VIBE PROJECT

Virtual Biomedical and STEM/STEAM Education

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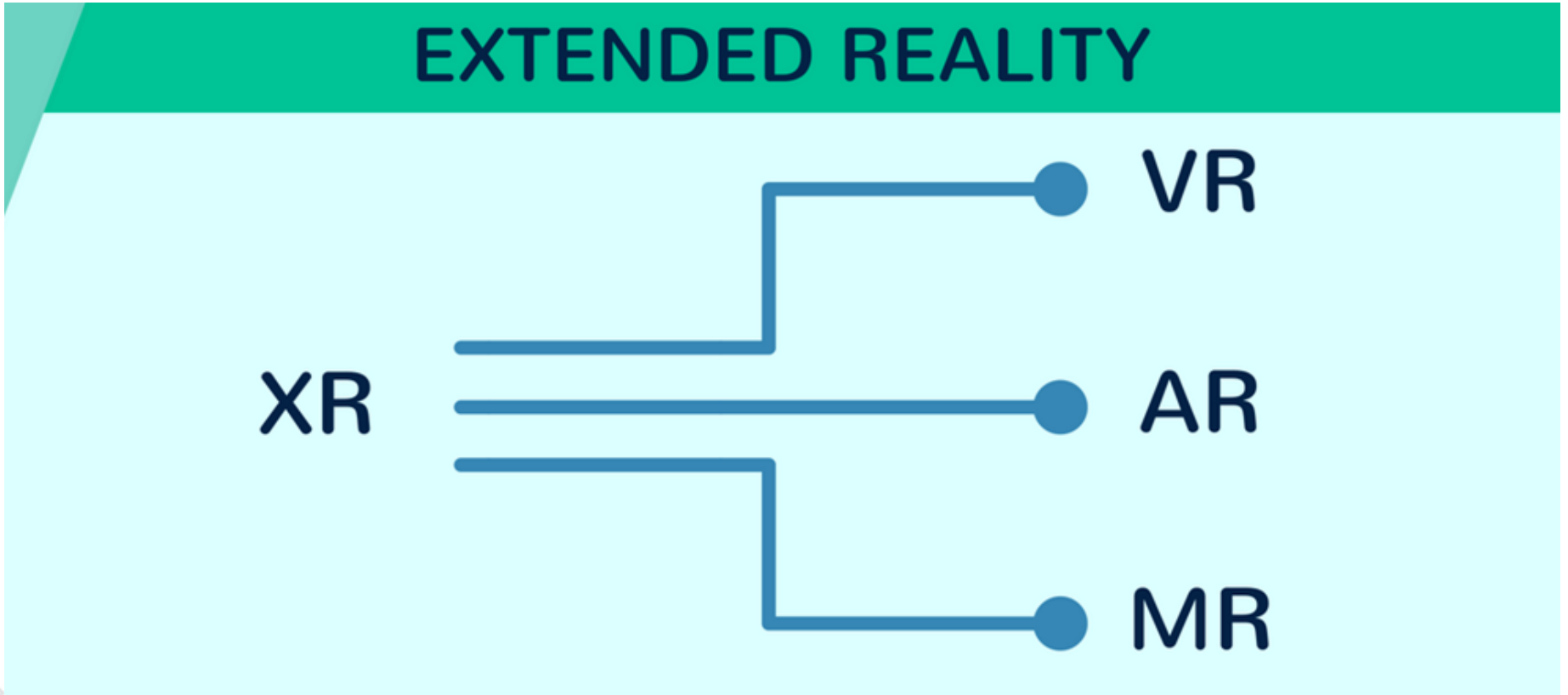
VIBE PROJECT

3D VISUALISATION & PRINTING

AR-VR-MR technologies

Extended reality (XR)

