

DIGITAL  
TRANSFORMATION

## Digital Transformation for Leaders



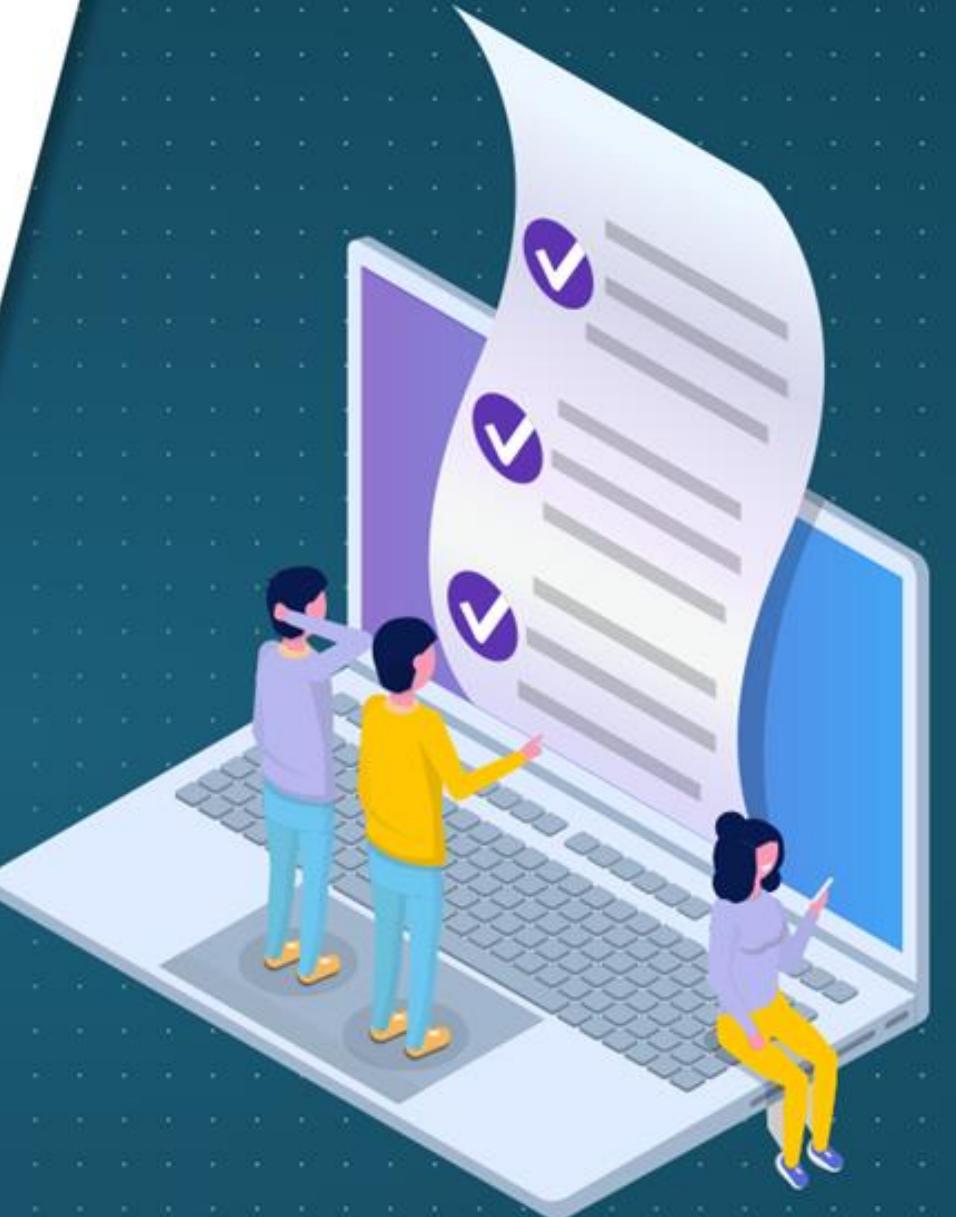
## Virtual and Augmented Reality



# Learning Objectives

By the end of this lesson, you will be able to:

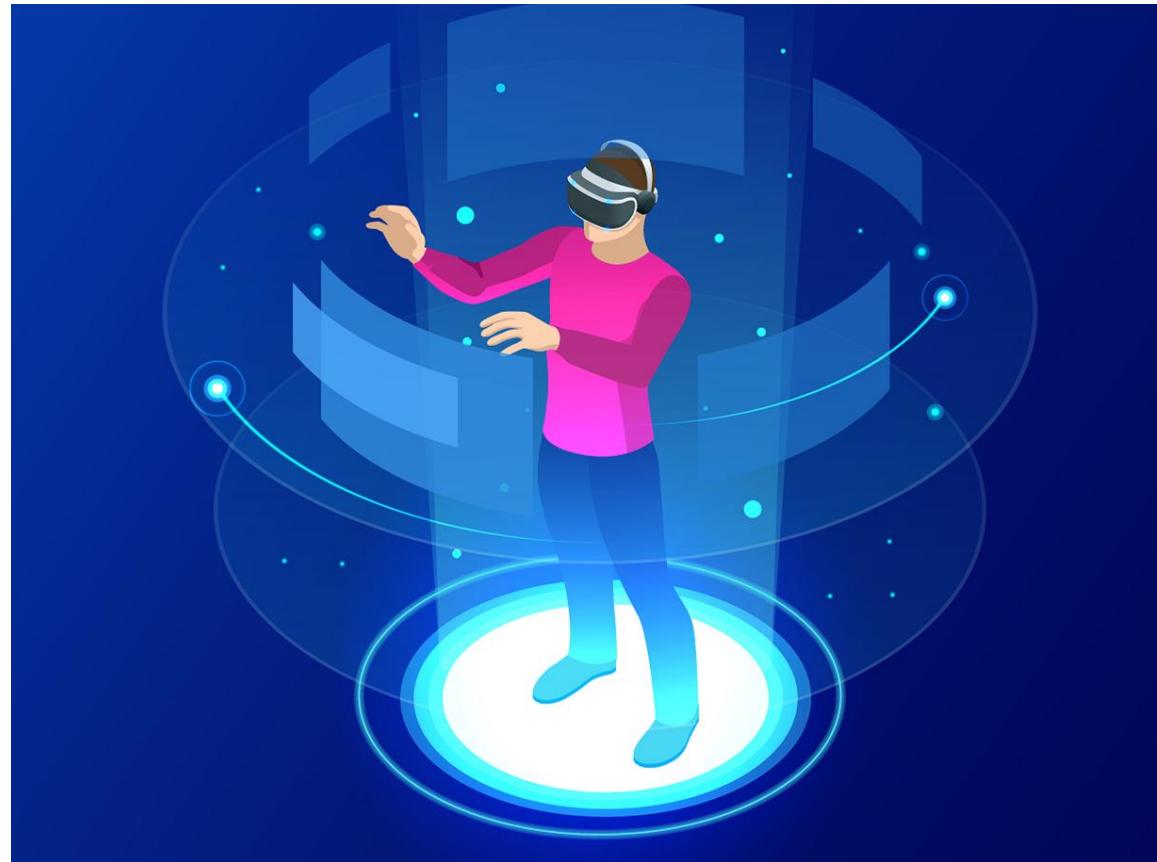
- Explain virtual reality (VR) and augmented reality (AR)
- Discuss how VR and AR are used in different industries and applications
- List the differences between VR and AR.
- Outline the future of VR and AR



## Virtual Reality: Overview

# Virtual Reality

Virtual reality is an experience in a simulated and immersive environment that can be similar to or completely different from the real world.



