

AR and VR Booming Worldwide



Summary

The global market for virtual and augmented reality was nearly \$4.5 billion in 2014. \$3.5 billion of the 225 AR/VR venture capital investment was made in the last two years. Virtual reality (VR) and augmented reality (AR) technology is still in the early stages of development. AR and VR have a great potential to become the next big computing innovation and drive a trend to in different sectors, including real estate, healthcare, retail and education. By one Goldman Sachs estimate, AR/VR has the potential to surpass the TV market in annual revenue by 2025, which would make AR/VR bigger than TV in less than 10 years. AR/VR technology could also change business models and the ways of work. New markets will be created and AR and VR technology may bring a multibillion-dollar industry. However, AR hardware is expected to take longer to bring to market and will focus more on commercial use cases.

What is Virtual Reality / Augmented Reality?

Virtual reality (VR) is an artificial, computer-generated simulation or recreation of a real life environment or situation. It creates a virtual world transposing the user or simply bringing the user to another place by making them feel like they are experiencing the simulated reality firsthand, while their current position in reality does not change.

Augmented reality (AR) is a technology simply "augments" our current state of presence in order to interact with virtual contents in the real world. AR is developed into apps and used on mobile devices to blends digital components into the real world and provides more freedom for the user.

- List of devices applying AR / VR technology

Augmented Reality	Virtual Reality
Microsoft HoloLens	Facebook Oculus
Google Glass	Samsung Gear VR
Magic Leap	Google Cardboard
Atheer	HTC Vive
Osterhout Design Group	Vuzix iWear
	VR Union Claire

Current Market of Augmented Reality and Virtual Reality

- Corporations Working On AR/VR



The Most Active AR/VR Investors

2011 - 2015

Investor	Rank	Companies
ROTHENBERG VENTURES	1	89VR, ADVANTAGE, ALPHEUS VR, CARONVR, DEEPVISION VR, DRACOVR, ENDIMARK, KINGDOM VR, FIVE, FRINGE, GEARCY, GEMVR, IMMERSIVE, ISTE, JUNE, MATHPORT, MEGA VR, OBT, HORIZON, PEARL, REALISTIC, REACT VR, REAL THEORY, ROK AR/VR, SIBRA, TANGIBLE ZONE, TIGER, VERTIGO TV, VIBRANT SURF, THE VR COMPANY, VECUT, VIVIT, WEVR
boostVC	2	89VR, ARTECH, BINARY VR, DEEPVISION VR, CASE VR, FEELERS VR, JUNE VR, PLANT EXPAND, PUMP, SERRAL VR, UNIMOR, VICE, VR SHARERS, VTECH
W (Formerly Google Ventures)	3	ALPHEUS VR, EMERGENT VR, ENVOY VR, HIGH FIDELITY, JUNE, MATHPORT, RESOLUTION GAMES
Intel Capital	3	ALPHEUS VR, AUGMENT, EYESENSE, OCULUS, SKULLY, TOTAL IMMERSION, WORKVR
techstars	3	FULL-BOWL VR, INVR, RESOLUTION TUBE, REAL THEORY, SERRAL VR, SKULLY, OCULUS
QUALCOMM VENTURES	4	BLISS, KINBLE, MAGIC LEAP, MATHPORT, NERDAR, SERRAL VR
ANDREESSEN HOROWITZ	7	LEAP, MAGIC LEAP, MATHPORT, OCULUS VR
formation B	7	ALPHEUS VR, INVR, OCULUS VR, SKULLY
PARTECH VENTURES	7	URDFEEL, RESOLUTION GAMES, SERRAL VR, TOTAL IMMERSION
Samsung Ventures	7	89VR, REALISTIC, REAL TECHNOLOGY, FIVE
Y Combinator	7	INVR, MATHPORT, NERDAR, SCOPES