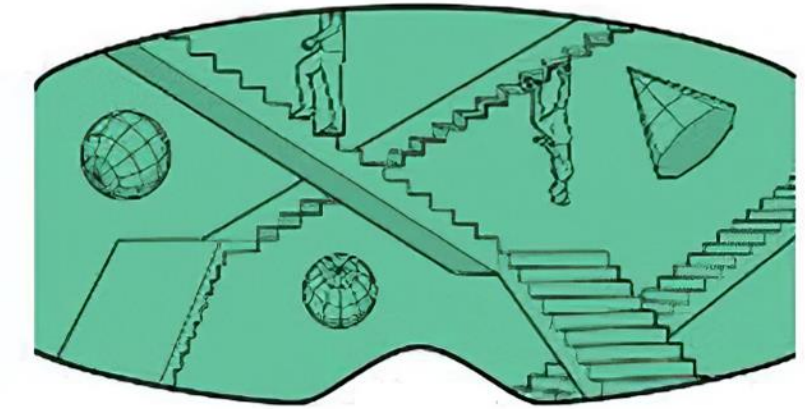


XR: a collection category covering different forms of digital reality

Virtual Reality (VR)

Virtual reality (VR) includes the experiences and content provided by a VR headset. The content is 100% digital and **computer generated or recorded video**.

Current reality is replaced by a new 3D **digital environment** in which the user is isolated from the real world.



Categories of virtual reality (VR)
Standalone VR

These standalone headsets (wireless VR) **do not require** a **connection** to a PC or smartphone and are usually a more **affordable** option.

HTC VIVE XR Elite

Oculus Quest 2

Categories of virtual reality (VR)
Tethered VR

Tethered VR headsets currently provide a much **more realistic** experience than other types of VR. They require a **wired connection** to a **high performance gaming PC**, providing a high-end, but still so-called desktop VR experience.

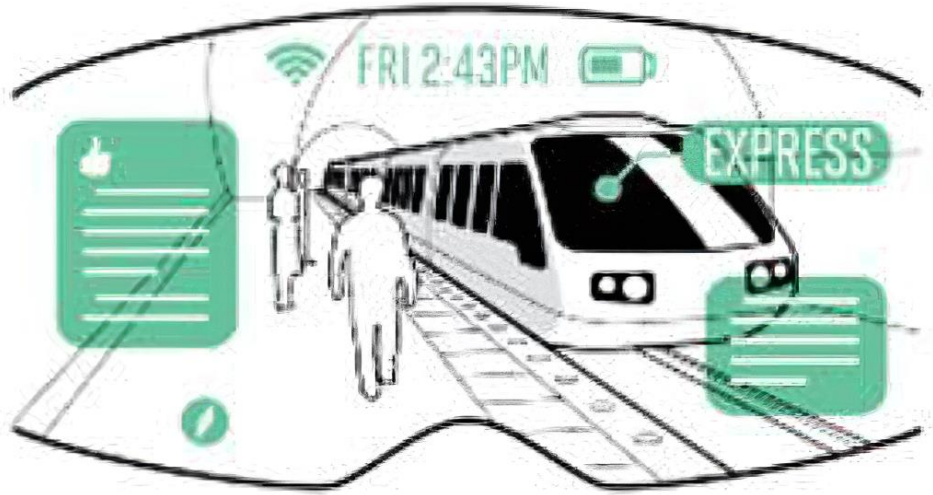
Oculus Rift

Bigscreen Beyond

HTC VIVE Pro

Augmented Reality (AR)

Augmented reality (AR) superimposes **digital content** on the user's view of the real world. This means that all types of content (2D or 3D) and data (ambient temperature, emails, directions, etc.) are **visible through an AR device**.



Categories of augmented reality (AR)

Wearable AR glasses (smart glasses)

AR glasses are wearable glasses that add information or digital content to what the wearer sees.

High-end AR smart glasses (micro displays) are used more widely at the enterprise level, for example in retail, manufacturing, engineering and sports. The price of these devices is usually quite high, ranging from $1000 to $5000. Both enterprise and consumer level AR glasses are available, but the trend is for manufacturers to target enterprise businesses.

