



The Parallax View Episode 1: Bring the world to wherever you are

By Kuldeep Singh



VIT



Who is Kuldeep?



Kuldeep Singh

Head of XR Practice, Principal Technologist

ThoughtWorks®

Alumnus - NIT Kurukshetra (2K-2K4)

Speaker, Juror, Mentor, Thought Leader, Technology Director, Engineering Leader, Product Specialist ...

 thinkuldeep.com

Join the XR communities -



[XR Enthusiats](#)



[XR Practices](#)

 [kuldeep-reck](#)

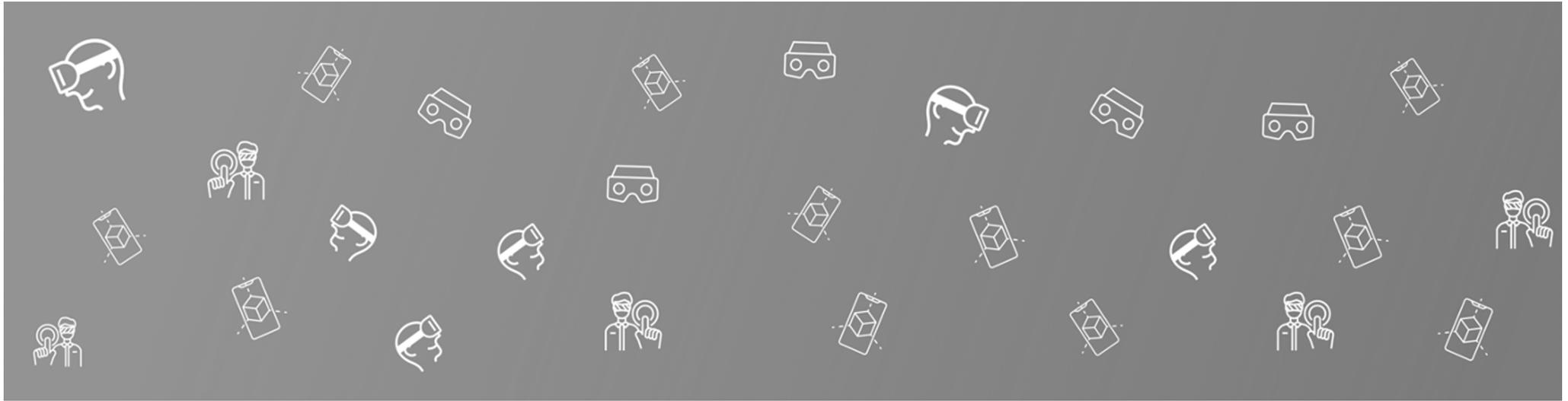
 [thinkuldeep](#)

 [thinkuldeep](#)

 [thinkuldeep](#)

 [kuldeep.reck](#)

 [@thinkuldeep](#)



Start with Basics

What is a Reality?



Reality?



Reality is what we see.



Reality is what we hear.



Reality is what we sense.



Reality is what we believe.



Artificial Reality?



Reality is what we see.



Reality is what we hear.



Reality is what we sense.



Reality is what we believe.





Bring the world to wherever you are?