# Applications of Virtual Reality

These are some of the few areas which has applications of virtual reality:



Defence



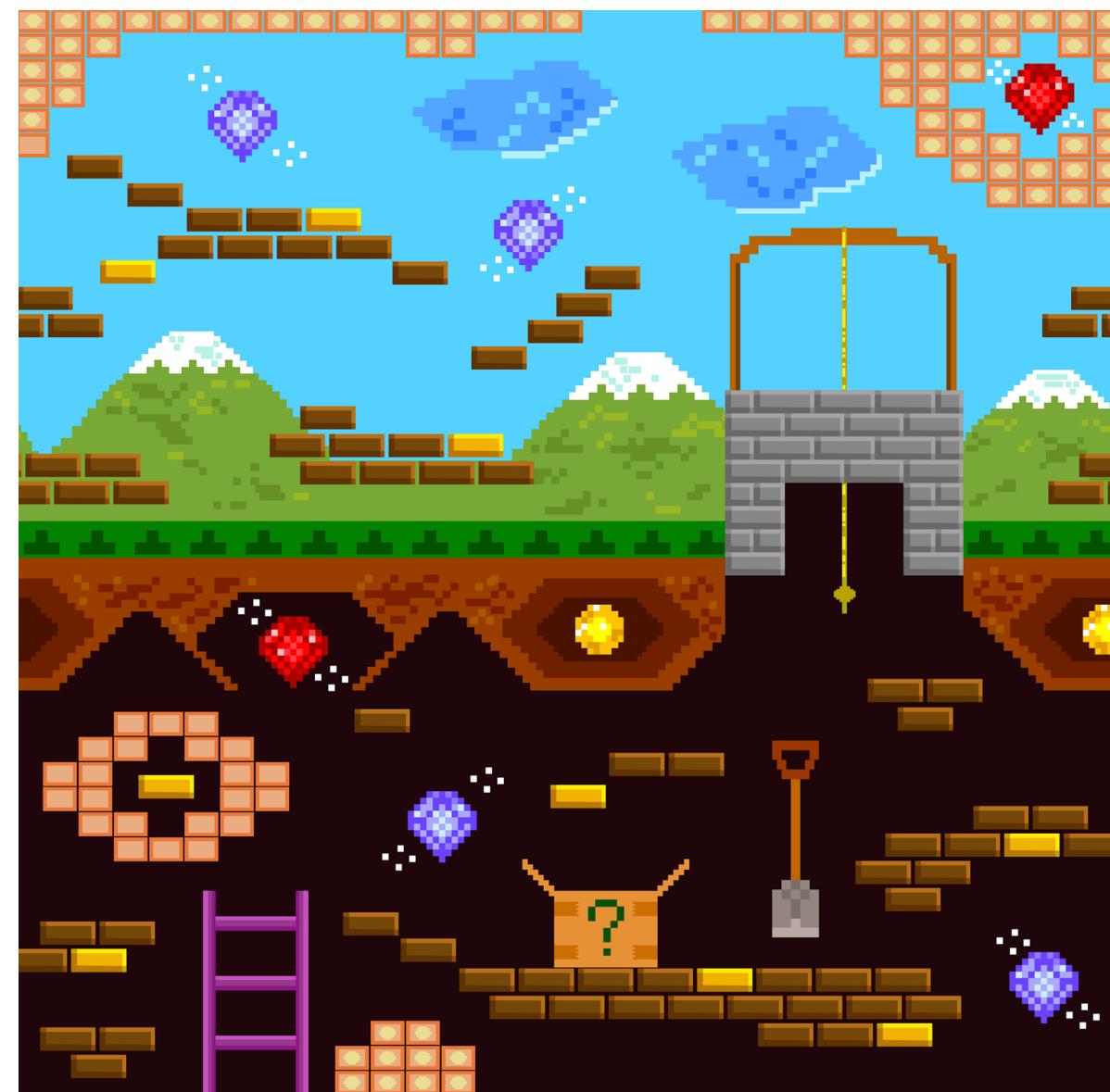
Entertainment



Education

# Applications of Virtual Reality

New technologies are often introduced through games.



# Applications of Virtual Reality

Technologies like VR change the way training is provided for diverse enterprise requirements.



## Virtual Reality: Examples

# TeslaSuit

TeslaSuit is the most sophisticated example of virtual reality gears.



It's the first full-body suit that enhances VR and AR experiences by synergizing four elements:  
*Haptics, Temperature control, Biometric feedback, and Motion tracking.*

# TESLASUIT

## Haptics

Provides an immersive VR experience by allowing you to feel the subtlest of sensations and changes in physical conditions

## Temperature Control

Allows you to recreate a range of hot and cold physical environments

## Biometric Feedback

Documents bodily responses to physical environments and psychological conditions

## Motion Tracking

Helps record expert movements in a virtual environment to facilitate training

# Microsoft Flight Simulator

Microsoft introduced *Flight Simulator* in 1982 to replicate and recreate an immersive experience of flying planes. It stretched the limits of computer capabilities.



Image Source: Wikipedia.org

# Microsoft Flight Simulator

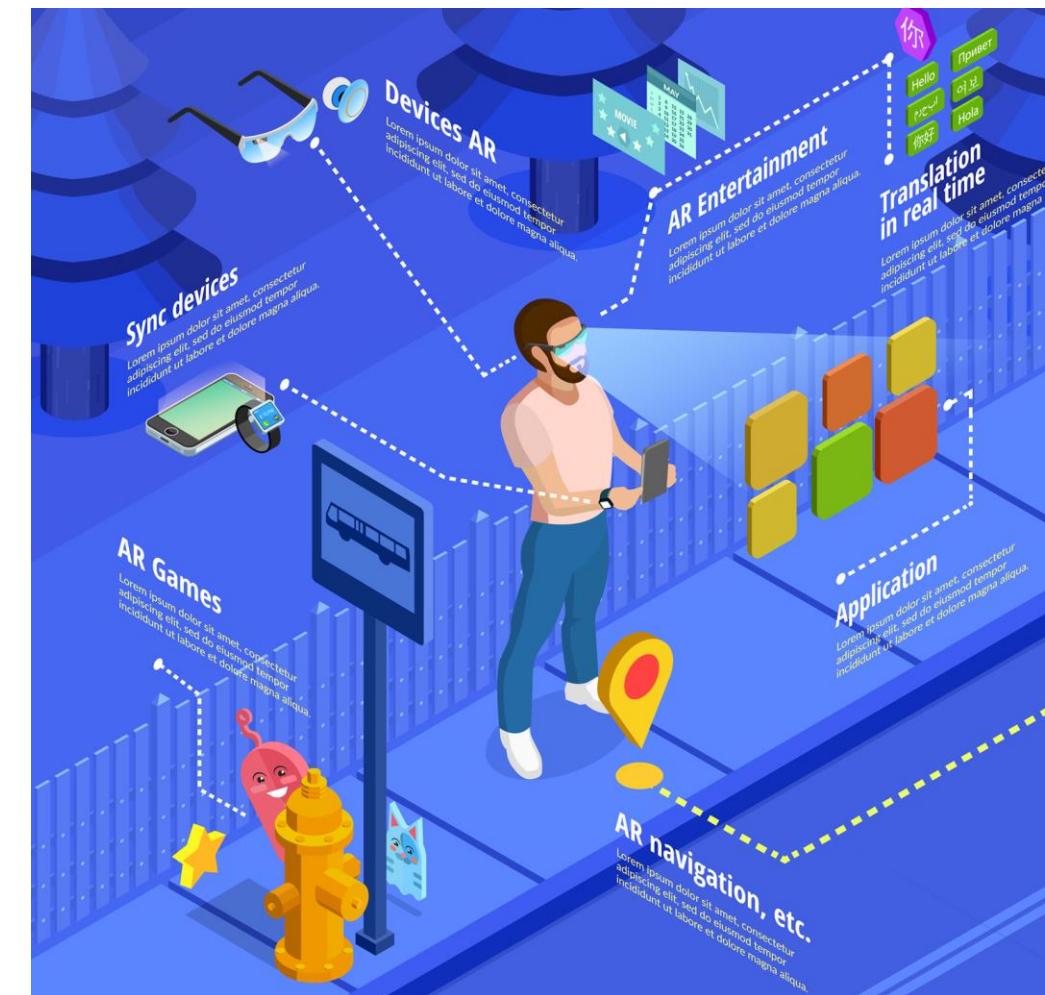
VR can be used for experiences like flying an A380 from New York to Paris.