Google Glass

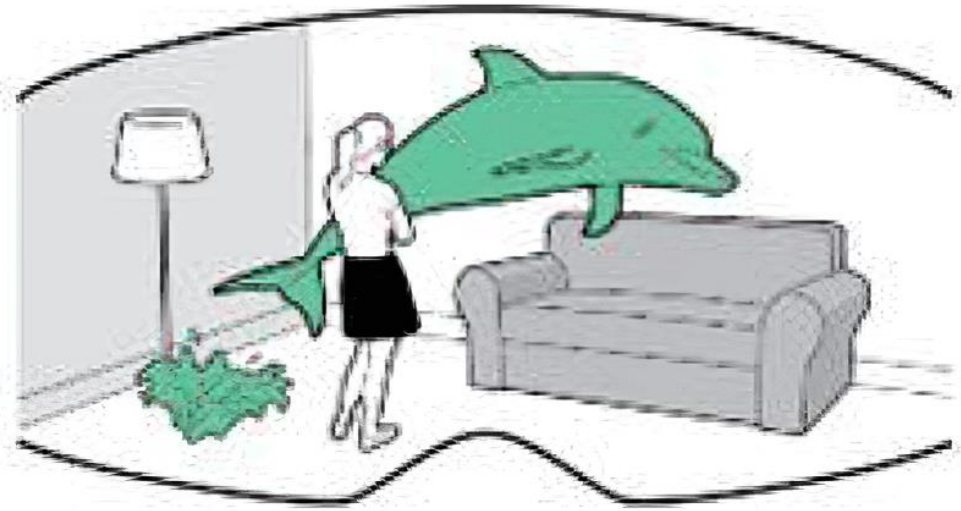
ThirdEye Gen X2

Vuzix Blade AR Smart Glasses.

Mixed Realty (MR)

MR (also known as MX, immersive media, spatial computing and hybrid reality) **displays digital content while interacting with the user's real environment.** This allows the digital content to blend with the user's real environment.

Computer generated objects can be visibly obscured by elements of the physical environment from the user's perspective.



Magic Leap Video

HoloLens Video

Mixed reality (MR) tools

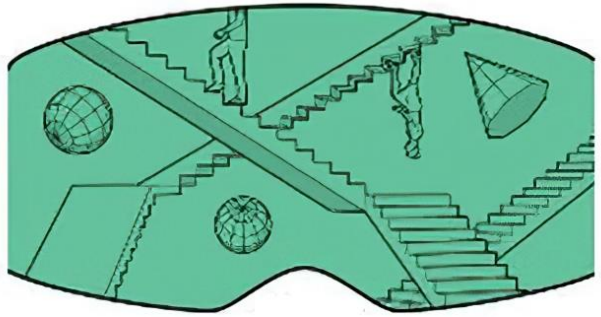
MR devices continuously scan the real environment to enable a mixed reality experience. This is necessary to place digital content in the user's real environment and to allow the user to interact with computer-generated objects. Compared to AR and VR, there are far fewer products available.

Wireless devices, not requiring external power supply. They contain several different types of sensors and cameras. They have a limited field of view, typically 40 degrees.