Show me the other world



Hear from the other world

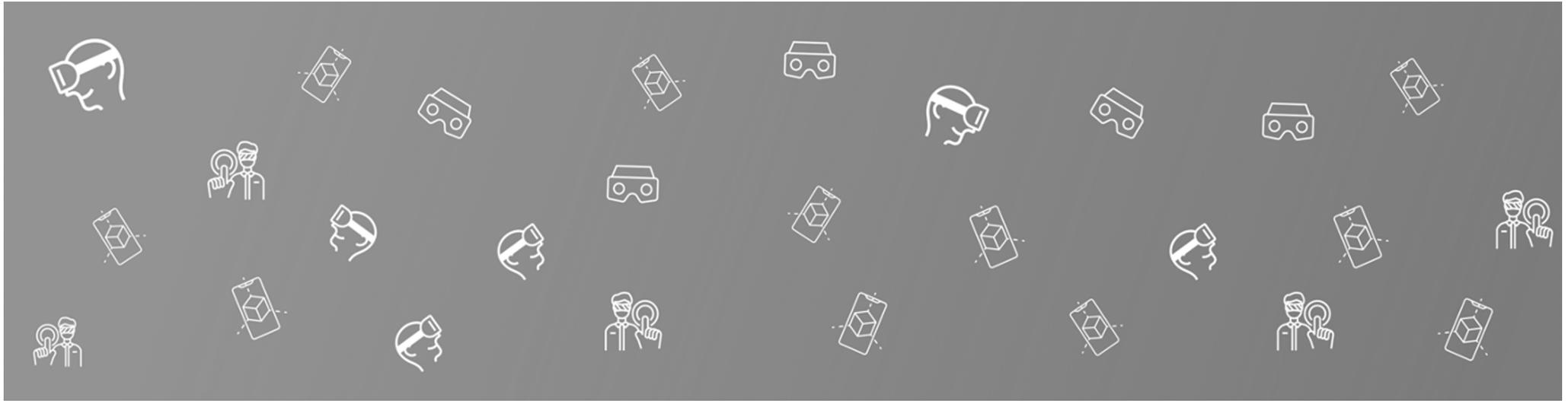


Touch and feel the other world.



Believe in the other world





Extending the Reality

Type of realities?



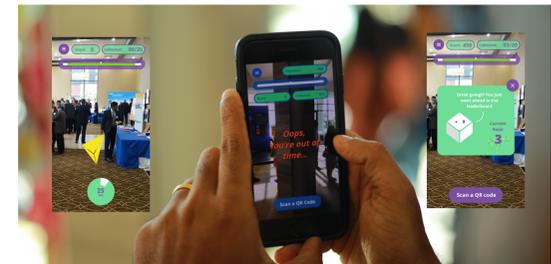


Augmented Reality

Augmented reality (AR) overlays digital content in the live environment.



GLASS
ENTERPRISE EDITION



Picture Credit – [iStock](#), [Google Glass](#), [Epson](#), [Vuzix](#), [ThoughtWorks](#)



Virtual Reality

A complete immersive experience that shuts out the physical world and takes into the virtual world.

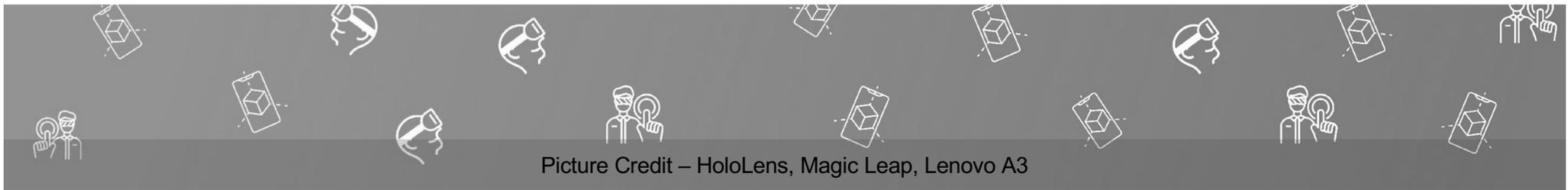


Picture Credit – Oculus, Google Cardboard



Mixed Reality

Combination of both AR and VR, where physical world and digital objects interact.