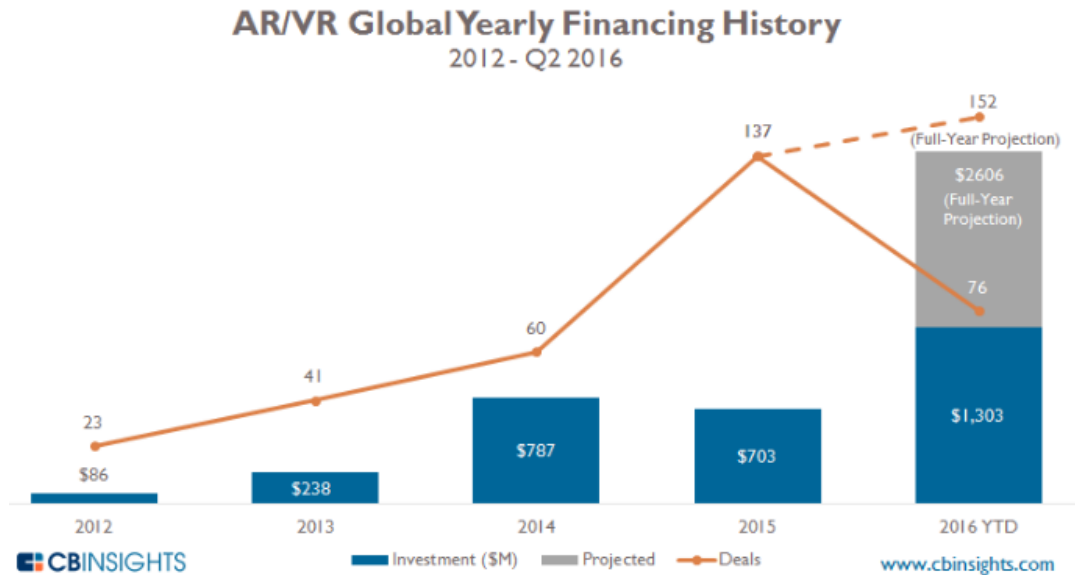
Source: <https://www.cbinsights.com/blog/active-arvr-investors-infographic/>

Take HTC Vive as an example, HTC Vive has announced the Virtual Reality Venture Capital Alliance (VRVCA) to bring together 28 VR investment companies to help finance startup companies working in VR as well as augmented and mixed reality. \$10 billion will be invested in the fund and the investment highlights the potential of AR/VR as an emerging platform.

Another case, GVR Fund, which is managed by San Francisco-based GREE VR Capital LLC, was launched on 14 April 2016 to offer \$12 million to support early-stage virtual reality (VR),

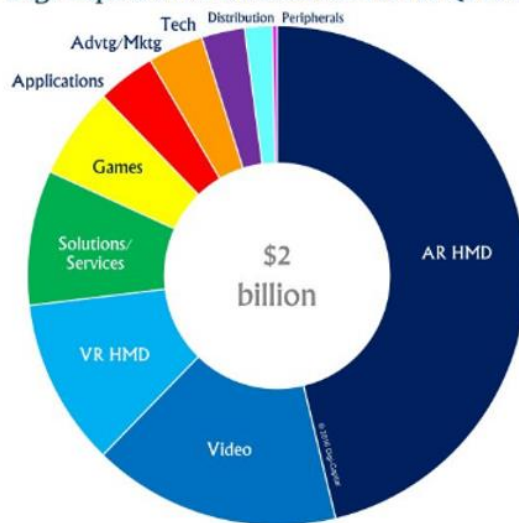
augmented reality (AR) and mixed reality (MR) companies. The fund has already invested in two VR-related companies, VRChat Inc. and SPACES, Inc. GREE expects the VR market to hit 80 billion by 2025.

- **AR/VR Global Yearly Financing History**

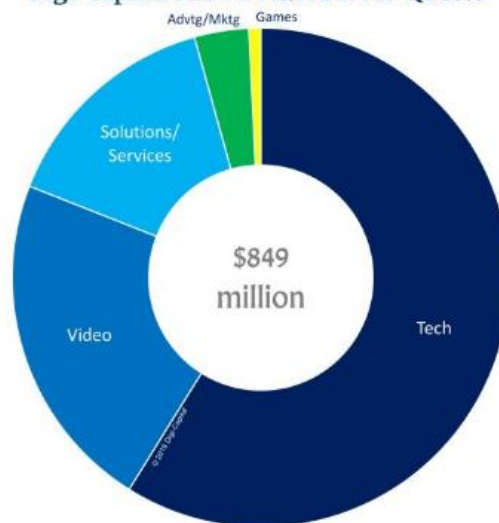


According to CB Insights, virtual and augmented reality startups attracted \$ 703 million in funding over 137 deals in 2015. Investors are chasing after that future revenue. 2016 has seen \$1.3 billion invested over 76 deals in the first half of the year, which already accounted to 85% growth over total funding in 2015. Deal volume is on track to see year-over-year growth by 11% more last year's total. AR deal activity will increase by nearly 40%, and VR will increase by more than 25%.

