





Update On The ARCUS System Of Augmented Reality (Derived From A Contrast CT) And Its Value In Vascular And Endovascular Procedures: How Does It Work And Experience To Date



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Disclosures, relevant to this presentation

Co-founder ARCUS
Research support WL Gore
Consultant for WL Gore




Augmented Reality for Clinical Understanding and Surgery




The issues

- 3D information on a 2D screen
 - Full dimension removed from data
- Too much radiation for endo-VS
- Even in open (vascular) surgery supportive visualization is meaningful
- Computer vision and smart algorithms can help!




Hologram-guided surgical interventions

Hardware and software are needed




HARDWARE: The Microsoft HoloLens 2™


- Wearable computer for displaying 3D holograms
- 11 sensors
 - Depth
 - Position
 - Camera's
- Mixed Reality device
 - Interaction with real world



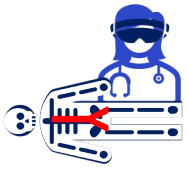
How does this software work?





Augmented Reality for Clinical Understanding and Surgery



Our SOFTWARE solution = ARCUS®:
Augmented Reality for Clinical Understanding and Surgery





- ✓ Recognizes the patients' unique surface
- ✓ No markers on the patient
- ✓ Overprojects CT/MR scans on the patient



WARNING NEXT PICTURES SHOWING CADAVERIC FOOT

Early stage: puncture an artificial vessel



Human cadaver study- Clinical applicability 

GORE Viabahn subcutaneous, filled with contrast



Not to be distributed:
Private demo material




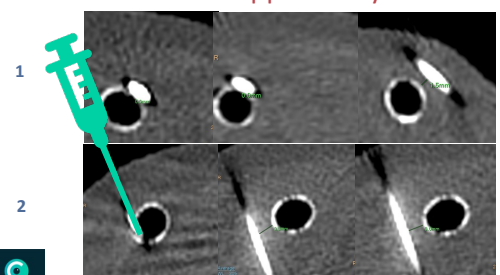
Human cadaver study- Clinical applicability 



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Results of Clinical applicability test 






1

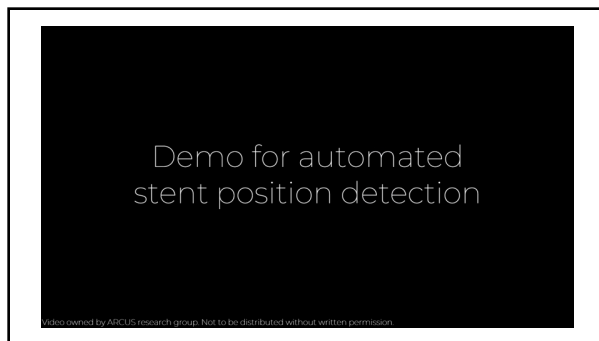
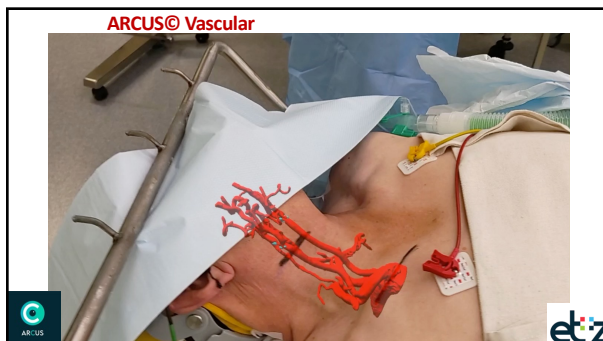
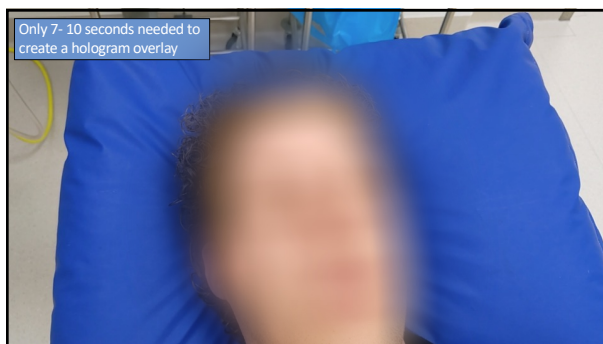
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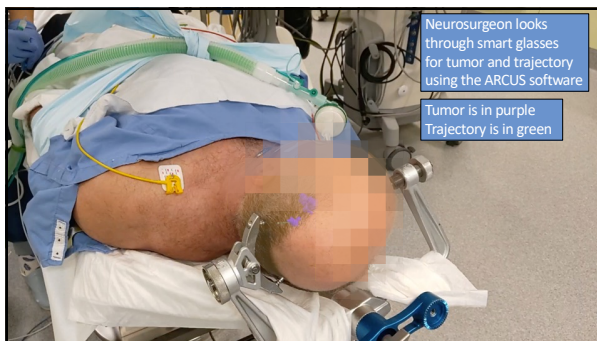
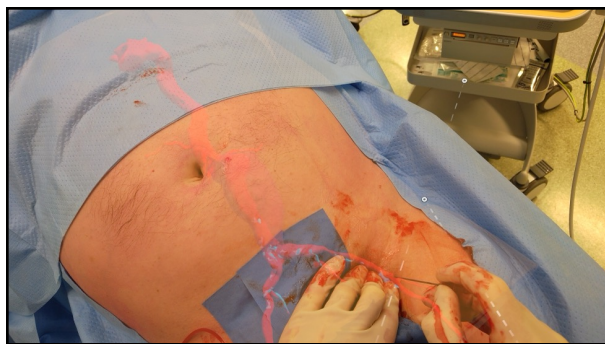


ARCUS®:
Augmented Reality for Clinical Understanding and Surgery

Next video's looking through smart glasses
Software has improved










ARCUS Preliminary results– Do not share without written consent

Human Cadaveric Head Study – Method

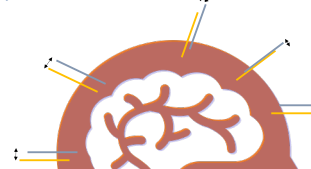


- 13 Heads
- 5 planned holographic trajectories per head
- Place k-wires along trajectory
- Compare placement

ARCUS Preliminary results– Do not share without written consent

Human Cadaveric Head Study – Method




- 13 Heads
 - Note: 1st head excluded due to learning curve of surgeon
- 5 planned holographic trajectories per head
- Place k-wires along trajectory
- Compare placement
- Get total offset

ARCUS©

Augmented Reality for Clinical Understanding and Surgery

- ✓ Software platform solution running on smart glasses
- ✓ Patient's unique surface is the frame of reference for 3D holograms
- ✓ Helps recognize the 3D EVAR stentgraft position
- ✓ Preliminary ARCUS Neuro data are promising and has the potential to substantially reduce OR time with a higher precision

"New With Holders?" (<https://doi.org/10.1016/j.ijmed.2019.04.001>) by Almirak, licensed under Creative Commons Attribution

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Augmented Reality for Clinical Understanding and Surgery

