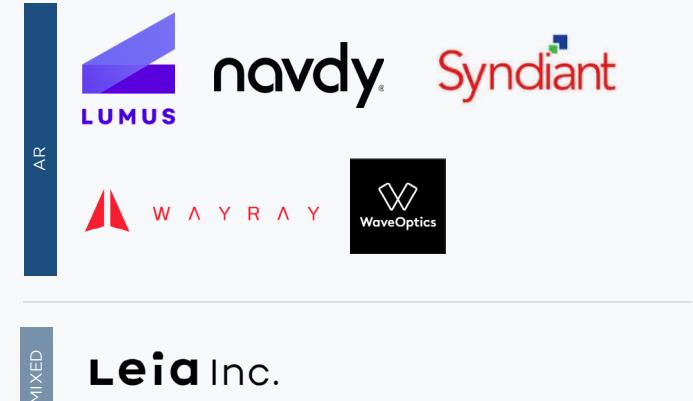


# AR/VR Market Map: Use Cases

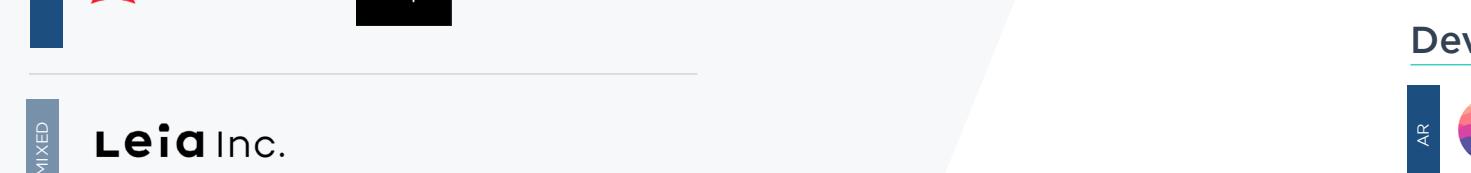
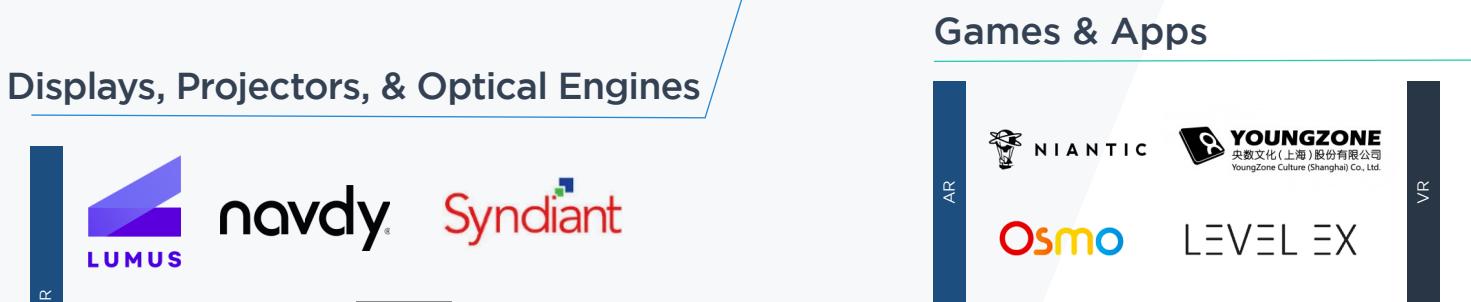
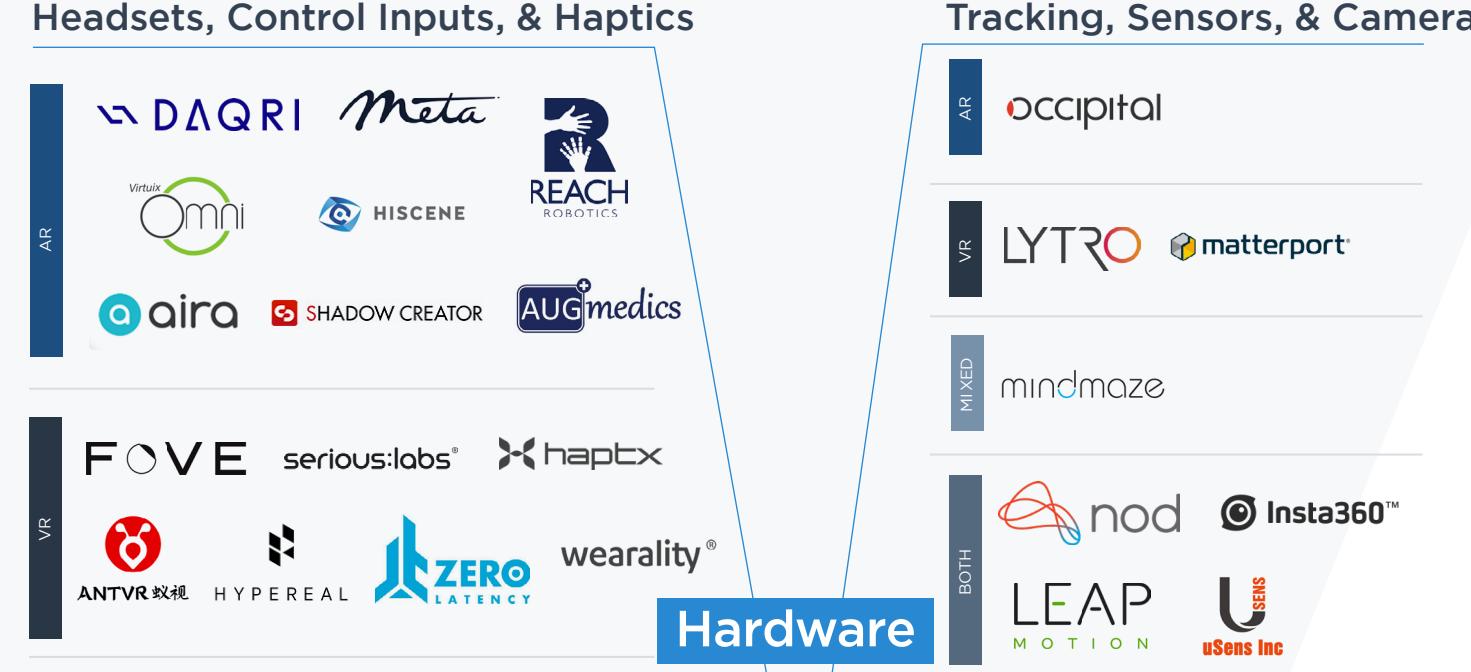
## Headsets, Control Inputs, & Haptics