## Augmented Reality: Overview

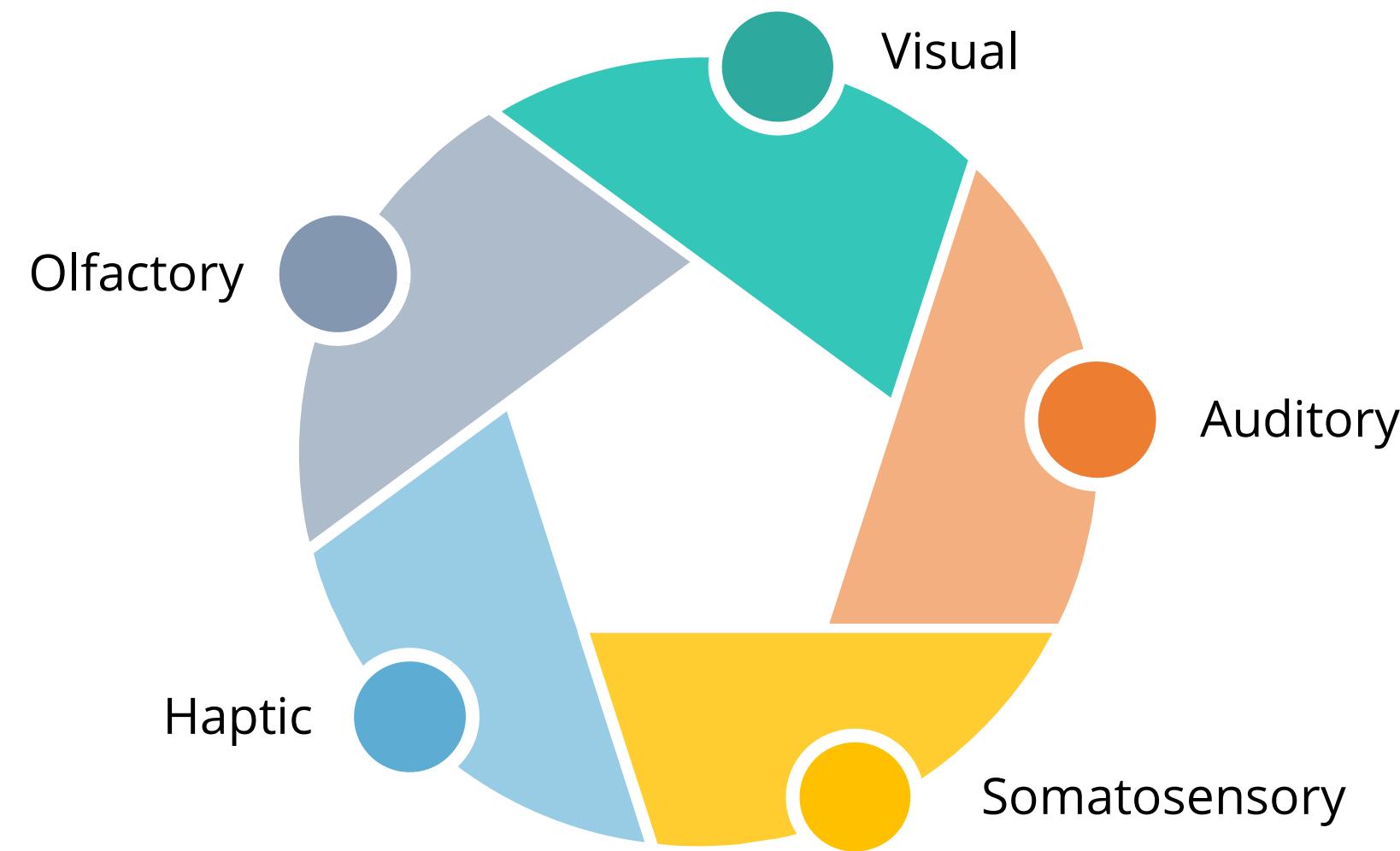
# Augmented Reality

Augmented reality is an interactive experience of a real-world environment in which objects from real-world are enhanced through computer-generated perceptual information.



# Augmented Reality

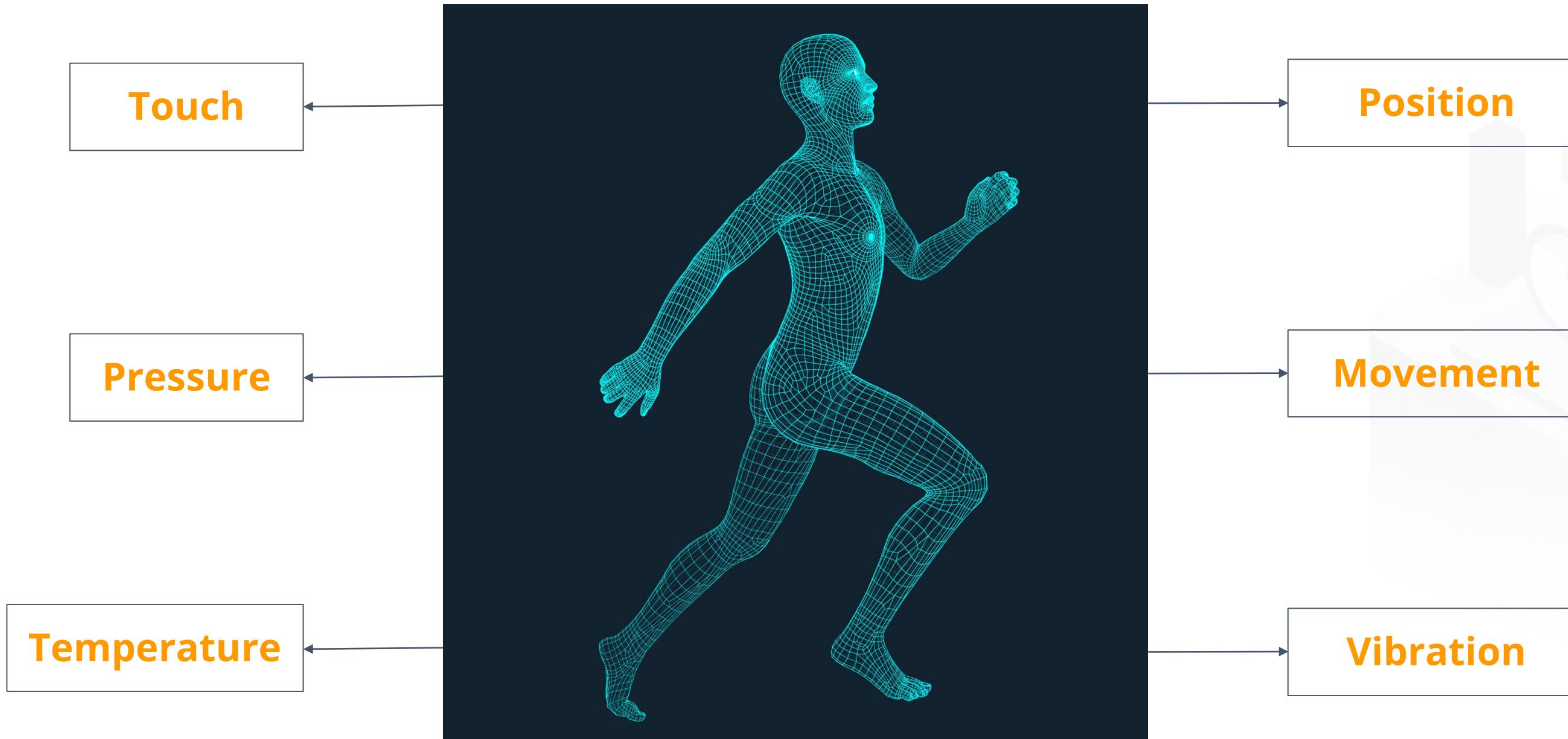
Augmented reality can be experienced across multiple sensory modalities such as:



AR appears in the direct view of an existing environment and adds sounds, videos, and graphics to it.

# Somatosensory System

The somatosensory system is a part of the sensory system concerned with the conscious perception of:



## Augmented Reality: Examples

## Augmented Reality: Example

Pokemon Go, launched in July 2016, creates an augmented reality experience so that players can chase little critters in the augmented world.



It served the same purpose that the Minesweeper game did in 1990. Microsoft introduced the game to help users get accustomed to the mouse.