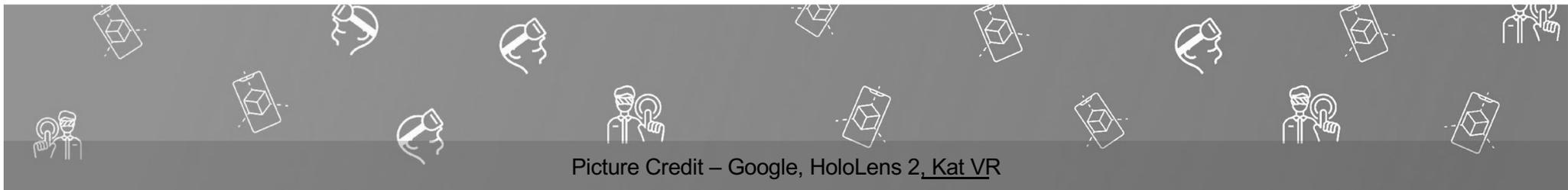
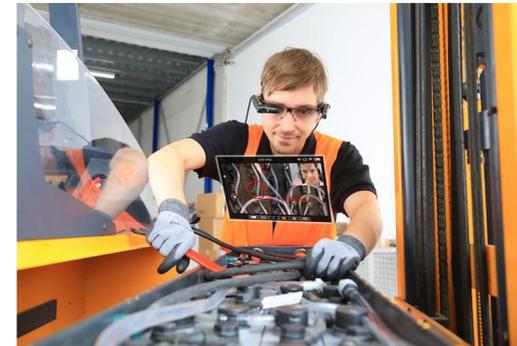
Augmented VR, Virtual AR

Mixing, Interactions

Treadmill with VR

GPS enabled VR Tours

Try augmenting on virtual objects



Picture Credit – Google, HoloLens 2, Kat VR



Mobile XR



https://thinkuldeep.com/post/extending_reality_with_ar_and_vr-2/



Web XR

Do I need HMD device?

Do I need apps to download?

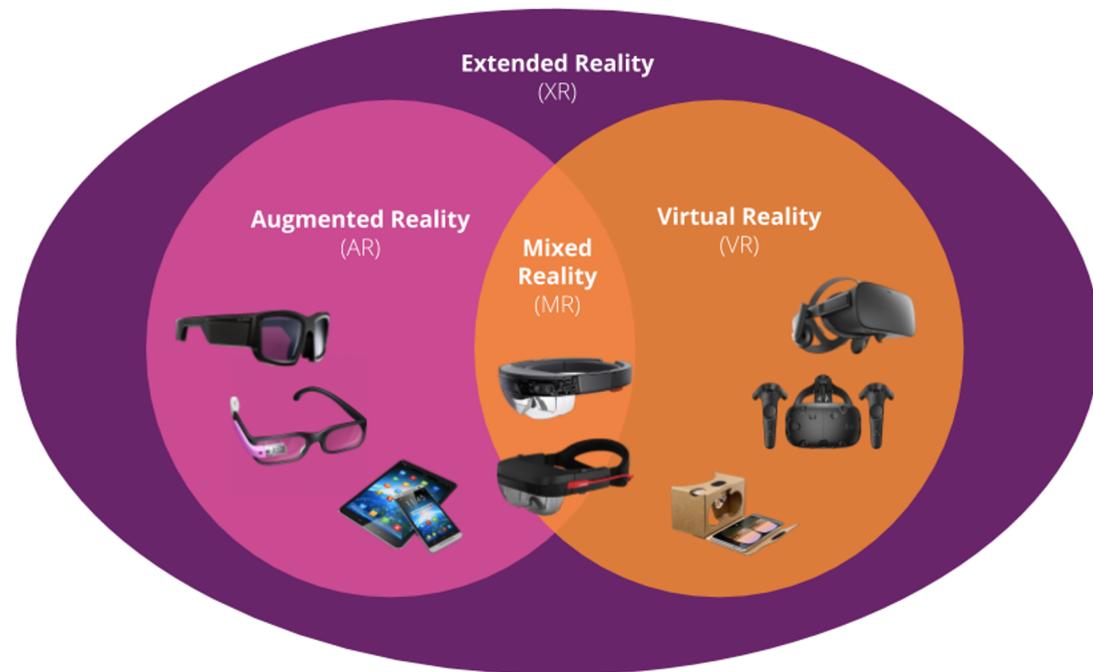
Do I need browser plugin to download?