## Displays, Projectors, & Optical Engines



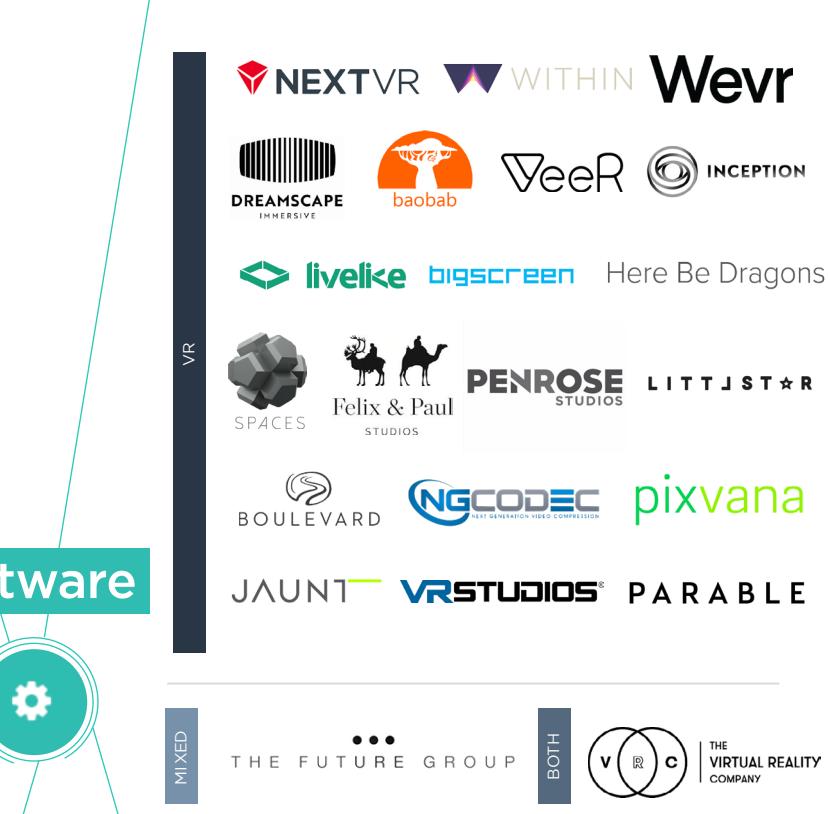
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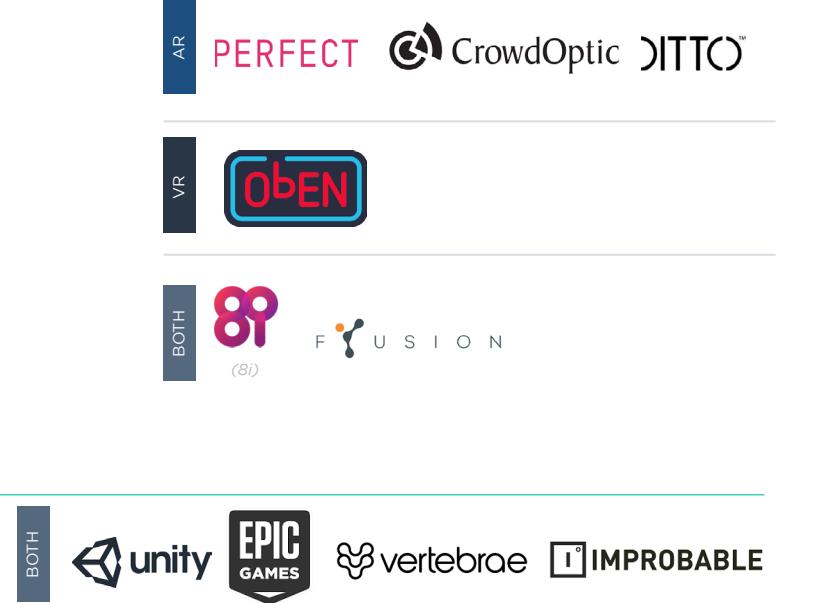
## Enterprise Solutions



