Prolearner INTERACTIVES

PC-VR and Standalone VR: A Comparison

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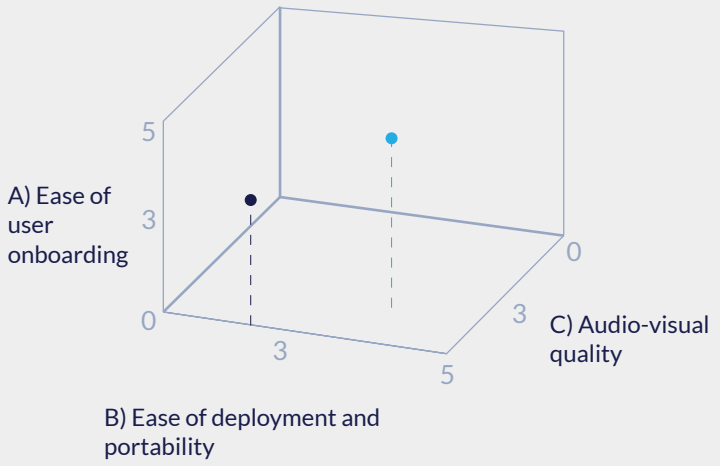
360° virtual reality (VR) simulations use commercially available VR headsets to re-create an immersive virtual reality environment which can replicate or mimic the actual environment.

When combined with custom high-fidelity visual content and effective sound & environmental audio design, such VR environments can be an effective replacement for real-life experience. In effect, such solutions 'transport' the user to the actual site.

VR Solutions Comparison Graph



The value VR can offer for user orientation and marketing is based on three key features:

1) Complete immersion
2) Ability to digitally re-create specific environments
3) Ability to interact with virtual objects, each with their own properties and attributes

For infrastructure, construction, and EPC companies, VR can be used to deliver content for multiple stakeholders, including:

1) Clients and business partners
2) Employees
3) Students and academic partner institutes

VR allows us to bring the environment and location to the user as opposed to the user traveling to the location.

Depending on the specific use case and solution development, VR can act as an effective substitute for 'site visits', simplify logistical challenges associated with site visits, including site preparation, travel and stay and other direct and indirect costs.

VR devices fall into two broad types based on the technology being used:

1) PC based VR
2) Standalone VR Systems

PC based VR

PC based VR solutions offer the highest visual fidelity and interaction quality. As the name implies, PC-based VR simulations require a VR headset connected to a high-powered PC system, and examples of PC-VR systems include the Oculus Rift-S and the HTC Vive systems.

Well-designed modules can mimic actual sites, including interactions the user would perform on location – this may include the ability to hold and rotate objects, use buttons and switches, open and close doors, interact with machinery, etc.

While PC-based VR systems offer high-quality, immersive interactivity (e.g.: opening doors, lifting, and rotating objects, etc.), the relative complexity of the VR controllers and potentially the simulation itself often requires atleast 10 – 15 min of onboarding where the user learns how to use the VR system.

PC-based VR systems are ideal solutions for immersive training where users can dedicate significant time for training in VR. This is particularly the case for training in high-risk, high hazard situations where a single error can result in a mission-critical failure, and users typically need to interact with the training simulation for extended periods of time as part of their training cycle.

Because PC-based VR systems require a high-powered PC as well as a VR headset, they are often significantly more expensive than standalone VR headsets and far less portable.

Oculus Rift-S

HTC Vive

Examples of PC-based VR Systems

Standalone VR systems

Standalone VR systems, as the name implies, are VR headsets that do not need a PC system. They include all the sensors, displays and processing required for delivering a VR experience.

Often, standalone systems are also considerably cheaper than PC-based VR systems. They are much more portable and easier to setup but at the cost of visual quality and the complexity of the simulations one can run on them.

Standalone VR headsets themselves are of two types:

1) 6-Degrees of Freedom (DoF) devices

6-DoF devices like the Pico Neo3 and the Oculus Quest 2 allow for the full range of interactions that PC-based VR systems used to allow, since they can track the position of the user in the real world and map their real-world movement to the VR simulation – however, because this feature is a function of the space the user is operating, 6-DoF devices require a few minutes of room-mapping & setup before they can be used.

2) 3-Degrees of Freedom (DoF) devices

3-DoF devices only track the movement and orientation of the user's head: they do not track the user's position in the physical space. 3-DoF headsets typically have the simplest controllers and can often be used without the controller. Therefore, for short VR engagements (5-8 min), and especially 360 VR content layered with simple interactions (gaze tracking, view and click interactions) they often deliver the most friction-free VR experiences one can create – this is particularly important when the VR experience needs to be offered to many users.

3-DoF devices are often the cheapest of VR devices, followed by 6-DoF devices and PC-based VR solutions.

6 Dof Device: Oculus Quest 2

3 Dof Device: Pico G24K

Factors dictating the solution choices

VR solutions should be evaluated across 3 dimensions –factors that dictate which specific VR implementation is likely to be successful in achieving the project goals. The 3 factors are:

1) User onboarding
2) Delpoyment
3) Audio Visual (AV) Quality

1) User Onboarding

PC-based VR solutions inevitably have a steeper user-onboarding curve. When the simulation needs to be deployed at scale with multiple users and the typical duration of the engagement is expected to be ~5 to 10 minutes, the friction of user-onboarding may lead to a poor end-user experience.
By contrast, standalone systems can be as simple as 'wear the headset and start the module'.

A smartphone-based app can be used to setup a 'classroom' and control multiple headsets in parallel - allowing a single individual to manage multiple devices. This eliminates user friction and offers a seamless user experience. This solution is especially applicable for situations where the content is primarily 360 VR videos, with simple 'gaze' based interactions.

2) Deployment

PC-based VR systems often require system configuration and room-setup. Further, the need to physically connect the headset to the PC with a cable and the need for dedicated powerfor the PC can often constrain deployment. By contrast, stand-alone VR systems are often battery powered and can be deployed with a quick 3-5 min setup (depending on the headset), with the only limitation being the battery life of the device (currently about 60 – 75 min of continuous use, depending on the content being played).

3) Audio Visual (AV) Quality

PC-based VR setups often deliver the highest visual quality possible since they can depend on a high-powered PC based system for rendering simulations. However, that this drawback largely disappears if one is playing 360 videos – shoot based or 3D reconstructions.

Comparison between VR Solutions

Matrix	PC-based VR	Stand-alone VR
Content quality	Highest	Medium
User onboarding	Complex	Simple
Deployment	Complex	Simple
Cost	~₹3,00,000 / unit (headset and PC)	~₹50,000 - ~₹80,000 / unit

Except for high-fidelity, interactive training simulations and complex interactive VR games, standalone VR headset-based solutions are almost always likely to be a better fit for deployment and ease of use – this is especially the case if one needs a portable, cost-effective solution for video-based content.