

Enhancing Model-Based Systems Engineering (MBSE) using Augmented Reality

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Context

Augmented Reality (AR)

- Augmented reality (AR) is the integration of digital information with the user's environment in real time.
- Contributes to the digital engineering initiative, allowing engineers to create 3D environments for MBSE
- Currently no integration of AR into the Systems Engineering environment

Work Enhancements

According to The Harvard Business Review:

Boeing

35% AR Training
Time Reduction

90% Trainee
Performance to
Completion on First
Attempt

DHL

25% Productivity
Gains in Warehouse
Pickups

KPN Field Engineers

11% Reduction in
Service Costs

17% Decrease in
Work Errors

General Engineering

34% Increase in
Productivity for
Complex Tasks

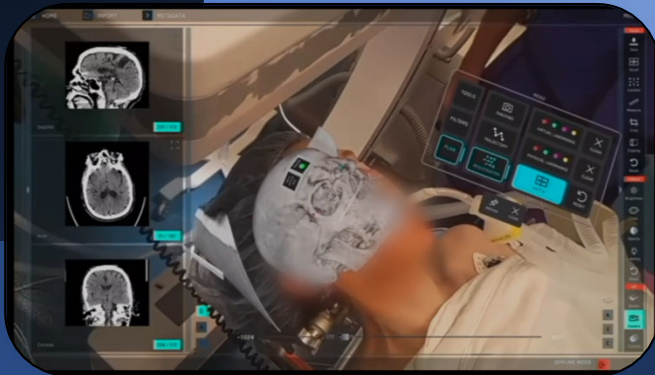
Microsoft & AR

- Microsoft's HoloLens 2 - Blending the digital and physical world
- Augmented reality advances the "AI4SE" initiative to improve performance and efficiency

AR Industries

HoloLens 2 is currently being used in the following industries:

Medical



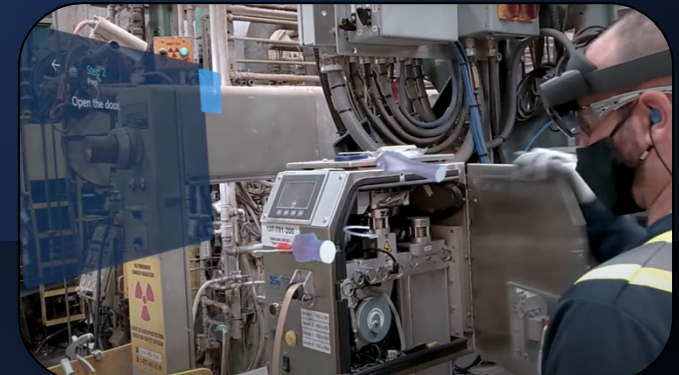
Medivis Inc.

Military



US Army

Engineering



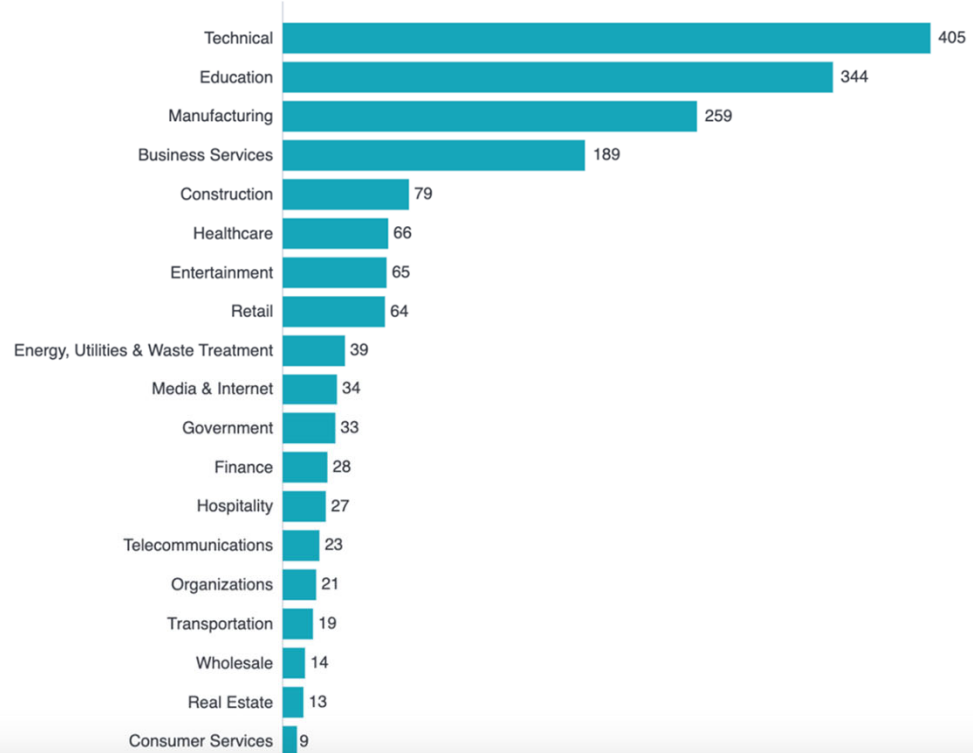
Auger Groupe Conseil Inc.