## Content & Content Distribution Platforms



## Image Capture & Scanning



# AR/VR Market Map: End-User

## Gaming



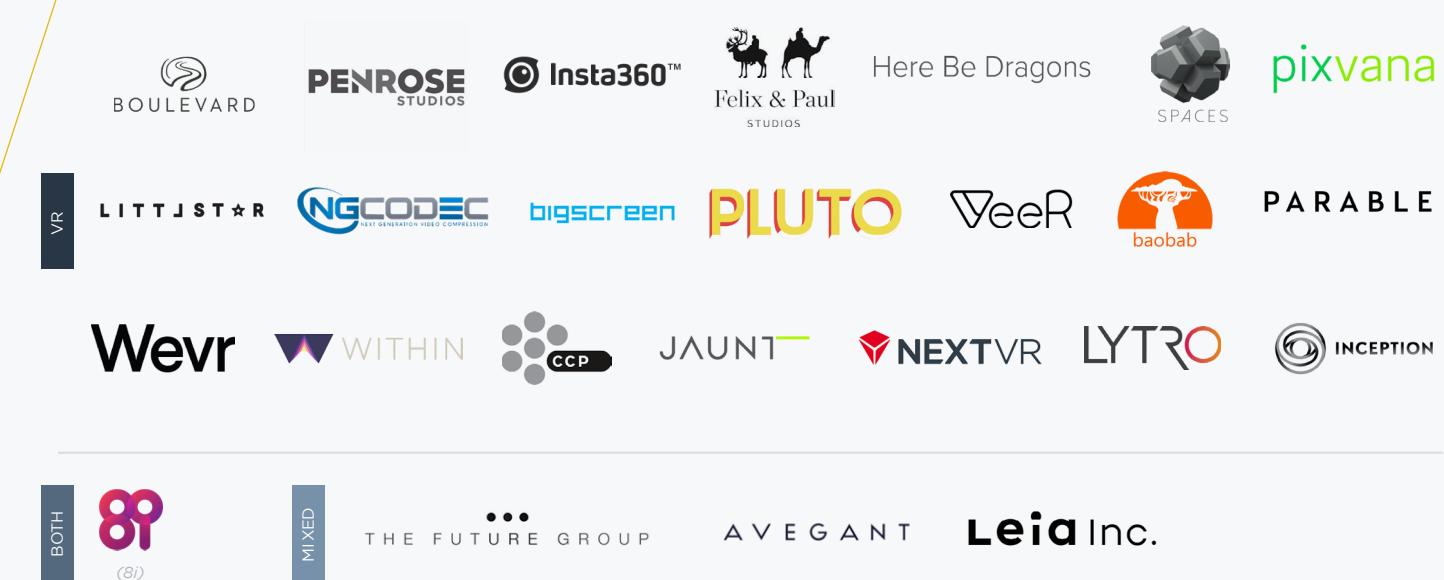
## Retail, Industrial, Real Estate



## Healthcare



## Digital Entertainment



## Education



## Transportation



## Social



## Advertising



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# Overview

Virtual and augmented reality (VR and AR) may seem like new phenomena, but these technologies have been around since the 80s, when government organizations like NASA harnessed them to simulate real-life experiences, while tech enthusiasts applied them to gaming and entertainment. Mainstream interest fizzled for some time as researchers developed the technology, but a resurgence in the last decade brought a wave of innovations and venture funding. Venture-backed startups have found ways to improve user experience and reduce costs, while introducing highly viable new use-cases that serve a broad range of users. As with any emerging field of technology, mapping the current landscape provides insight into how the space evolved and where it is headed, as well as the opportunities that lie in between.

