Virtual & Augmented Reality Implementation: Redefining the Future

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Disclosures

Grants/Research Support: ACR Innovations Grant

Other Financial/Material Support: Case Western equipment loan for AR Educational Modules

The following will be discussed for off-label use: VR/AR Equipment for IR training

Brand names are included in this presentation for participant clarification purposes only.

No product promotion should be inferred.

Objectives

- History of virtual/augmented reality in interventional radiology
- Current applications of VR/AR in IR
- Future potential of VR/AR in IR

HISTORY OF VR/AR IN IR

JACR-2018

ARTICLE IN PRESS

CASE STUDIES IN TRAINING AND EDUCATION

Interventional Radiology Training Using a Dynamic Medical Immersive Training Environment (DynaMITE)

Colin J. McCarthy, MD, Alvin Y. C. Yu, MD, Synho Do, PhD, Steven L. Dawson, MD, Raul N. Uppot, MD

Radiology 2019

REVIEWS AND COMMENTARY • REVIEW

Radiology

Implementing Virtual and Augmented Reality Tools for Radiology Education and Training, Communication, and Clinical Care

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Conflicts of interest are listed at the end of this article.

Radiology 2019; 291:570–580 • https://doi.org/10.1148/radiol.2019182210 • Content codes: ED IN SQ

24 Years Ago… JVIR

Journal of Vascular and Interventional Radiology

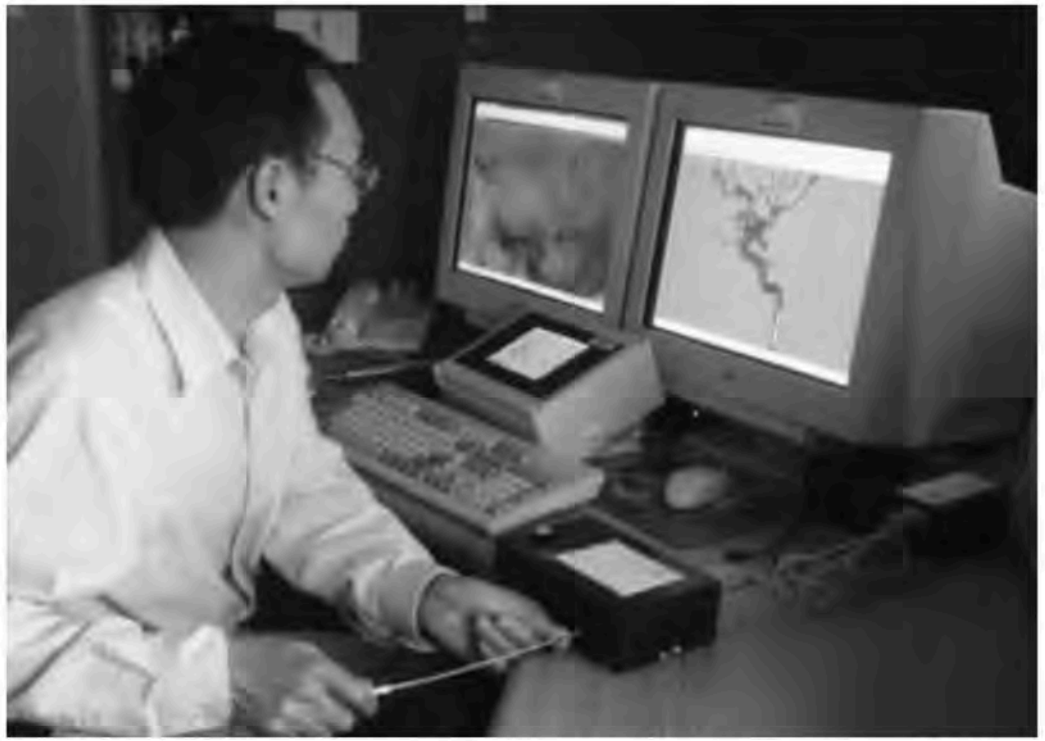
Volume 7, Issue 1, Supplement, January–February 1996, Page 374