Digi-Capital[™] AR/VR Investments LTM to Q2 2016



Digi-Capital[™] AR/VR M&A LTM to Q2 2016



Source: http://www.digi-capital.com/news/2016/07/record-2-billion-arvr-investment-in-last-12-months/#.V_Nr3fB97lV

Deals to VR, in particular, are driving that growth in funding. Digi-Capital showed the AR/VR investment market is at an annual run rate over \$1 billion. AR/VR hardware, video, solutions/services, games, advertising/marketing, consumer apps, distribution, tech and peripherals were the leading AR/VR investment sectors in the last 12 months to Q2 2016. \$849 million of AR/VR acquisitions was recorded in the last 12 months to June 2016, with the largest deals in AR/VR tech, video and solutions/services.

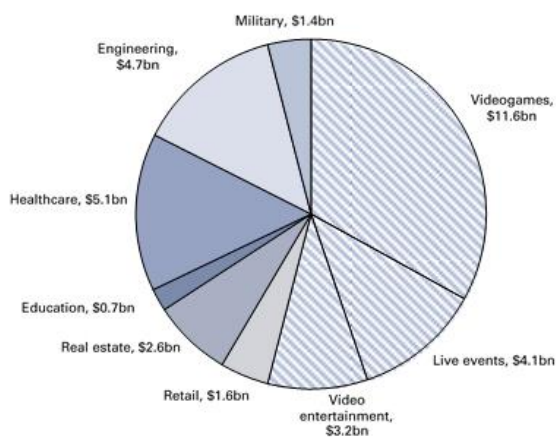
- **Market of AR/VR**

Report from International Data Corporation (IDC) indicated the consumer segment accounts for the largest share of spending in AR/VR market, at nearly \$90 million in VR and over \$7 million in AR so far in 2016. Worldwide shipments of VR hardware is expected to grow in 2016, with total volumes reaching 9.6 million units, leading by key producers of Samsung, Sony, HTC, and Oculus. Asia/Pacific (excluding Japan), the United States, and Western Europe will account for three quarters of worldwide AR/VR revenues in 2016. AR/VR software revenues will also grow more than 200% year in year in 2016.

Future Market of Virtual Reality and Augmented Reality

Research firm Frost & Sullivan indicates that the next 10 years of Augmented Reality and Virtual Reality technology development are set to redefine the future of both business and consumer processes and interactions. With increasing competition and market penetration, a report from Frost & Sullivan predicts Augmented Reality will be adopted across industries by 2025 and become affordable for a wider spectrum of companies and individuals in the future.

- **Distribution of the usage of AR/VR**

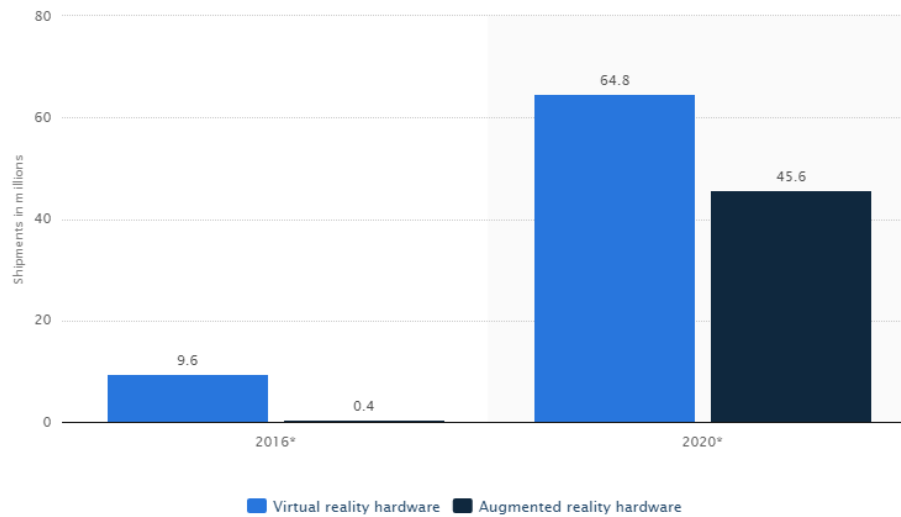


Source: Goldman Sachs Global Investment Research.

