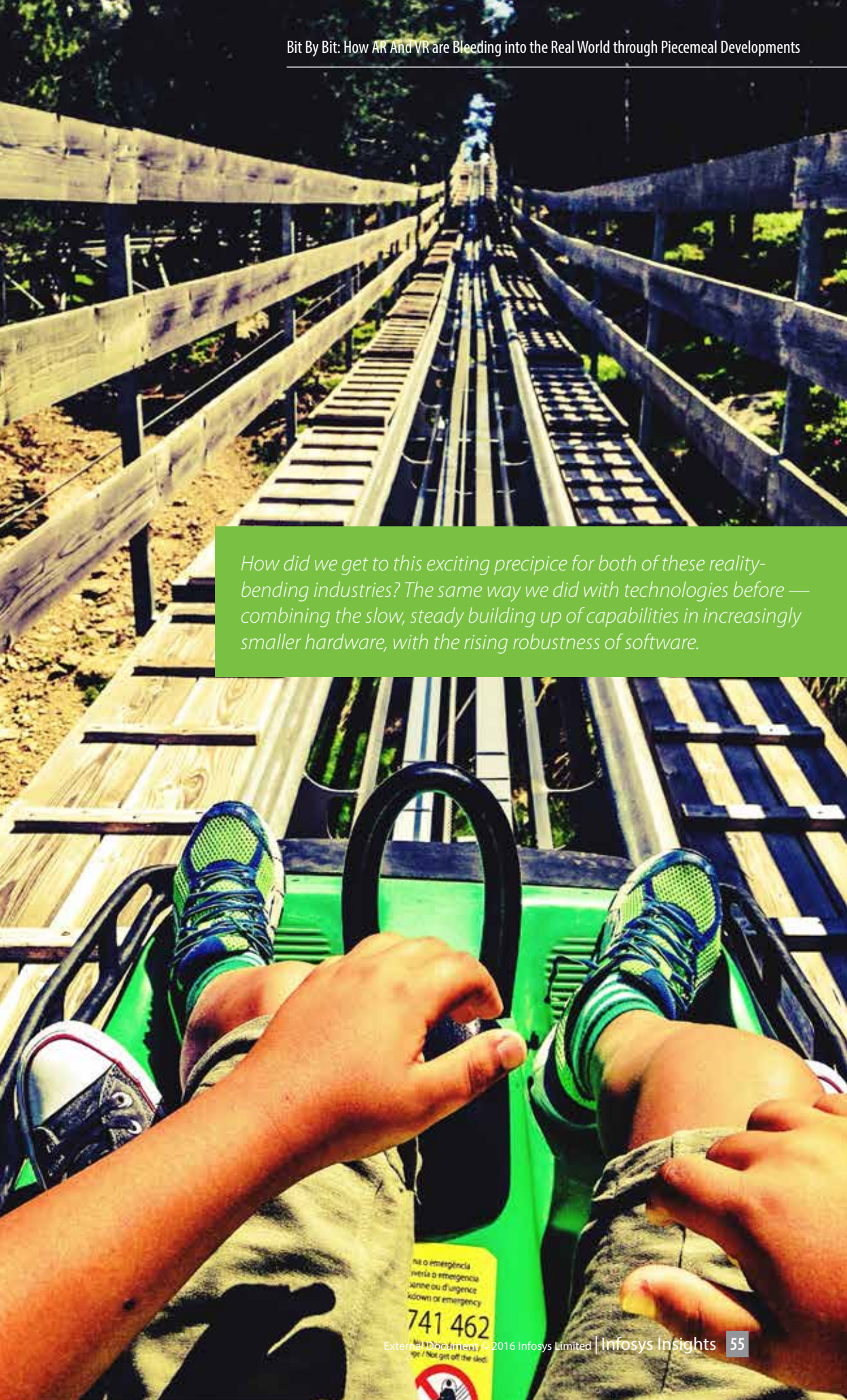# BIT BY BIT: HOW AR AND VR ARE ENTERING THE REAL WORLD

Most of us understand augmented reality and virtual reality in the context of entertainment; not many of us can fathom the sheer impact these can have in our daily lives — until now.

Consumer and business interests in the possibilities presented by augmented reality (AR) and virtual reality (VR) have boomed over the past few months. The reason is simple: technology has advanced enough to take exotic, expensive, and niche products, and turn them into everyday experiences. People are delighted by what might unfold from such advances. However, this change isn't happening all at once. Rather, it's a piecemeal process driven by a few notable, disparate developments that, put together, create practical interactions within the AR and the VR environments.

Historically, AR and VR have been held back by poor hardware and software, and the high cost of both. Hardware was often either too large or too expensive for mass adoption; software wasn't able to process and interpret data reliably; and the supply chain and applications necessary to produce components for AR and VR cost-effectively for a mass market were just not available.