Magic Leap 2

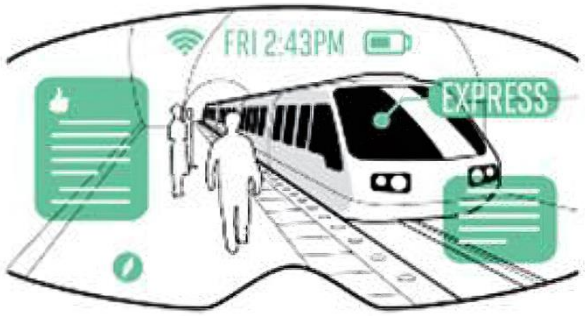
HoloLens 2

Differences VR/AR/MR



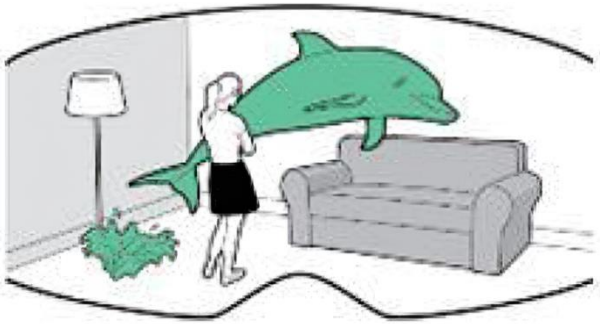
Virtual Reality

VR puts the user in a completely different place. Whether this location is computer-generated or captured on video, it completely obscures the user's natural surroundings.



Augmented Reality

In augmented reality, such as Google Glass, the visible natural world is overlaid with a layer of digital content.



Mixed Reality

With technologies like Hololens, virtual objects integrate and respond to the natural world. For example, a virtual ball under your desk would not be visible unless you bent down to look at it.