Trend

Firmographics of Companies using Microsoft HoloLens i

COMPANIES WE TRACK USING MICROSOFT HOLOLENS

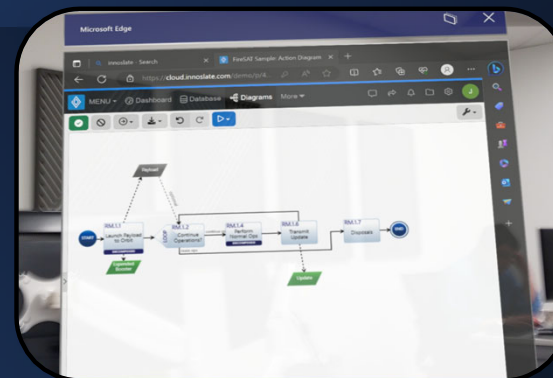
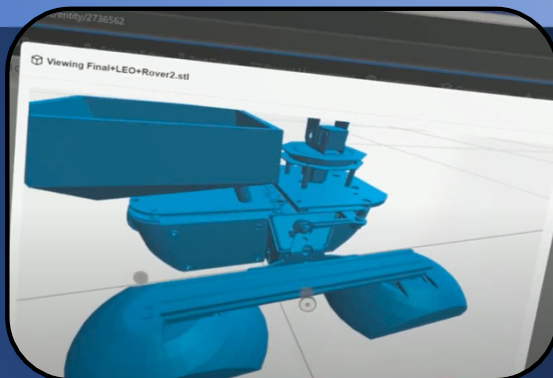
 **1,935**



Source: discovery.hgdata.com - 2023

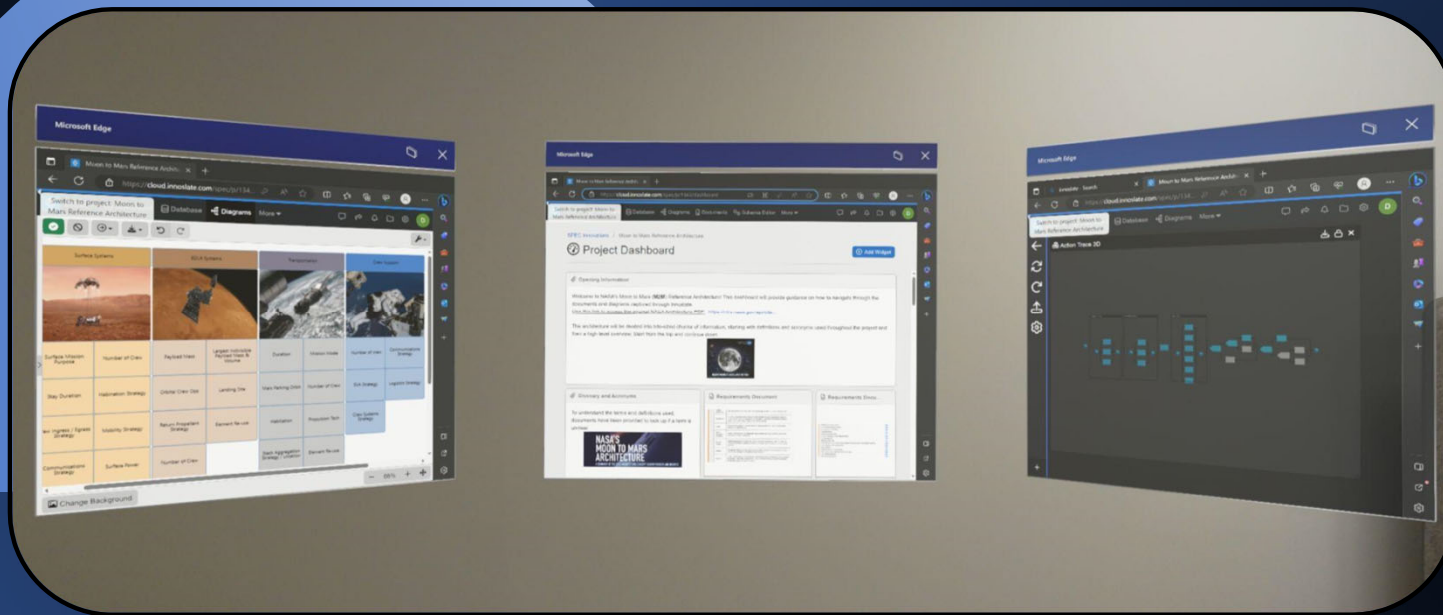
AR & MBSE

- Model-Based Systems Engineering is defined as an approach that uses graphical models to define and communicate the various aspects of a complex system, which makes the HoloLens a valuable tool for engineers
- AR defines spaces in its digital world that can be used to digitize models for engineers, through CAD files and other modeling software compatible with the HoloLens