# Virtual and Augmented Reality: Examples

Sectors with plenty of examples in VR and AR are:



Gaming



Entertainment



Military



Arts

VR and AR are enablers of creativity as they re-engineer tasks and processes and uncover new opportunities.

## Virtual Reality vs. Augmented Reality

# Virtual Reality vs. Augmented Reality

VR

- 1. Doesn't exist physically
- 1. About 75% virtual and 25% real
- 1. Aims to bring a fully-immersive environment and lets users experience a state of flow

AR

- 1. Enhances real-world objects
- 1. About 25% virtual and 75% real
- 1. Aims to bring a partially-immersive environment and lets users interact with real-world objects

## AR for Mobile Apps

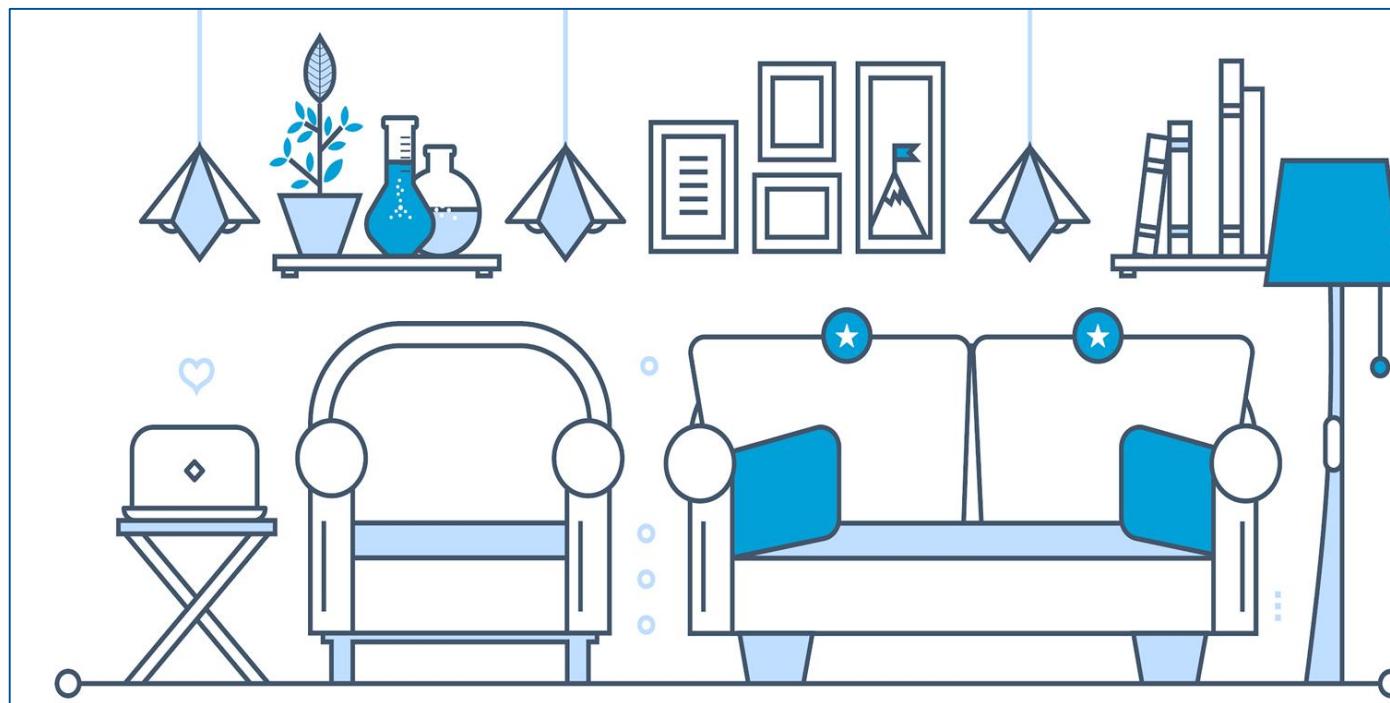
# AR for Mobile Apps

AR experience is not limited to gaming alone.



AR can be experienced everyday through consumer-focused iOS and android apps on mobiles.

# AR for Mobile Apps



- There are apps enabled with AR for redecorating or repainting a room, moving furniture around, or taking the measurements.
- These apps usually target amateurs, but few are powerful and used by professionals too.

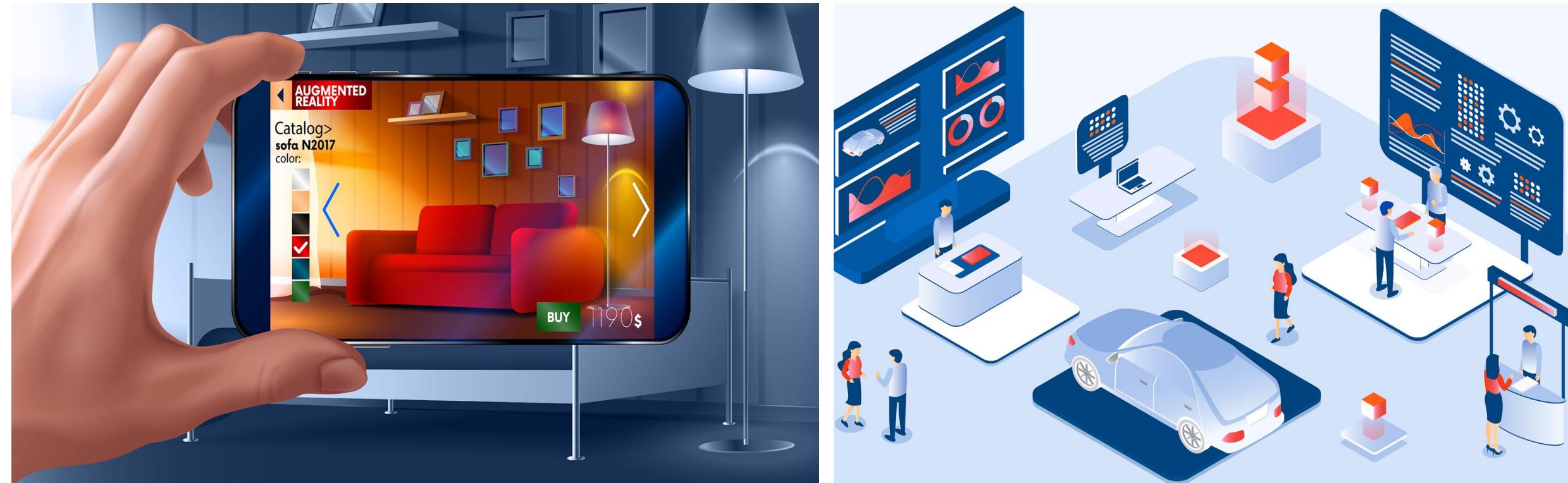
# AR for Mobile Apps



- Popular home improvement app, Houzz, upgraded its **View in My Room 3D tool** with AR capabilities.
- Users can get details after selecting objects from the app's library and placing them in their living spaces.
- Users can also adjust lightings and conveniently buy those items using the app.

# AR for Mobile Apps

Brands use augmented reality apps as a marketing vehicle.



Large retail stores use AR to showcase a virtual, fully-decorated room or to sell clothes or expensive jewelry.

AR can also be used by a car manufacturer to demonstrate the prowess of their latest model.

## AR for Marketing

# AR for Marketing



- Augmented reality has been used for marketing without any technological requirement on the user part.
- Marketing with AR was illustrated in the Pepsi Max bus shelter stunt in 2014.
- Another example is the recent road safety awareness campaign in Montreal, Canada.