AR, VR, MR, and XR

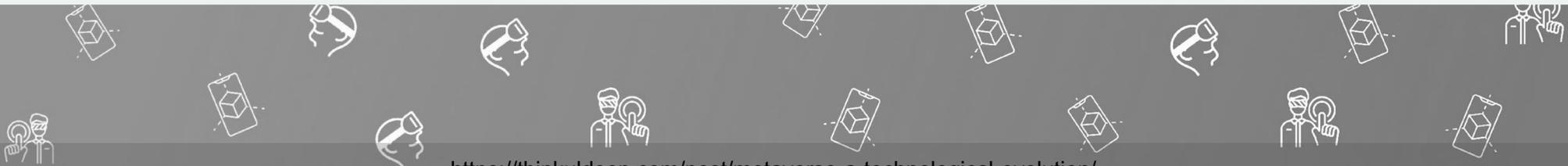
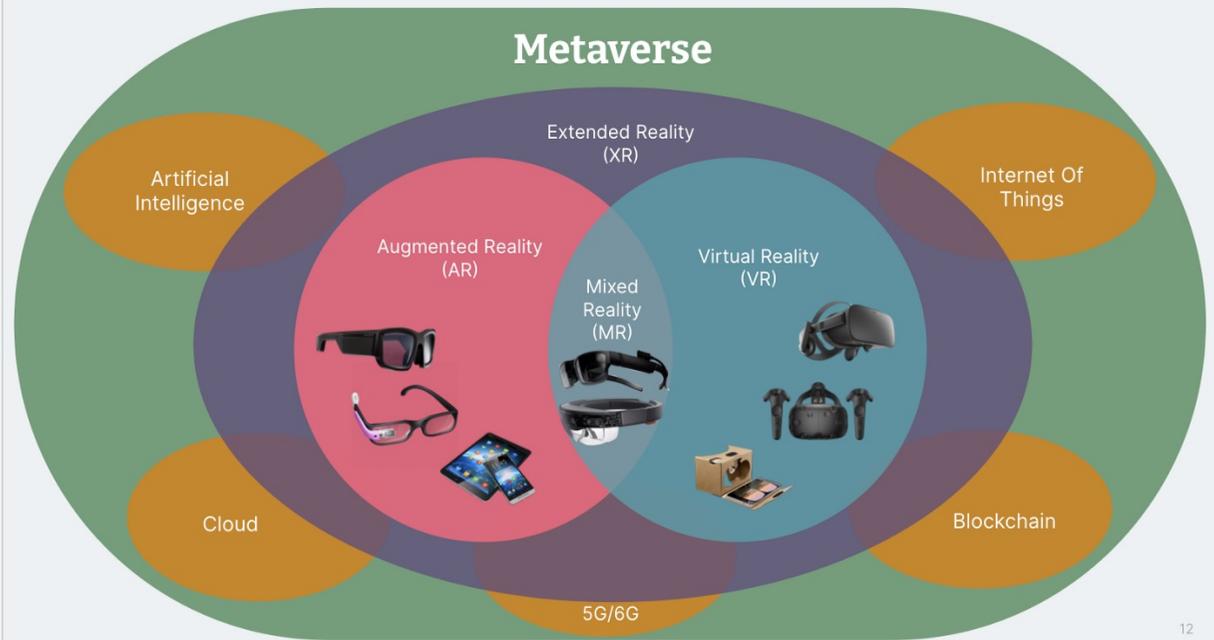
Everything together ..