Integration with Innoslate

- HoloLens 2 integrates with cloud-based tools like Innoslate



- Our overall vision is to have multiple instances of Innoslate running to improve productivity

Demonstration

Performance Gaps

Some of the notable limitations we evaluated when using the HoloLens 2:

Hardware Performance

GPU can be slow

Text to Speech Index Performance

Small and Outdated index

Field of View

FOV is smaller than competitors

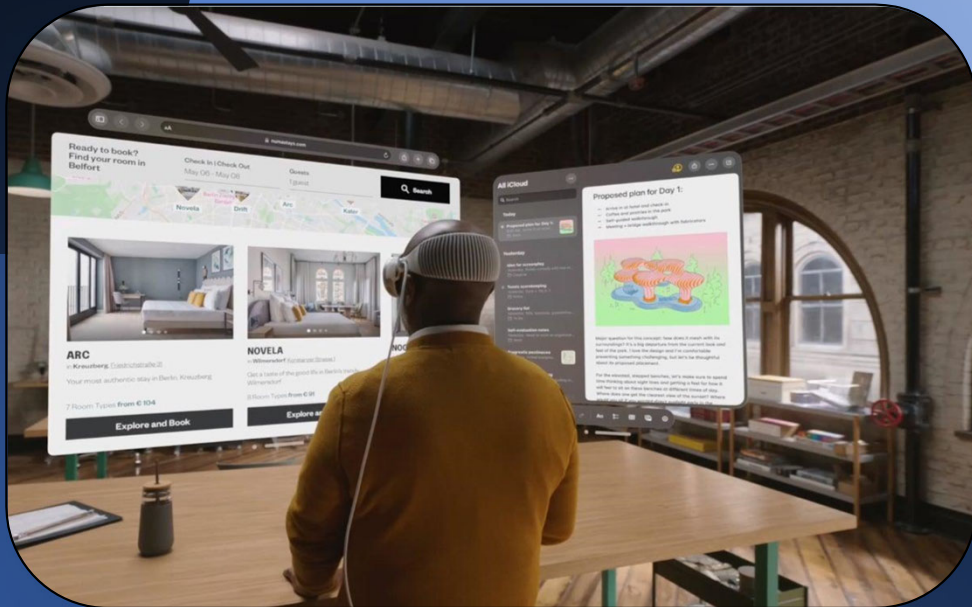
Hand Tracking Recognition

Lack of hand device relies completely on hand motions

Alternatives

- There are alternatives in the AR industry with some similar and different characteristics

Apple Vision Pro



Approved for Public Release

Early 2024

Magic Leap 2



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2018 - Present

Future Improvements

- Despite the HoloLens 3 project being canceled from development, Microsoft is still updating the software of the HoloLens 2 and upgrading military capabilities



HoloLens 2
(Commercial & Private Use)



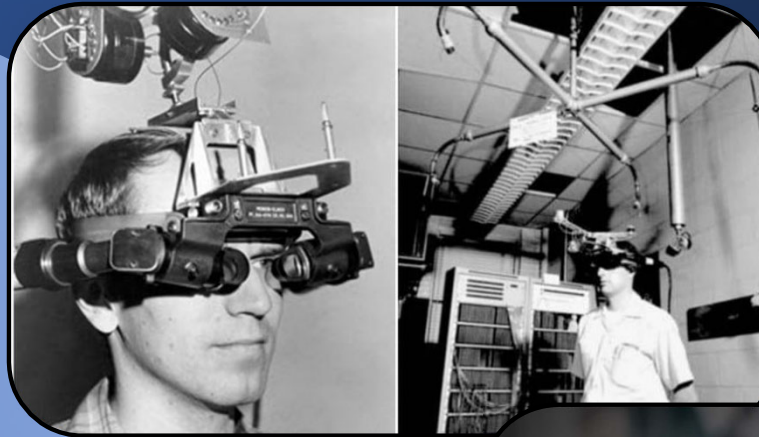
“HoloLens 3”
(Military Use Only)



HoloLens 4?
(Not in Development)

Conclusion

- HoloLens 2 is a huge leap in the field of Engineering and Technology
- Cloud services are more accessible and working within them is easier
- This is a glimpse into the future of what is to come for AR + MBSE



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2023

Q & A