# AR for Marketing

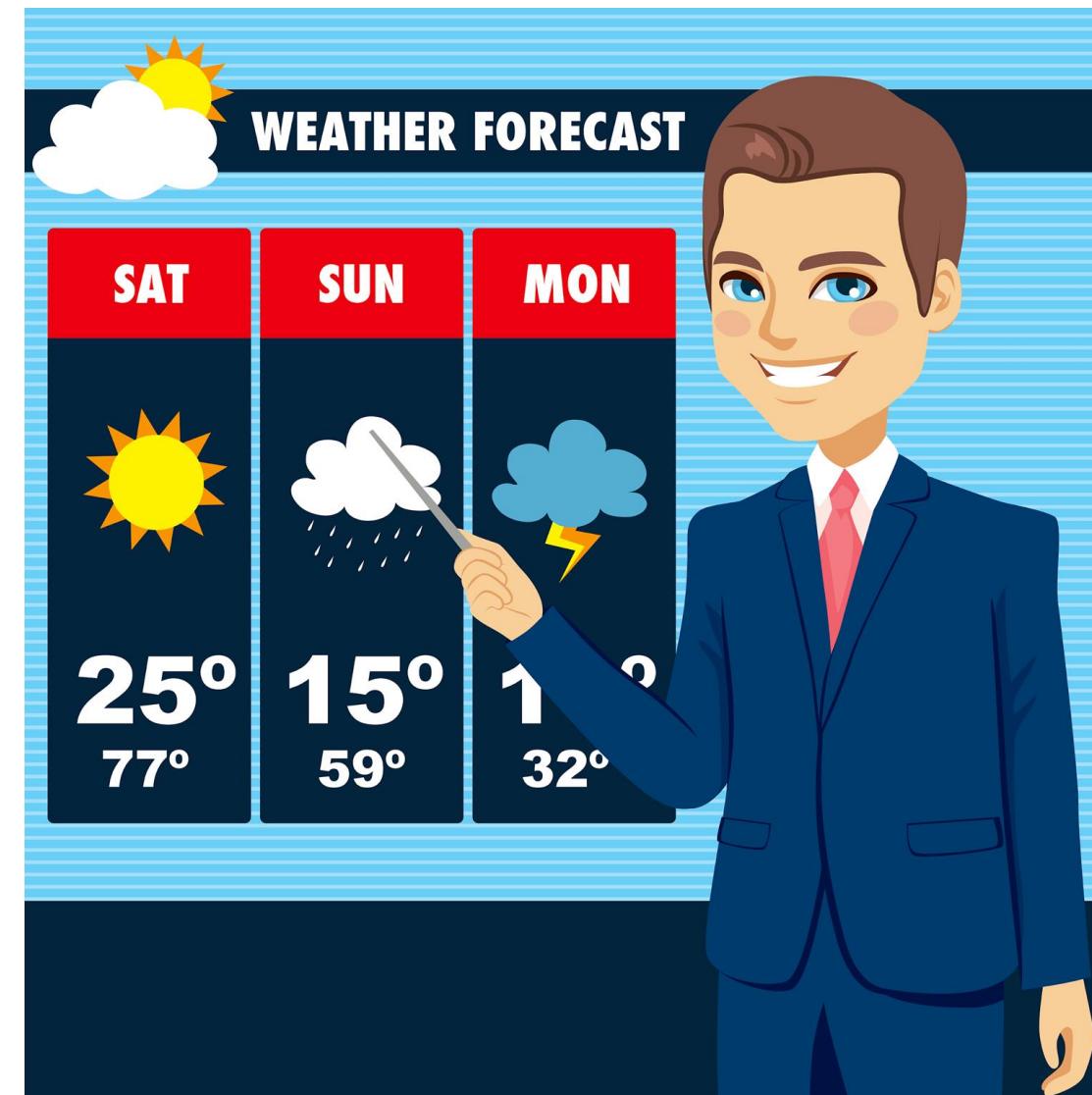
Earlier, magazines such as National Geographic or Popular Science came with a pair of cardboard glasses that allowed readers to see images in 3D.



Today, AR is used in traditional newspapers and magazines to augment reader experience and create innovative modes of advertising.

## AR on TV

On TV, The Weather Channel made a splash when they used augmented reality to demonstrate the impact of Hurricane Florence.



## Applications of Augmented Reality

## AR: Google Translate



- Few apps translate text from any language.
- Google translate isn't strictly an AR app, but it does have one AR feature that is useful in translating text.
- Phone camera is used to capture the text that is not understandable and the app translates the text in real time.

## AR: Google Maps

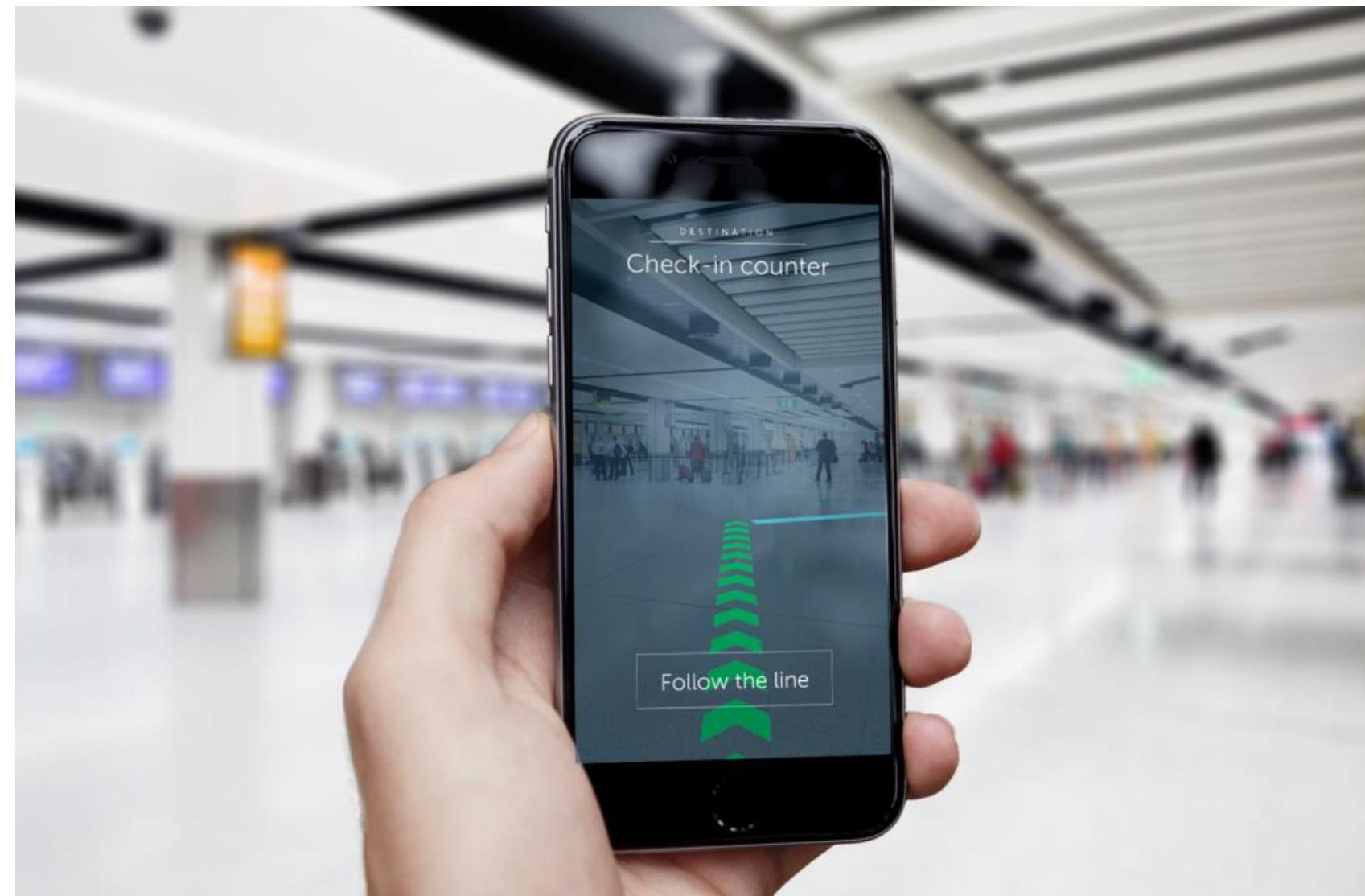
Google Maps has an AR mode that allow users to get directions to any place by simply holding their phones up.



Google Maps

## AR: Gatwick Airport App

The Gatwick airport app uses 2000 navigation beacons to help find the way and complete all procedures.



# AR: Tourism Industry



- AR has a passive application in tourism industry and helps in spotting sightseeing attractions along with additional relevant information.
- It also provides local transit information or any other relevant item of interest, just by holding the mobile in front of something.