Example projects - VR

Video

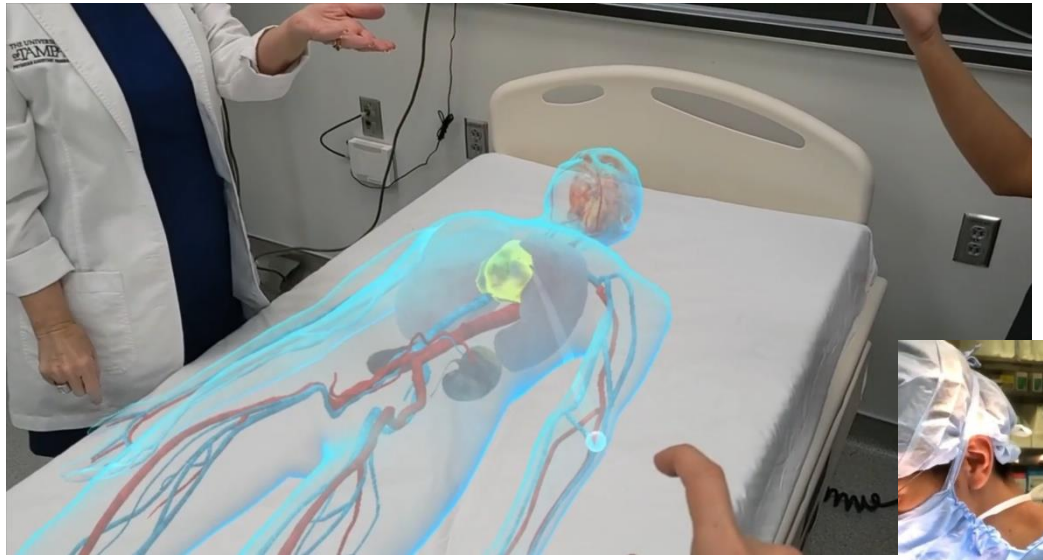
Video

Example projects - AR

Video

Video

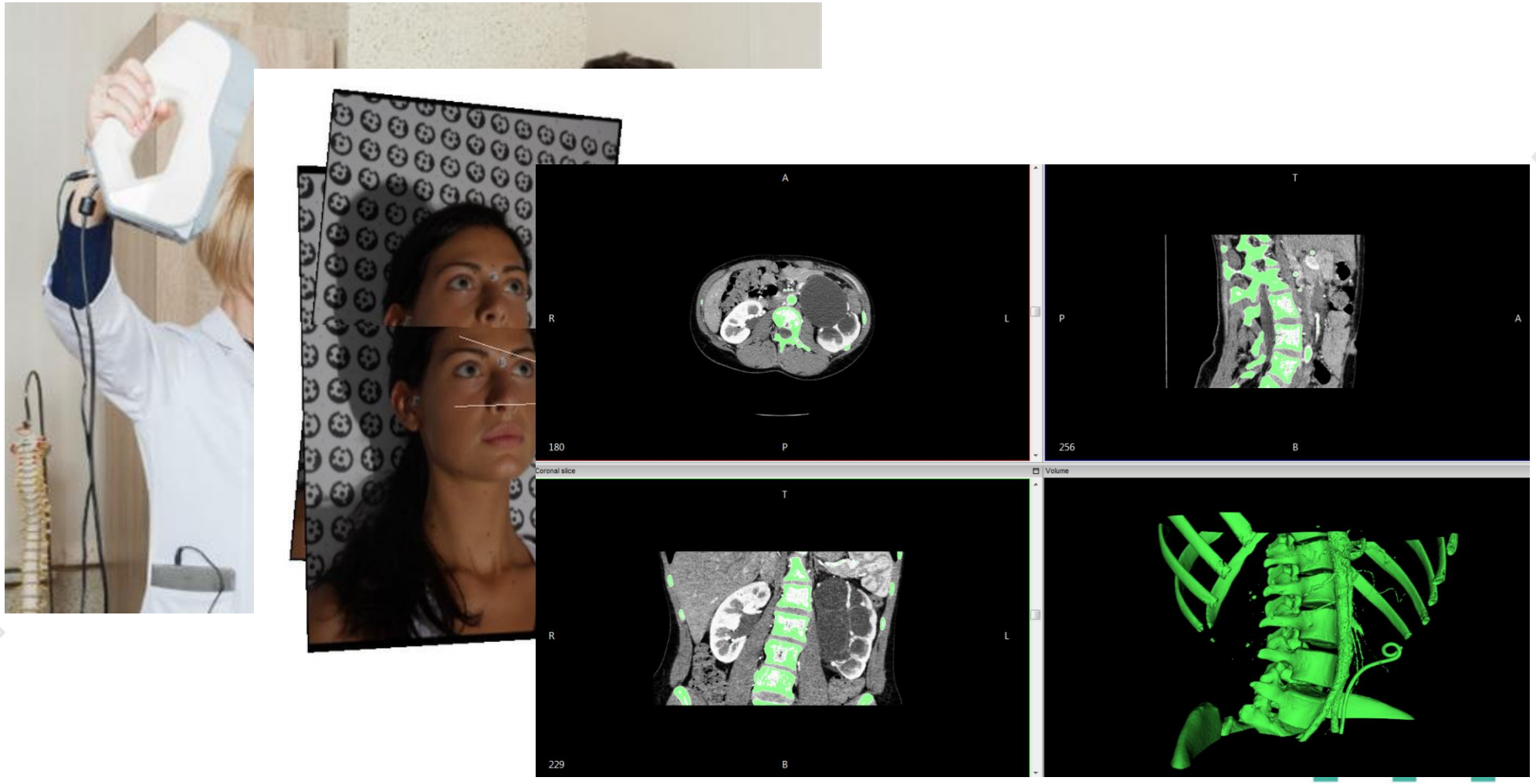
Example projects - MR



Video

Video

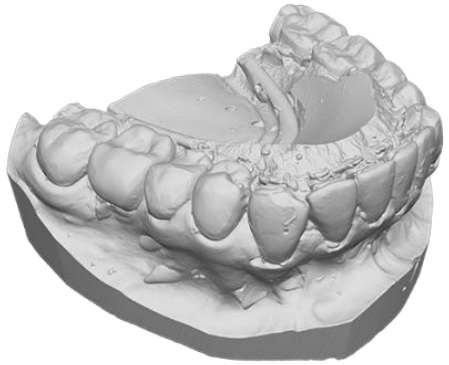
3D digitisation in medicine



