Virtual Reality

Artificial Intelligence @ Allegheny College

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Virtual Reality

- A technology that simulates real or imaginary environment and allows user to interact with that environment.
- To enter in virtual reality mode, user has to wear a special headset with all necessary sensors and high-quality display, earphones, and a special controller for interaction with the virtual world.
Virtual Reality

Diagram:

- Organism
- VR Hardware
- Tracking
- Stimulation
- Surrounding Physical World
Applications

- Robot-assisted surgery.
- Virtual tours (e.g., real-estate).
- Urban planning.
- Entertainment.
The Diverse Potential of VR & AR Applications

Predicted market size of VR/AR software for different use cases in 2025*

- Enterprise and public sector: $16.1b
- Consumer: $18.9b
- Total: $35b

- Healthcare: $5.1b
- Engineering: $11.6b
- Real estate: $4.7b
- Retail: $2.6b
- Military: $1.6b
- Education: $1.4b
- Videogames: $4.1b
- Live events: $3.2b
- Video entertainment: $0.7b

* Base case scenario
Source: Goldman Sachs Global Investment Research

Statista Charts

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Forecast augmented (AR) and virtual reality (VR) market size worldwide from 2016 to 2022 (in billion U.S. dollars)

Source
IDC
© Statista 2018

Additional Information:
Worldwide; IDC, 2016 to 2018
AR vs. VR

**VR**
- Recreates, replaces, and turns the real environment into a virtual landscape.

**AR**
- Enhances the real words by adding new elements layered over the real environment.
VR Platforms

- Oculus Rift by Facebook.
- Gear VR by Samsung.
- Vive by HTC.
VR Platforms

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- These platforms provide immersive VR experiences with high-quality headsets, controllers and sensors.
Google Cardboard

- Google’s platform for low-cost VR introduced in 2014.
- $4 headset is created from cardboard or plastic.
- User’s Android phone is used as a screen for the headset.
- The Android phone should have gyroscope for tracking orientation.
- Cardboard provides seamless VR experience with some special apps from Play Store or 360 videos from YouTube.
Google VR

https://developers.google.com/vr/develop

- Android
- iOS
- Unity
- Unreal
- Web
Why AR and VR?

- Heavily used in entertainment, healthcare and education.
- Stress reduction by immersing the user in the virtual environment.
- Provides a real form of story telling.
- In addition to stimulating the sense of sight, VR can now help users engage in the aroma of the virtual world.
Problems

- **Mismatching Sensory information:**
  - Ex.: Vision and acceleration is not matched in a flight simulator. (Unless an advanced motion-platform is used).
  - Nausea could be the result.

- **Latency:**
  - Due to simulation, graphic rendering of scene, device updates, etc.
  - The time it takes for the system to react to user's action.
  - Could cause nausea.

- **Update frequency:**
  - Frame rate (FPS), the rate of which the system can generate new images.
  - An application can have high frame rate, but still suffer from latency.
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VR and AI

Current Examples:

Eolian applications use AI technologies to reduce human error rates through AR and VR simulations of dangerous tasks.

Virtualitics provides data visualization in VR and AR environments through machine learning and AI.

Connectar's MRO.AIR, which provides an AR display that uses AI image recognition to streamline complex maintenance in aviation.

Possibilities:

- Image recognition output in a VR display.
- Identity detection for security applications.
- Recognition of complex scenarios in everyday life: car mechanics for maintenance detection.

Pokemon Go + Watson = next for retail?
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VR and Philosophy

What is “real”?
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“What is real? How do you define ‘real’? If you are talking about what you can feel, what you can smell, what you can taste and see, then ‘real’ is simply electrical signals interpreted by your brain?”
How to Combine AR and VR Without Destroying the World?