## AR: Ryot App

RYOT, a motion picture studio, recreated Paris' renowned Louvre Museum at a warehouse in Los Angeles using AR.



This allowed kids in LA explore art and learn about it using a tablet or a mobile device.

## Applications of Virtual Reality

# VR for Training

VR helps train employees in a safe manner without the risk of accidents, slowing down productivity, or breaking something.



It can also be used to enhance occupational safety by recreating realistic scenarios that are less dangerous.

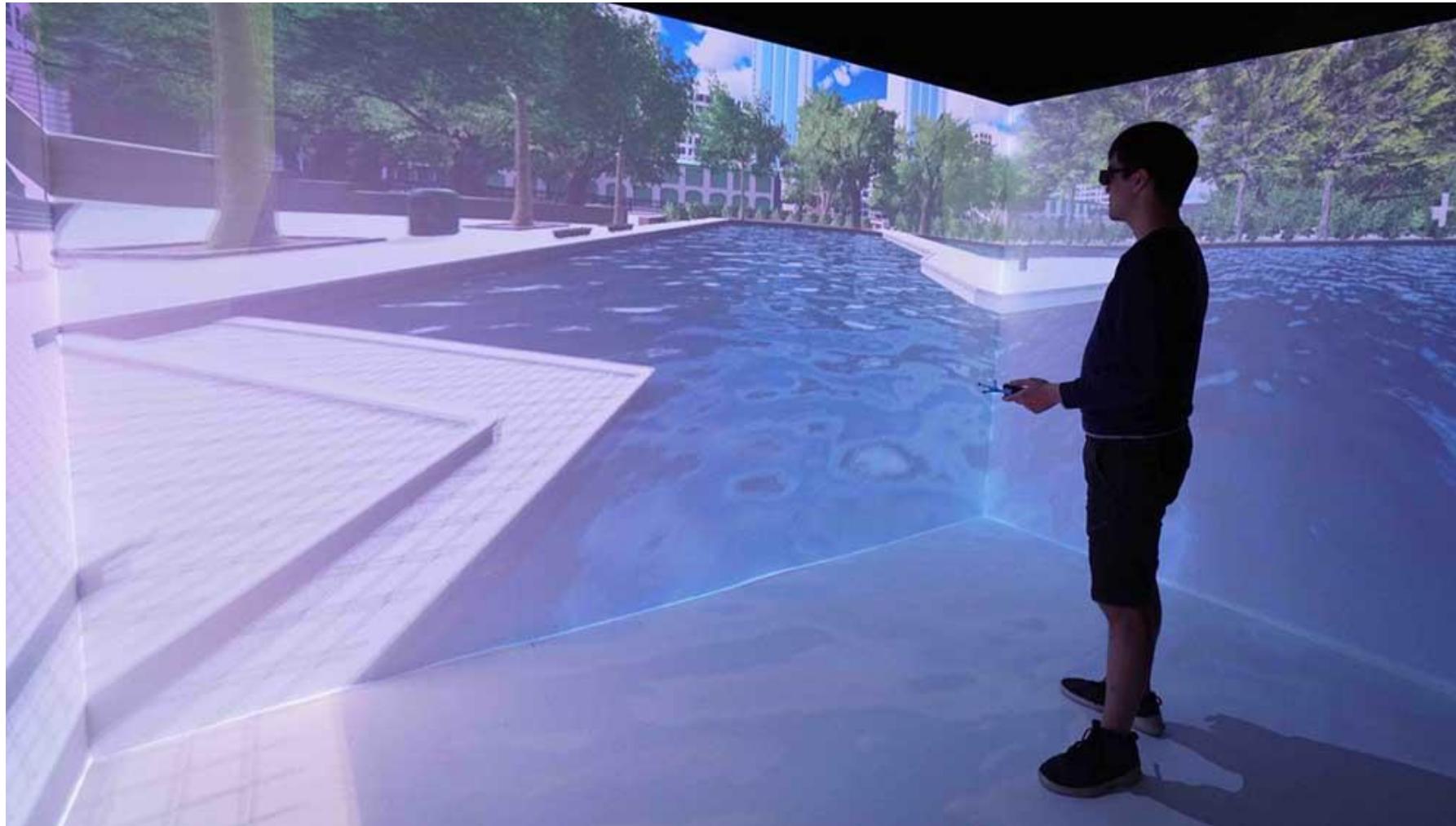
# VR for Engineering Perspective



- VR allows to virtually create a part or a whole prototype and put it to test before the real product is created.
- It allows designers and engineers to see, assess, and modify a considerable number of variants.

## VR: CAVE

A truly immersive environment needs to capture all our senses and movements.



Cave Automatic Virtual Environment (CAVE) is a room-sized cube in which we can create truly immersive experiences.

# VR for Healthcare



- Virtual and augmented reality are used extensively in healthcare industry, be it for medical training or patient treatment.
- A simple VR/AR tool reveals the bloodstream, facilitates the identification of potential issues, and makes it easy to find the best spot for drawing some blood.

# VR: Research Study

According to a research conducted by University of Texas, practice in virtual reality environments helps improve performance in real-world scenarios.

Skill	Robotic Skill	Pretesting Overall Score (%)	Posttesting Overall Score (%)	No. of Trials to Proficiency	p-value
1	Camera control	72.5	90	3	<.001
2	Energy control	68	84.5	2	<.001
3	Endowrist manipulation	86	96	2	<.001
4	Basic needle driving	54	80	3	<.001
5	Advanced needle driving	50.5	73.5		<.001
6	Needle control	71.5	85	6	<.001
7	4 <sup>th</sup> arm control	30.5	69	2	<.001

## Risks of VR and AR

# Risks of VR and AR



- Texting and driving is dangerous and leads to many road accidents. Cases of people using mobiles while walking is equally risky.
- People are really immersed in their augmented realities that they become oblivious to the real world around them.

# Risks of VR and AR



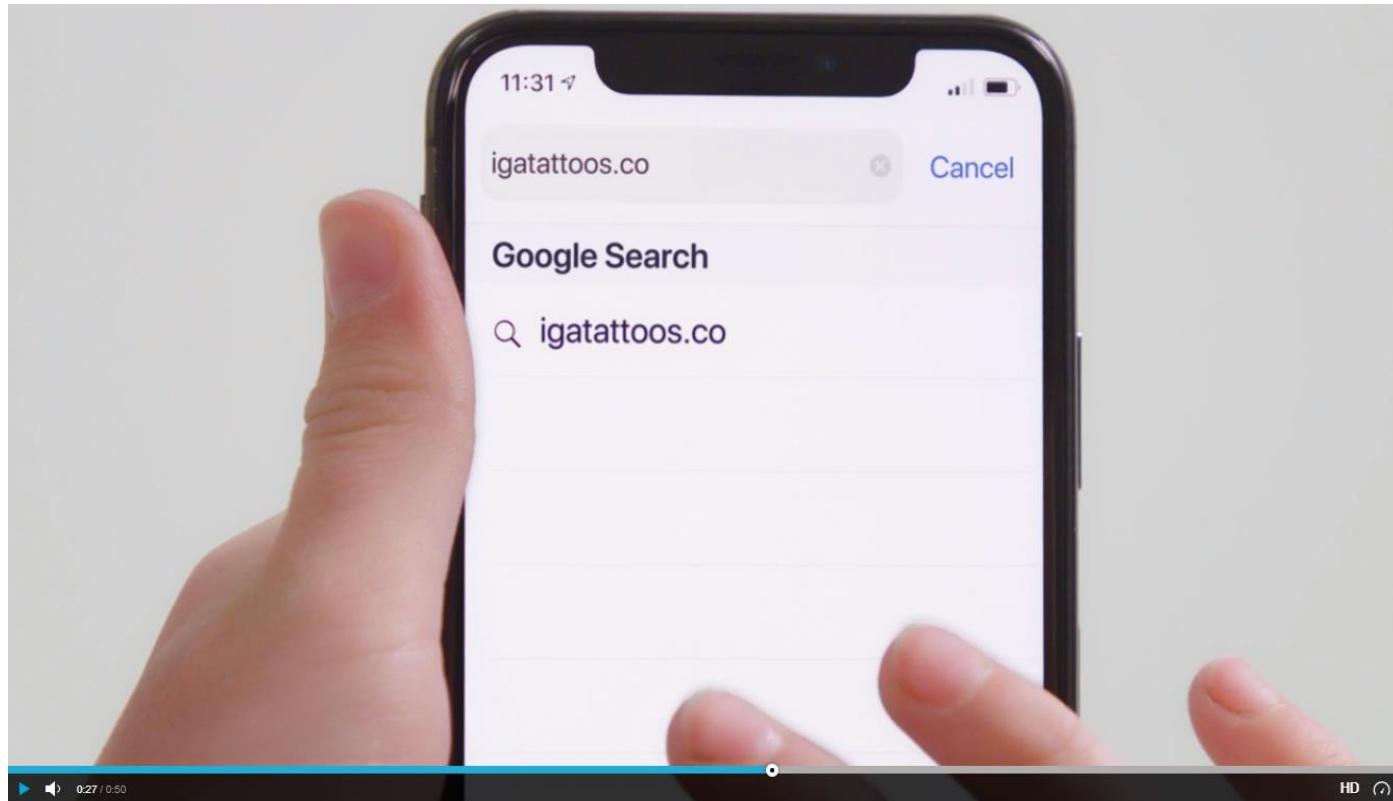
- The advent of wearables makes this risk even more potent in public spaces.
- A quick google search will lead you to plenty of shocking videos of people losing balance and falling down.
- VR and AR can be used to improve training and safety, while they can also cause safety risks.