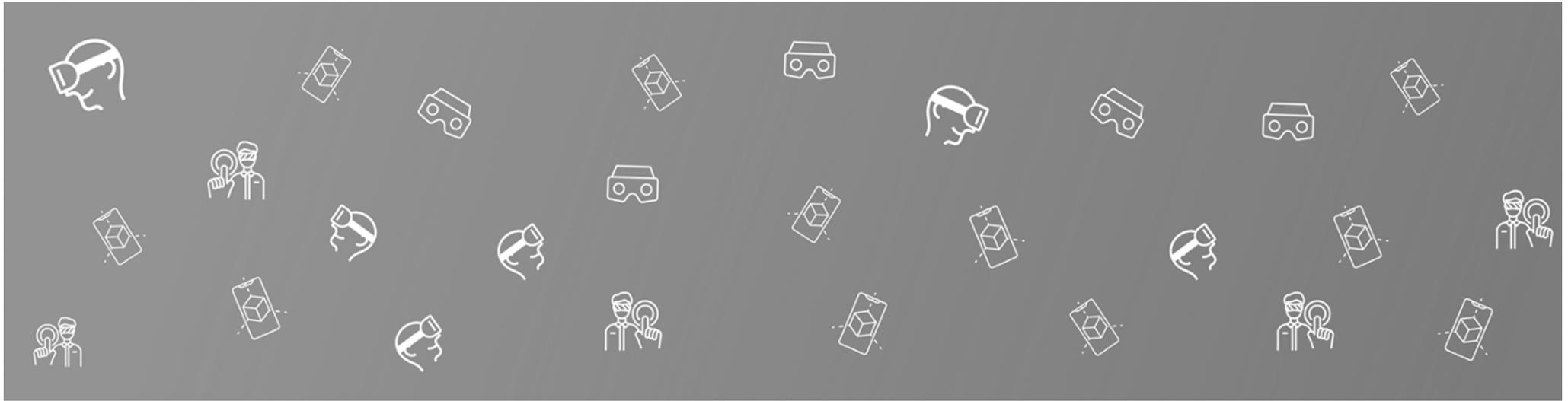
Any form of changing reality..



Everything Together

The M word - Metaverse





“Why” now?

