-based activities which will be hugely important for AR head-mounted displays worn by people doing their job.

5G will be able to recognising where the user is, providing the right contextual information in real time, in a visually rich way.

What is VRoadcaster?

It is a VR framework that enables companies to bring together a number of their own digital assets and start optimising them for an interface, whether that be 2D, 360 degree or 180 degree content.

In the enterprise market we use VRoadcaster to assist with industry trade skills, for simulation training and risk prevention such as a forklift sim in a factory or learning how to use heavy machinery. One of the main goals there is really to reduce accidents at work because actions at work are expensive on a human level, financially and on a PR level.

VRoadcaster by Visyon

We are already implementing it in two or three different scenarios where we can see tangible examples of accident prevention. It integrates seamlessly with existing learning platforms rather than starting from scratch again.

What does the workplace of the future look like?

In terms of immersive learning we are working with a number of educational institutions and LMS platforms, to get them closer to onsite training without the costs..

At the moment, you can get online training, which is very cost effective and then you have onsite training which is very personal and human but expensive logistically difficult.

For the future workforce, we are investigating how brain/computer interfaces can improve the training capabilities of workers, allowing them to adapt much faster to a changing environment. We have set up a partnership with Neurable which is a next generation brain sensor company, who received investment from HTC.

Their brain sensor allows people to choose options with their thoughts, for example, selecting A, B or C. This makes a worker a lot more capable as it frees up their hands to operate a number of other things. This could bring a huge contribution to the workforce of the future.

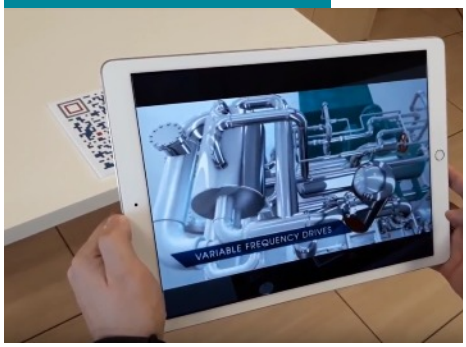
PLAY ›››

VISYON Immersive Enterprise Solutions

PLAY ›››

HTC Vive Modified With Neurable Reads Your Mind At SIGGRAPH

PLAY ›››



Stellar (AR to supercharge maintenance workers)

THANK YOU FOR READING

To get in touch email jonathan@virtualrealityconsultancy.co.uk

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