Glodman Sachs Global Investment Research predicts VR and AR to not only create new markets but also disrupt the existing ones. The software market will be boosted by both consumer and enterprise. Base on its assumption that there are 70 million VR gamers in 2020 and 216 million in 2025, \$11.6 billion revenues would be generated from videogames. Living events will be another main focus, which is expected to bring \$4.1 billion gains. The use cases in healthcare and engineering will also increase to \$5.1 billion and \$4.7 billion in 2025 respectively.

- **Future market of AR/VR**

Forecast unit shipments of augmented and virtual reality (VR) hardware devices from 2016 to 2020 (in millions)

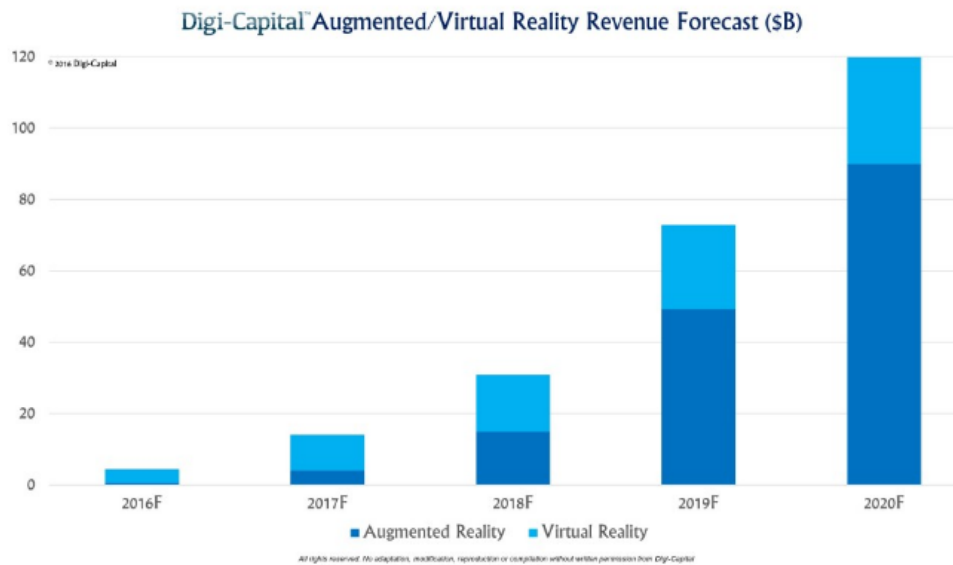


Source: <https://www.statista.com/statistics/539713/worldwide-virtual-and-augmented-reality-hardware-shipments/>

Worldwide Augmented and Virtual Reality Hardware Shipments and 5-Year CAGR (shipments in millions)			
Product Category	2016 Shipments	2020 Shipments	2016-2020 CAGR
Virtual Reality Hardware	9.6	64.8	183.8%
Augmented Reality Hardware	0.4	45.6	189.8%