Evolutions



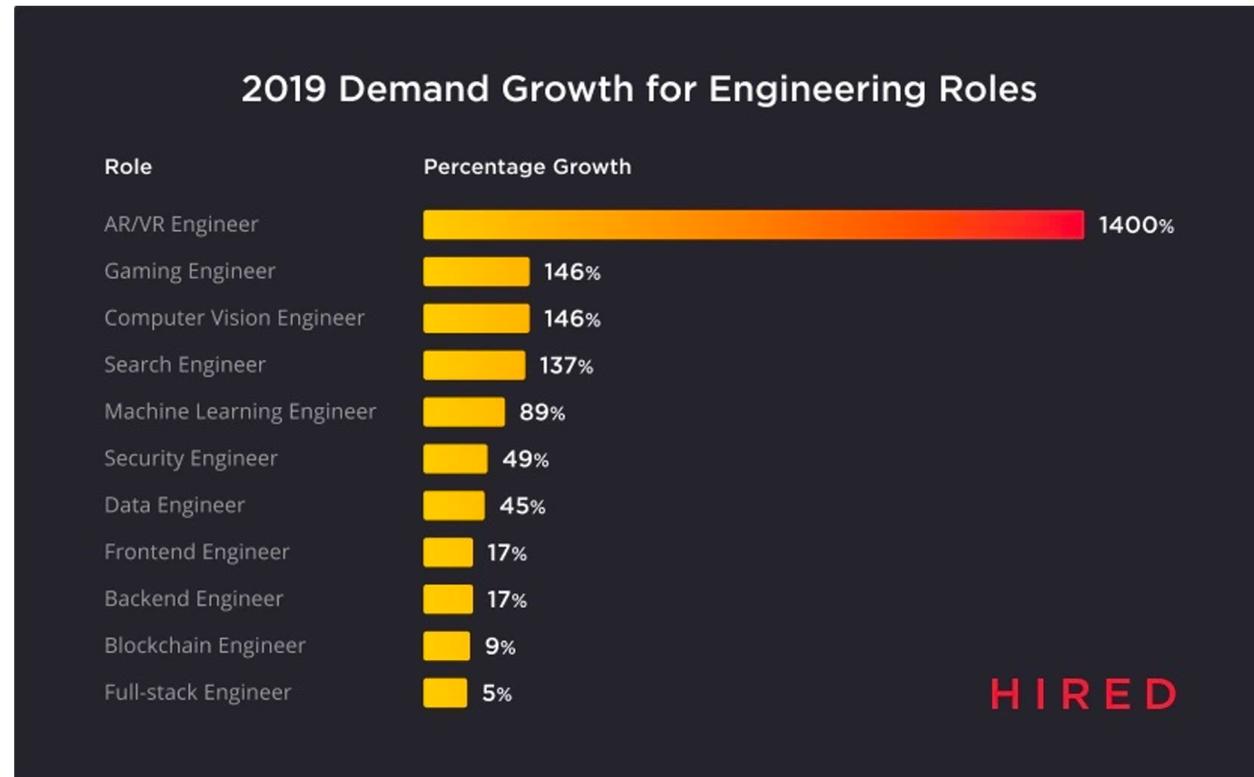
Increasing Adoption



<https://thinkuldeep.com/post/the-growing-list-of-xr-devices/>

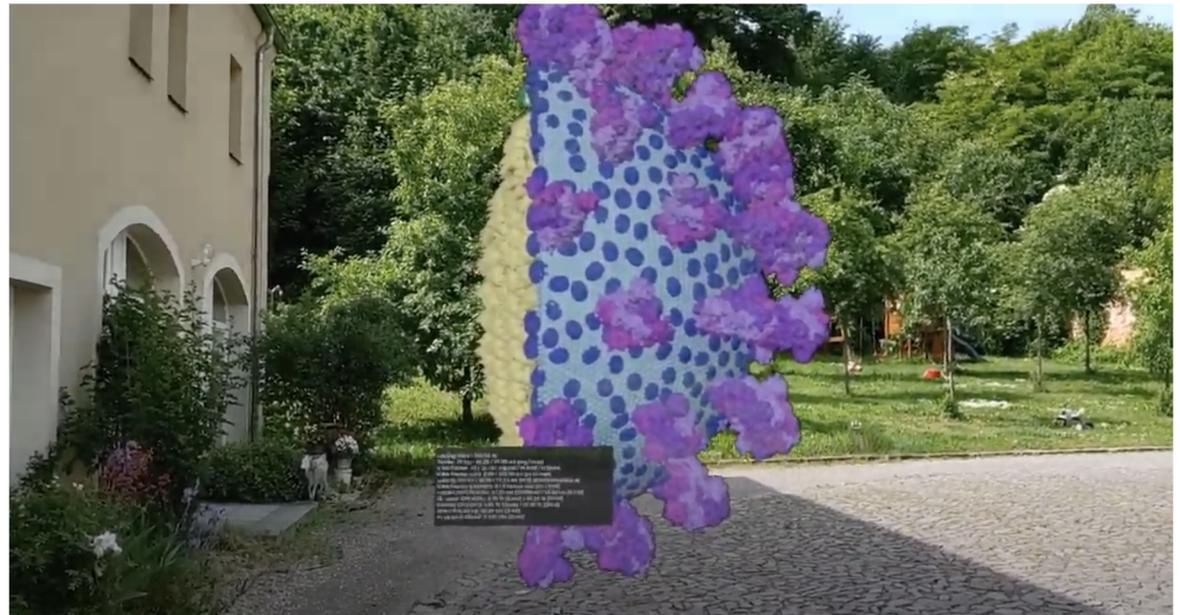


Opportunities



Covid#19 Fueling

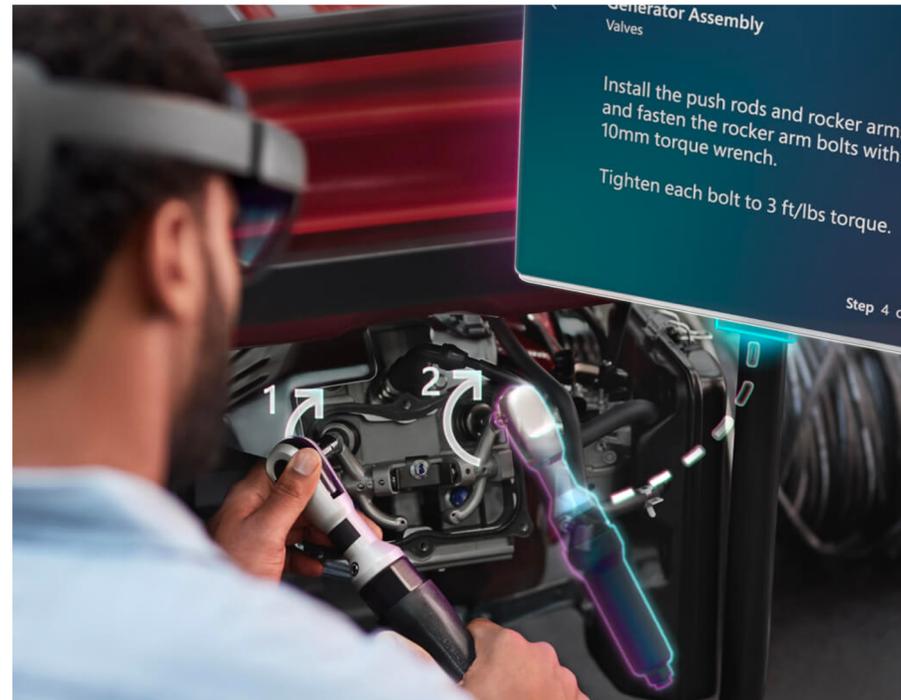
- Touchless, Contactless experience
- Hygiene
- Germaphobia – Fear of Germs
- Agoraphobia – Fear of crowded places
- Use Tech as a solution...
- XR going from “Nice to have” to “Must have”
- Virtual Try-on
- Believing in Virtual as Real