Yet, there hasn't been a better time for both of these reality-bending industries. VR has captured the imagination of video game enthusiasts, thanks to the HTC Vive and

How did we get to this exciting precipice for both of these reality-bending industries? The same way we did with technologies before — combining the slow, steady building up of capabilities in increasingly smaller hardware, with the rising robustness of software.

Oculus Rift. Filmmakers too have shown interest in the field with some success; for instance, the virtual reality short film, 'Henry,' recently won an Emmy award. Further, interest in AR gaming and applications has exploded after Nintendo and Niantic's surprise hit, Pokémon Go, and after Microsoft introduced its AR headset, the Microsoft HoloLens, to much fanfare.

So how did we get to this exciting precipice? The same way we did with technologies before — combining the slow, steady building up of capabilities in increasingly smaller hardware, with the rising robustness of software. Another contributing factor for the imminent success of AR and VR is the concurrence of another technological innovation, the smartphone.

The confluence of opportunities

As soon-to-be industries, AR and VR both owe a lot to the smartphone. The rapid miniaturization of processors and sensors, along with the establishment of standards already account for most of what AR and VR require to succeed. They have the supply chains, the user base, the software expertise, and proven use cases for the technology at home as well as at work. All that remains is to put the pieces together in the hands of both consumers and enterprises.

This movement is already taking shape because of the latest development in smartphone technology: dual cameras. The dual camera setup is almost a necessity for AR because it enables depth measurement, which is crucial for an optimum AR experience. So, the fact that Apple's flagship phone, the iPhone 7 Plus, features dual cameras is remarkable (in fact, this is also how Apple achieves the prized 'bokeh' effect it is marketing in its new phones). Additionally, Apple's smart use of artificial intelligence also helps to address known shortcomings.

We don't know yet if Apple intends to use the iPhone 7 Plus' dual cameras for AR. But,

regardless of the Cupertino giant's intentions, one thing remains true — dual cameras are here to stay for the foreseeable future because Apple has long set the standard for what's expected of a modern smartphone (even though they weren't the first to experiment with dual cameras on a smartphone). As for AR and VR, the more standardized this feature becomes across smartphones, the more capable the AR and VR software ecosystem will become.

Software for AR and VR is tricky today because the standards for both technologies aren't fully developed. There are, however, efforts to correct these shortcomings. One project, the Open Source Virtual Reality (OSVR) project, is seeking to standardize VR experiences through open source software and hardware. Additionally, the Immersive Technology Alliance is also seeking to cement open source (software) and open standards (for both hardware and software) for AR, VR, and other immersive technology fields.

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Because of the confluence of these factors (rapid miniaturization and rapid standardization), the cost of producing and buying AR- and VR-ready headsets should fall from their current heights (US$3,000 for Microsoft's HoloLens developer kit) to a reasonable price point that will appeal to both enterprises and consumers. In fact, as mentioned before, we may not even see a direct flashpoint of AR and VR devices on the market, but a gradual buildup to AR and VR capabilities through smartphones and similar mobile devices.

The endless possibilities

The wide adoption of AR and VR, and of their respective software ecosystems, has massive implications for not just the tech sector, but nearly every other industry. Manufacturing, travel, education, and medical industries are some obvious examples. In fact, these industries are already pursuing and experimenting with AR and VR technologies.

What's even more fascinating are the varied, potential applications of AR and VR outside of common workplace environments. Do-it-yourself (DIY) homeowners and hobbyists could leverage AR to make home repairs or build products at home. Farmers could use the data collected from drones to get a birds-eye view of their crop's health in VR and pinpoint areas of concern. The fact that consumers and the general public may no longer have to rely on specialists for repairs could spur a boom in AR and VR guides, software development, and entertainment. The possibilities are truly endless.

AR and VR are capturing people's attention today because they have the potential to transform how we work and play tomorrow. Thankfully for us, the gradual progress of technology is turning this dream into a reality. We've still some way to go to make AR and VR an everyday reality, but each morning brings us a bit closer.

About the Author

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Vishwa Ranjan sees things others don't, thanks to his 20-odd years working in the computer graphics field. At Infosys, Vishwa helps to paint a better picture of augmented and virtual reality capabilities by showing how the technologies will impact consumers and professionals, how they'll buttress new and old industries, and what paths are necessary to get there. When he's not showcasing VR demos at the World Economic Forum in Davos, Switzerland, Vishwa can be found in the classroom using his doctorate in computer graphics to teach.

Prior to joining Infosys, Vishwa pushed the limits of animation and visual effects for Industrial Light & Magic, Electronic Arts, and DreamWorks Animation, including work on films and video games in the Star Wars and Lord of the Rings franchises.

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