## Risks of VR and AR

VR and AR raise privacy and ethical concerns as they rely heavily on data.



## Risks of VR and AR: Examples



- A non-profit organization targeted a campaign at kids to raise funds from their parents.
- In the campaign, temporary tattoos were brought to life using Facebook's AR technology.
- Targeting young minds raised ethical concerns as most parents viewed it as an invasion of their privacy.

# Disadvantages of VR and AR

About one in 4000 may face severe dizziness, seizures, or blackouts while using VR/AR technologies.



There is a risk of organizations falling for the “new shiny object,” spending a lot of resources on it and getting very little-to-no return.

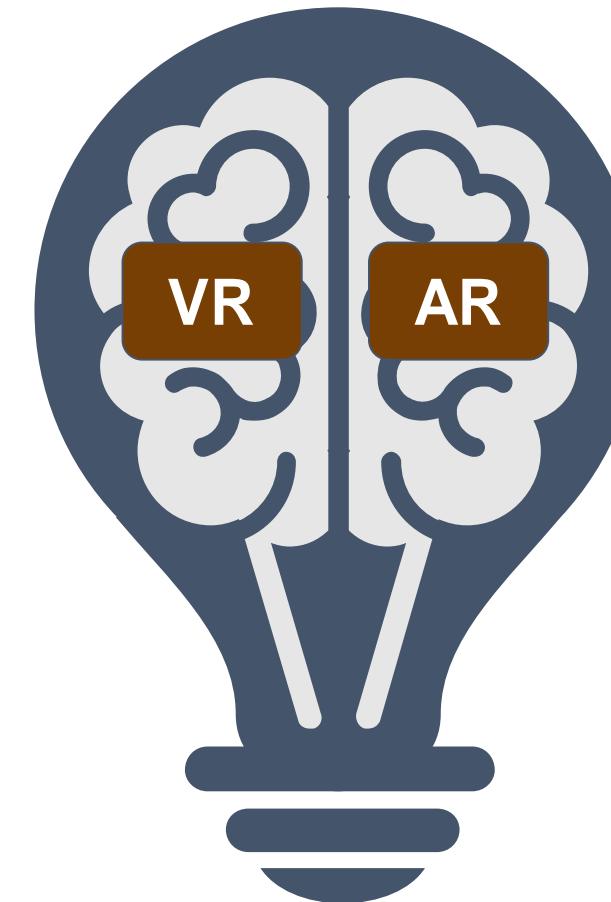
## The Future of VR and AR

# Benefits of VR and AR

VR and AR are removing barriers to creativity and allows to re-think solutions to existing problems and imagine totally new possibilities to grab a greater share of attention.



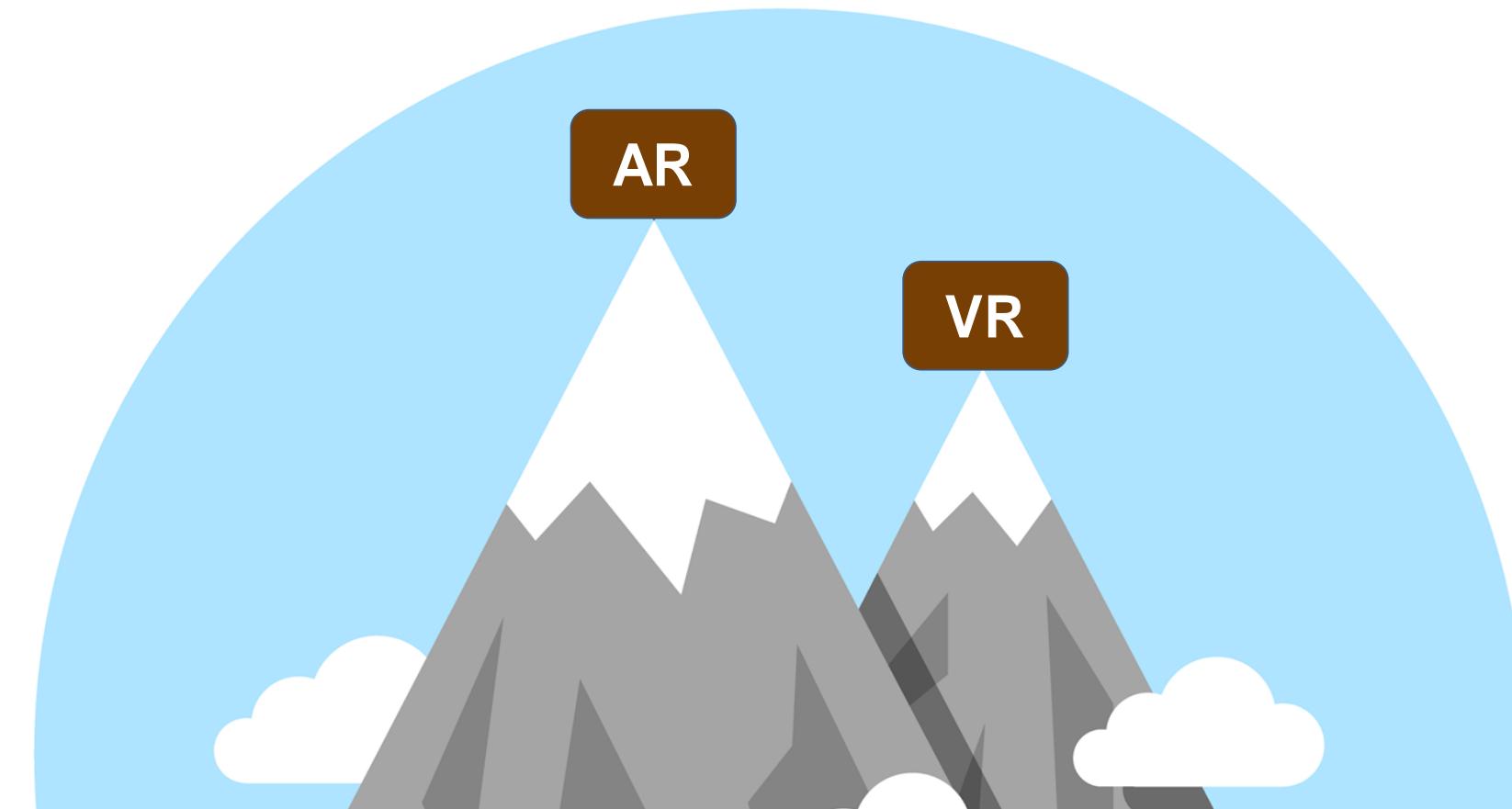
# Benefits of VR and AR



- 01 Impacts training
- 02 Re-engineers processes
- 03 Eliminates risks

## VR vs. AR

AR applications have more potential than VR applications as VR is costly and complex whereas AR is mainstream, thanks to smartphones and headsets.