- No travel
- Teleportation





eXtending Reality

- Training and maintenance
- Locate and map
- Product customization and demonstration
- Contextual experiences
- Customer engagement
- Industrial design
- Remote expert
- Gaming and entertainment
- Travel
- Education
- ...



<https://www.thoughtworks.com/insights/blog/extending-reality-ar-and-vr-part-ii>, <https://dynamics.microsoft.com/en-in/mixed-reality/overview/>



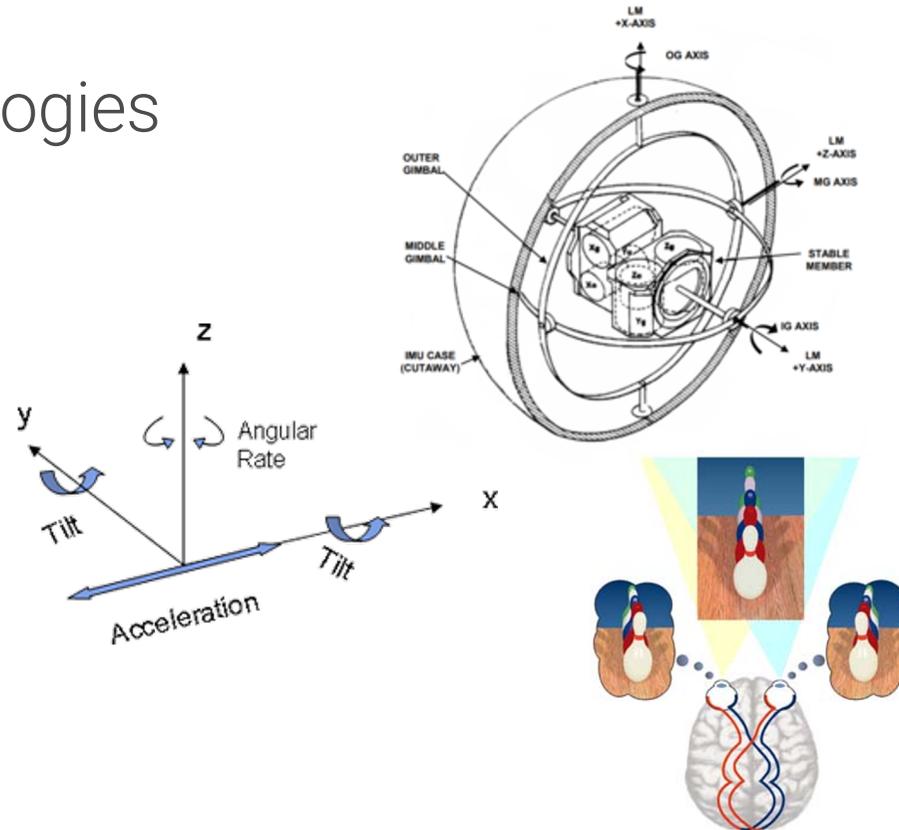
How?