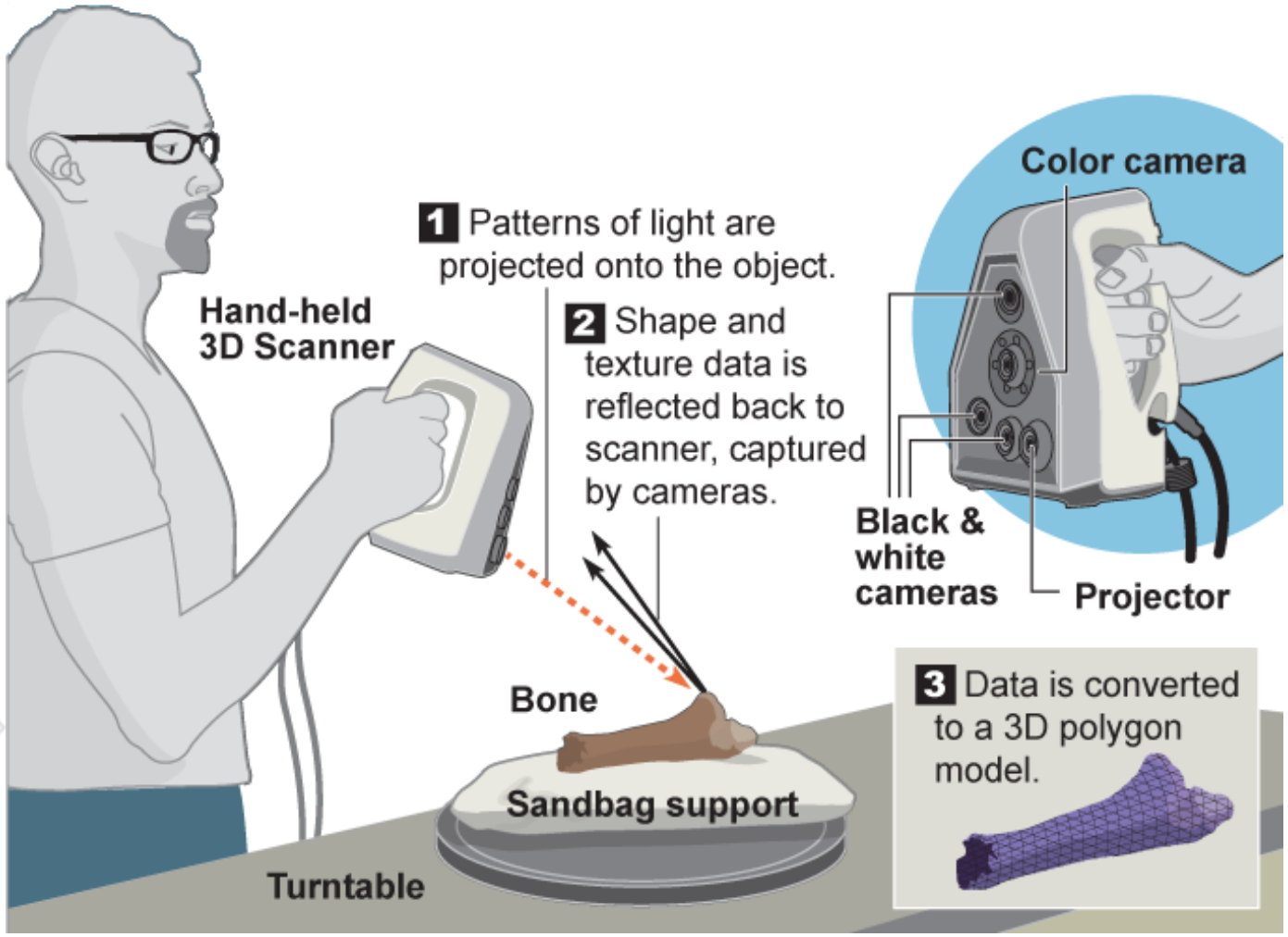
Segmentation

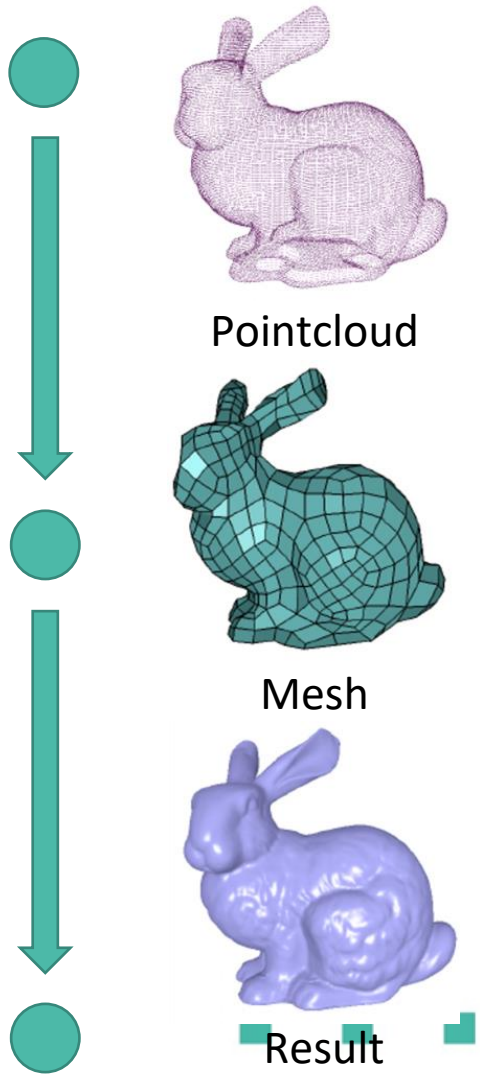
3D scanners in healthcare

3D resolution:	0,03 mm	0,1 mm	0,2 mm
Largest sizes:	dental	human head	full body scan



Scanning process

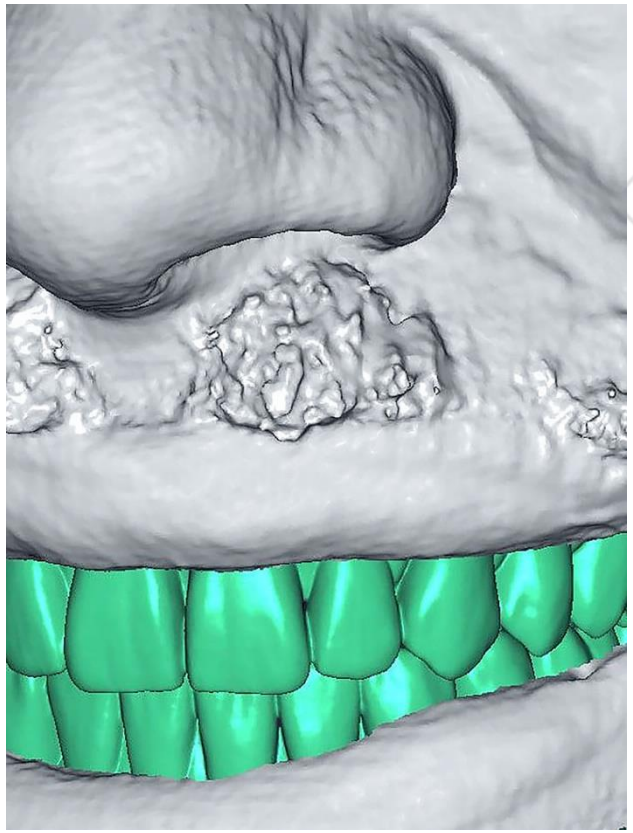




Use cases

Custom limb prostheses

Custom implants



Customized dental planning

Model examples

Complete skeleton in 40 minutes

Forearm in 4 minutes

Full head with textures in 5 minutes

Sources

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