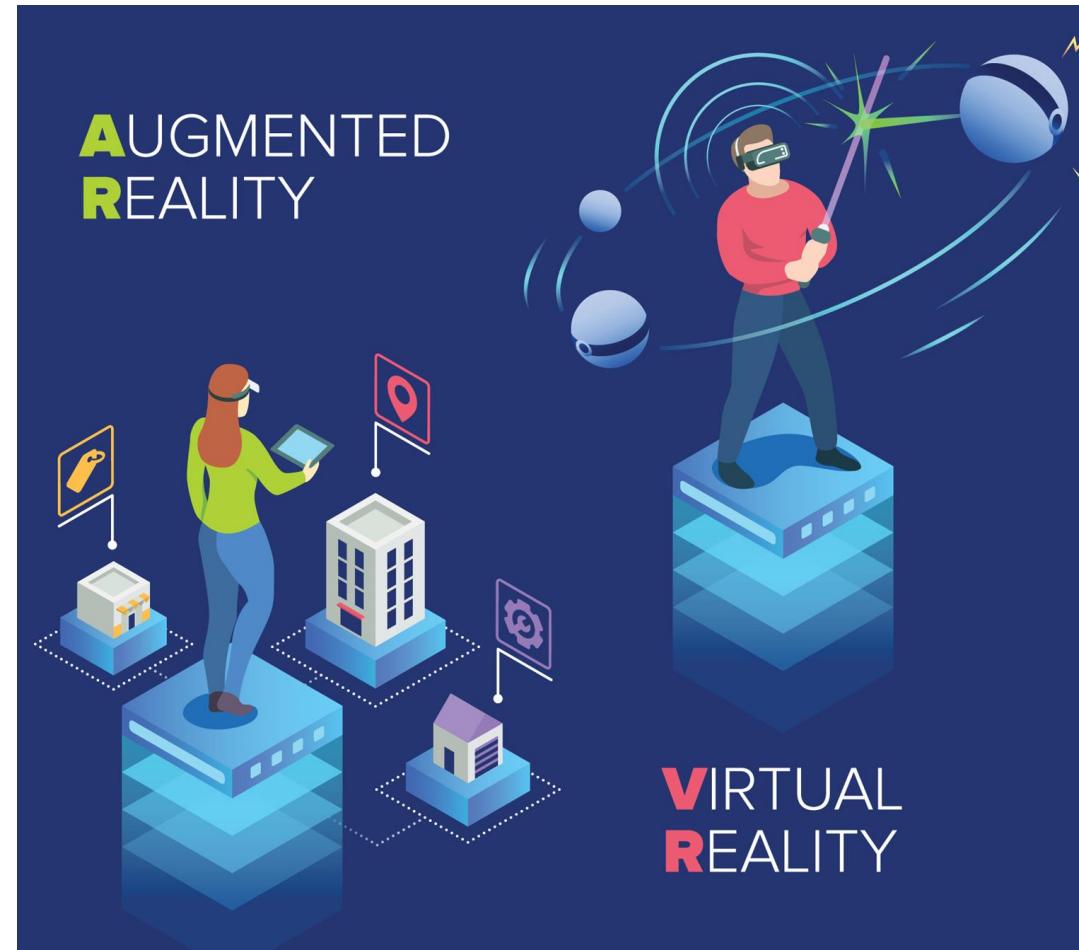


# VR vs. AR



- A basic cardboard setup and mobile phone can provide augmented reality experience.
- AR glasses have the potential to replace the smartphone within the next 10-15 years.
- AR devices allow to interact intuitively with virtual objects using senses like smell and taste, and abilities like movement and balance.

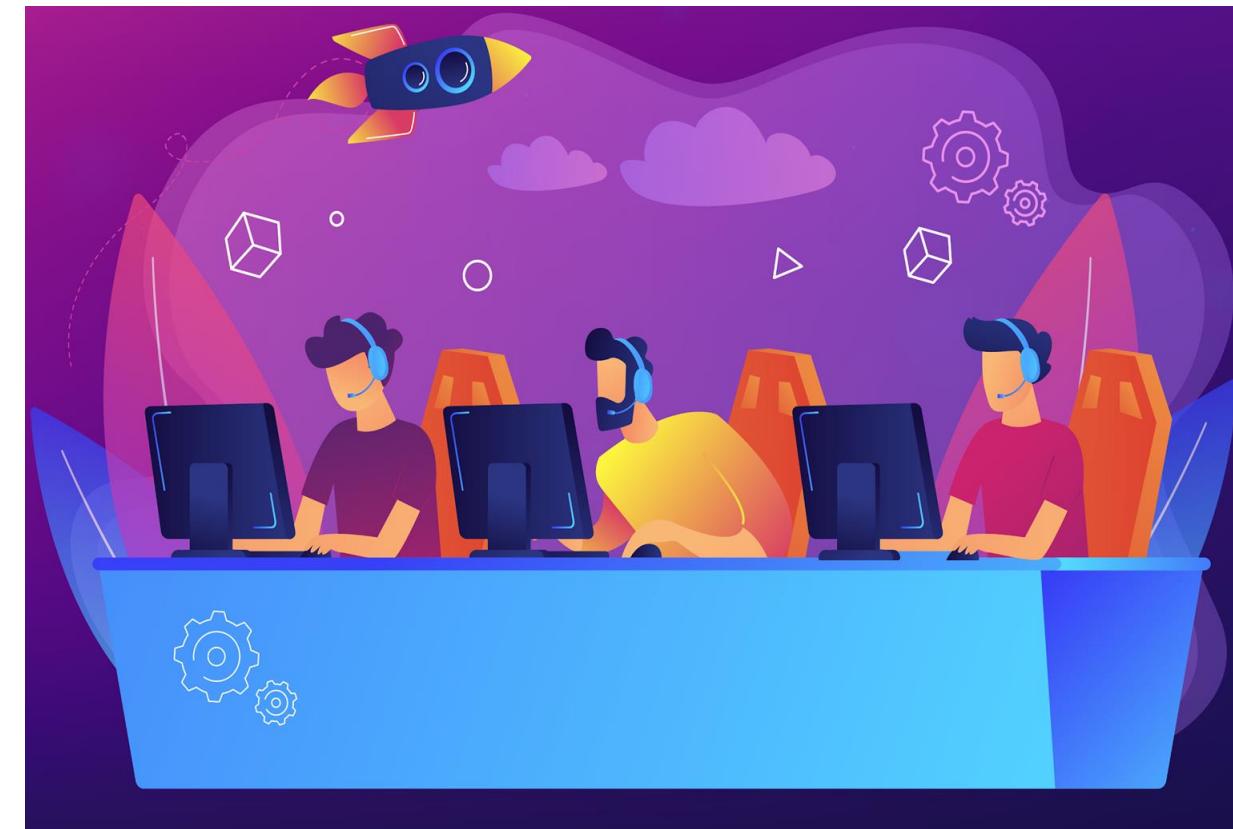
# Future of VR and AR



- Ultrasound may be used to stimulate nerves in our brain or vertebrae or trigger senses by surgically placing implants in the brain.
- Although, some industries like FMCG might be less suited for VR and AR.
- AR and VR can only be used for marketing purposes and nothing much.

# Future of VR and AR

AR and VR will make use of all senses as the Teslasuit example demonstrated, instead of just using visual faculties.



Heavy gamers will likely be the first to use these advanced technologies before it is introduced to the broader audience.

# Future of VR and AR

Data science and artificial intelligence will make AR and VR more efficient by creating self-learning systems and virtual environments.



## Key Takeaways

- Virtual reality is an experience taking place in a simulated and immersive environment.
- Augmented reality is an interactive experience of a real-world environment.
- Technologies supporting VR and AR have evolved very quickly over the past few years and can be put to many uses.
- Benefits of using VR and AR include stimulated creativity, improved training capabilities, attenuated risks, and reengineered processes. But there are also risks to health, privacy, and safety.