This map provides a market survey of the 97 VR/AR and mixed reality (MR) global startups that have received the most venture funding, categorized into hardware and software segments (pg. 1), and then by end-user (pg. 2). For startups that span multiple segments or have multiple end-users, categorizations

are based on our understanding of their primary use case or end-user.

Though VR/AR technology is most commonly associated with gaming and entertainment experiences, an emerging segment focuses on integrating VR/AR tech into professional settings. With use cases ranging from medical imaging projection to skilled labor training, these technologies could become invaluable to professional workflows in areas of healthcare, infrastructure, retail, and beyond. We hope this map will prove useful to you in your practice and shed some light on this vertical of emerging technology.

## Definitions

VR involves immersion in an artificial world, typically achieved by channeling the user's sensory factors through a headset and headphones, effectively tuning out the real world. AR, on the other hand, incorporates 3D visuals into the user's environment, augmenting surroundings rather than blocking them out. MR incorporates virtual objects into an AR environment, a

balance of VR and AR. Startups under the "both" tag provide products or services for both VR & AR markets.

## Hardware

### Headsets, Control Inputs, & Haptics

Head-mounted displays (HMDs) and smart glasses are headsets that serve as the primary hardware medium for VR and AR experiences, respectively. HMDs shut out input from the outside world to submerge users in VR experiences, while smart glasses incorporate visuals and graphics into the user's real-world environment. Control inputs are pieces of hardware, such as hand controllers, treadmills, and floor pads, that integrate user movements to allow for interactive motion control. Finally, haptics technology enables the transmission of sensory (touch) information between users and VR/AR platforms.

### Displays, Optical Engines, & Projectors

Displays are the screens or lenses that receive or project content from optical engines or projectors.

Optical engines are essentially tiny projectors that are embedded within a VR or AR device, which project images or content onto a display. Projector hardware is also used to project holographic images (or light field displays) before users, typically in AR/MR environments.

### Tracking, Sensors, & Cameras

Sensors track a user's motions or gestures in the real world, then translates these into actions into the VR/AR interface. Sensors are also used to track user and object positions in VR/AR environments, to aid in collision avoidance and object detection. Cameras include light-field and 3D computational cameras, which capture 4D or 3D models rather than 2D images to create accurate replicas of real-world environments.

### Software

#### Content & Content Distribution Platforms

This category includes startups that create VR/AR-specific content, such as films, art, and sporting events. Content platforms distribute this content across hardware mediums, including mobile and PC VR/AR

devices. We also include cloud computing platforms in this segment, as they are used for creating, editing, and processing high-resolution VR experiences and content.

#### Dev Tools

This segment includes companies whose primary offering is a proprietary software, or software development kit (SDK), which assists in the creation of new software. Currently, software development tools are used predominately for developing VR/AR environments/worlds, games, content, and applications. Additionally, some VC-backed startups provide tools to develop VR/AR advertisements, as well as AR visualizations for applications like skills training programs.

#### Enterprise Solutions

Enterprise solutions include software used to satisfy VR/AR use cases for other companies or organizations rather than individual consumers. Primary applications of enterprise VR/AR tech include interactive retail experiences, employee training software for complex labor processes, medical visualizations and simulations, and digital ads. Accordingly, end-users of VR/AR

enterprise software include businesses in retail, industrials, real estate, digital advertising, healthcare, and transportation.

#### Games & Apps

This segment includes startups that create games and apps for VR, AR, or MR systems or platforms. VR and AR games are highly interactive, as users actively influence the game via direct inputs, though the level of control a user has depends on the medium, platform, and the type of game. Game types range widely from shooter games, to exploratory games and multi-player online games, while apps include uses from digital communication to education.

#### Image Capture & Scanning

This segment is the software complement to the "Sensors & Cameras" hardware category. Startups in this segment develop applications and software that capture and record real-life environments or objects to produce 360-degree images and videos, as well as 3D models. This segment also includes scanning software that allows users to project AR images onto themselves (think face filters) or import their physical likeness into a virtual environment.