How to start with XR?



Understanding the Terminologies

- IMU - Accelerometer, Gyroscope, Magnetometer
- Degree of Freedom - 3DOF, 6DOF
- Depth Sensing - IR, Dual Camera
- SLAM
- Feature Points - Cloud Anchors
- Occlusions
- Light Baking
- Camera fundamentals





Know this

- Vector and Statistics
- Geometry
- Physics
- Estimations
- CV, AI, ML
- Software development

- 3D Modelling
- Textures
- Animations
- Video mockups
- Audio

Engineer ↔ Scientist ↔ Artist ↔ Developer ↔ Gamer ↔ Movie Director

Light ↔ Camera ↔ Action





Tools and Tech...

Devices

- *VR - Oculus Go, GearVR, Vive, Cardboard*
- *AR - Google Glass 2, Vuzix, Epson, Dell Visor*
- *MR - Hololens 2, Magic Leap 2, Lenovo ThinkReality, Dell Visor, Samsung Odyssey*
- *Mobile Phone/Tablet*
- *A PC with a browser*

Development Tools

- *ARCore and ARKit*
- *Unreal Engine - Epic Games - C++*
- *Vuforia - PTC*
- *Unity Engine - C# and Javascript, XRTK*
- *Qualcom Spaces SDK, Lenovo ThinkReality SDK*
- *UWP - MS, MRTK*
- *AFrame, babylone.js and three.js, 8th Wall*





Getting Started

- [C# Fundamentals](#)
- [Getting Started Unity](https://medium.com/xrpractices/lets-get-started-with-unity-a5b262436a8) - <https://medium.com/xrpractices/lets-get-started-with-unity-a5b262436a8>
- [Learn.Unity](https://learn.unity.com/tutorials) - <https://learn.unity.com/tutorials>
- [Roll A Ball](https://learn.unity.com/project/roll-a-ball-tutorial) - <https://learn.unity.com/project/roll-a-ball-tutorial>
- [Survival Shooter](https://learn.unity.com/project/survival-shooter-tutorial) - <https://learn.unity.com/project/survival-shooter-tutorial>
- Try to build an run on your phone.

Game Object

Scene

Lights and Camera

Game Physics

Animations

Particle System

Audio

Navigation and
Pathfinding

Rendering and
Shading

Build and Deploy





Getting Started – AR & VR

- [Google ARCore - YouTube – Hello AR](#)
- [Getting Started with VR - https://learn.unity.com/tutorial/getting-started-with-vr](https://learn.unity.com/tutorial/getting-started-with-vr), [YouTube – Hello VR](#)
- [WebXR - https://thinkuldeep.com/post/webxr-the-new-web/](https://thinkuldeep.com/post/webxr-the-new-web/)
- 3D Modelling – Blender, 3Ds Max, Maya





Thank you!



Kuldeep Singh

Head of XR Practice, Principal Technologist

ThoughtWorks®

Alumnus - NIT Kurukshetra (2K-2K4)

Speaker, Juror, Mentor, Thought Leader, Technology Director, Engineering Leader, Product Specialist ...

 thinkuldeep.com

Join the XR communities -



[XR Enthusiats](#)



[XR Practices](#)

 [kuldeep-reck](#)

 [thinkuldeep](#)

 [thinkuldeep](#)

 [thinkuldeep](#)

 [kuldeep.reck](#)

 [@thinkuldeep](#)