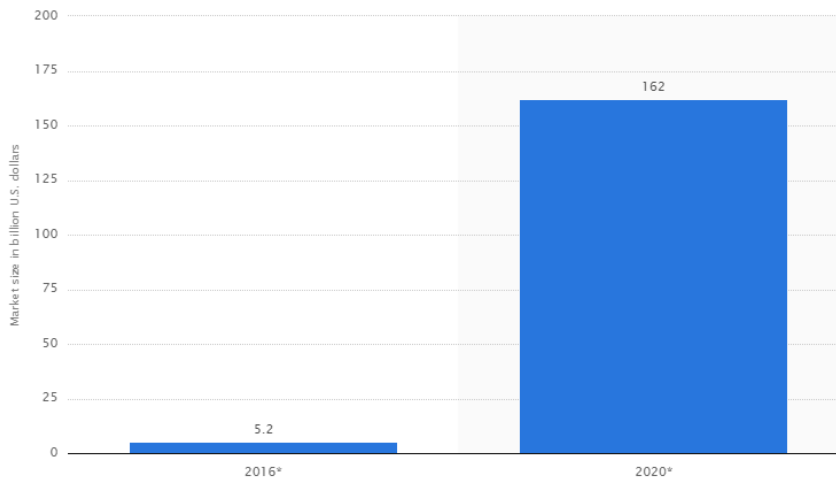
Source: IDC, April 2016

The first worldwide AR/VR forecast from IDC estimates worldwide shipments of total volumes shipments of VR and AR hardware devices will reach 9.6 million units in 2016 and grow 11-fold to past 110 million units in 2020. However, AR hardware is expected to take longer to bring to market. AR/VR will drive digital transformation in the coming years by creating new revenue streams and changing the work of people.



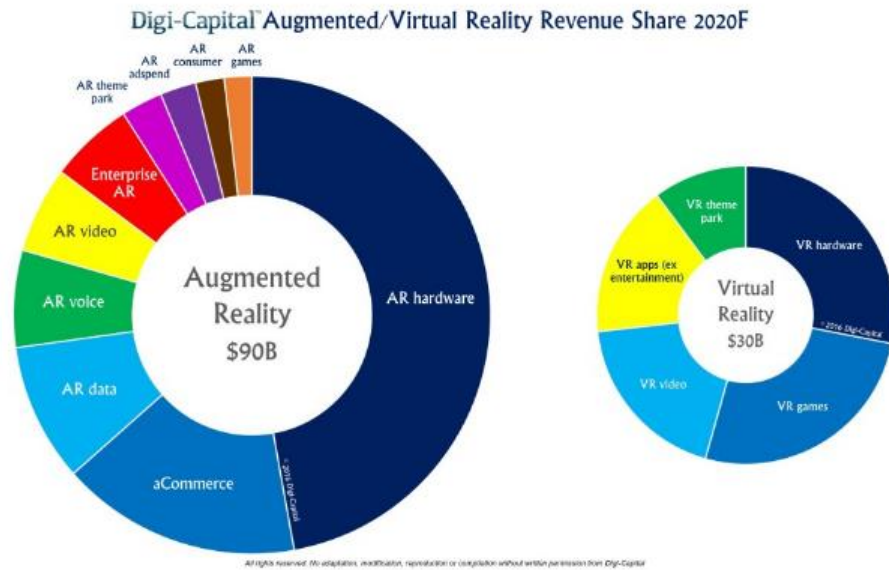
Source: http://www.digi-capital.com/news/2016/01/augmentedvirtual-reality-revenue-forecast-revised-to-hit-120-billion-by-2020/#.V_Nz1fB97IU

Forecast augmented and virtual reality (VR) market size worldwide in 2016 and 2020 (in billion U.S. dollars)



Source: <https://www.statista.com/statistics/591181/global-augmented-virtual-reality-market-size/>

The statistic shows a forecast for worldwide revenues for the augmented reality and virtual reality (AR/VR) market will grow from \$5.2 billion in 2016 to more than \$120 billion in 2020. Half of all revenues during the forecast periods will be generated from hardware. According to the new Worldwide Semiannual Augmented and Virtual Reality Spending Guide, IDC forecasts that global market size for AR/VR will grow from \$5.2 billion in 2016 to more than \$162 billion in 2020, suggesting a compound annual growth rate (CAGR) of 181.3% over the 2015-2020 forecast period.



Source: http://www.digi-capital.com/news/2016/01/augmentedvirtual-reality-revenue-forecast-revised-to-hit-120-billion-by-2020/#.V_N7SfB97IV

Revenues for VR are forecast to be greater than AR-related revenues in 2016 and 2017. AR-related revenues should surge ahead after 2017 as AR will become especially important in non-gaming fields including healthcare and product design and management. However, VR largely remain an entertainment market, becoming a minority of revenue by 2020. The VR market will be worth \$30 billion, while AR could be worth as much as \$90 billion. Changes to consumer market will boost AR hardware sales and revenue. Sales of AR/VR hardware will account for more than 50% of the global revenue.

As shown by IDC, there are significant concentrations of development in Asia. From a regional perspective, Asia/Pacific (excluding Japan), the United States, and Europe will account for three quarters of worldwide AR/VR revenues. However, the United States is expected to surpass the other two regions by 2020. Every region is expected to see annual growth of more than 100% throughout the period.

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