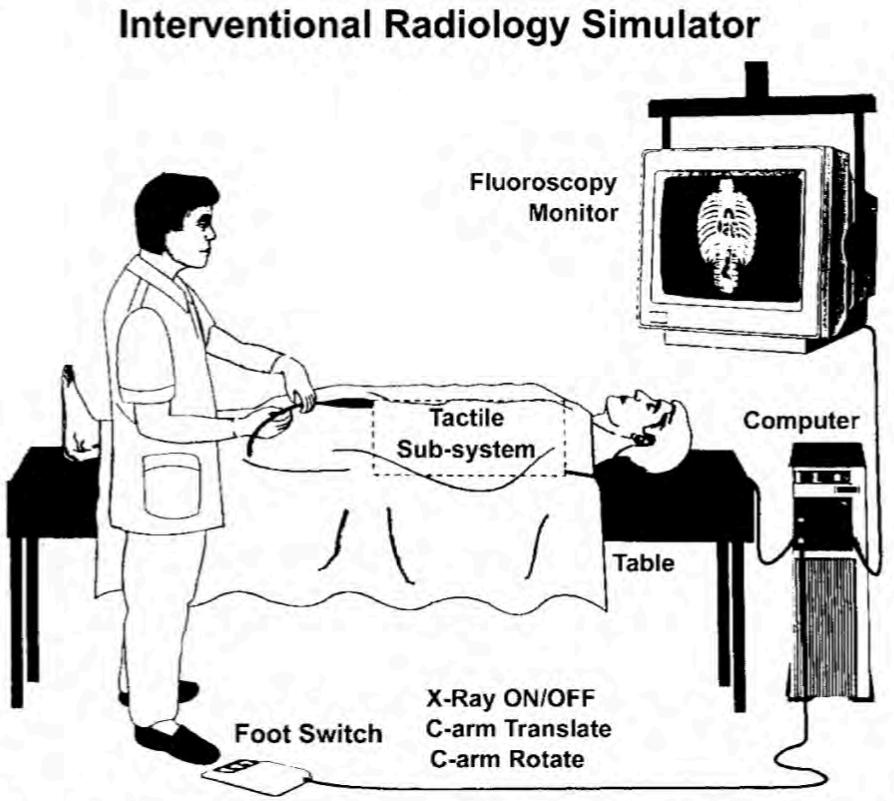
An Interactive Virtual Reality/Simulator Trainer for Interventional Radiology

S.L. Dawson MD, J.A. Kaufman MD, D. Meglin PhD

Virtual Reality Training In Interventional Radiology: The Johns Hopkins and Kent Ridge Digital Laboratory Experience

James Anderson, Ph.D.,[1] Chee-Kong Chui, M.Sc.,[2] Yiyu Cai, Ph.D.,[3] Yaoping Wang, Ph.D.,[2] Zirui Li, M. Eng,[2] Xin Ma, M.Eng.,[2] Wieslaw Nowinski, Ph.D.,[2] Meiyappan Solaiyappan, B.E.,[1] Kieran Murphy, M.D.,[1] Philippe Gailloud, M.D.,[1] and Anthony Venbrux, M.D.[1]





CURRENT APPLICATIONS

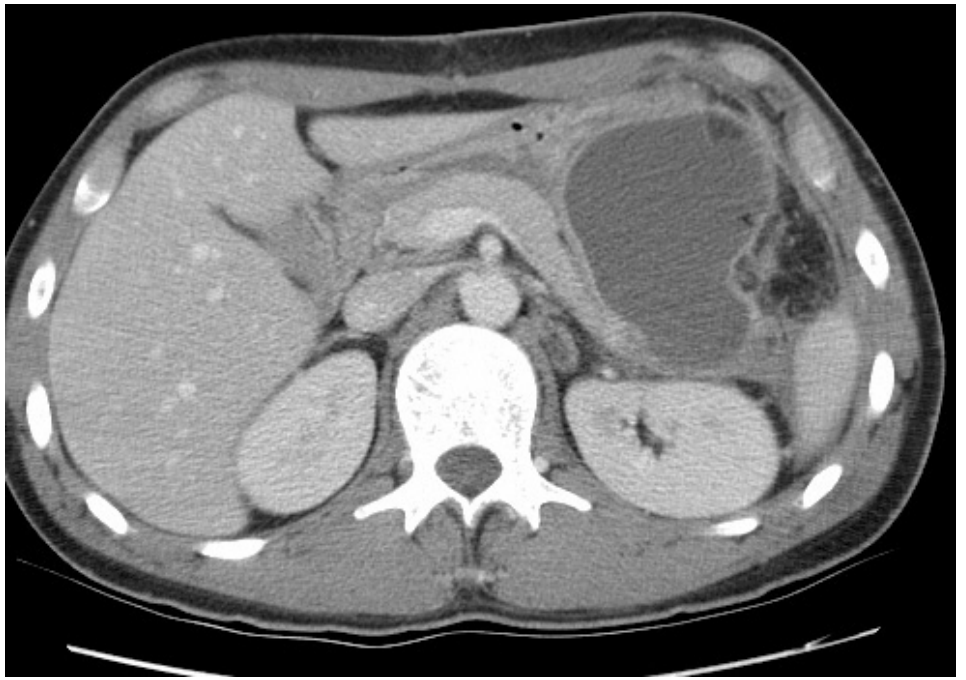
Current Applications

- Lectures
  - Immersive lectures with trainees
- Simulation Training
  - Equipment
  - Environment
  - Procedural steps
  - Intra-procedural overlay (clinical use)

IMMERSIVE LECTURES

HMS IR IMMERSIVE LECTURE

40-year-old female with history of Crohn's. Presents to ER with abdominal pain, fever, and elevated WBC. CT shown.



Findings/diagnosis?

What do you want to do?

Indications/contraindications?

What equipment do you use?

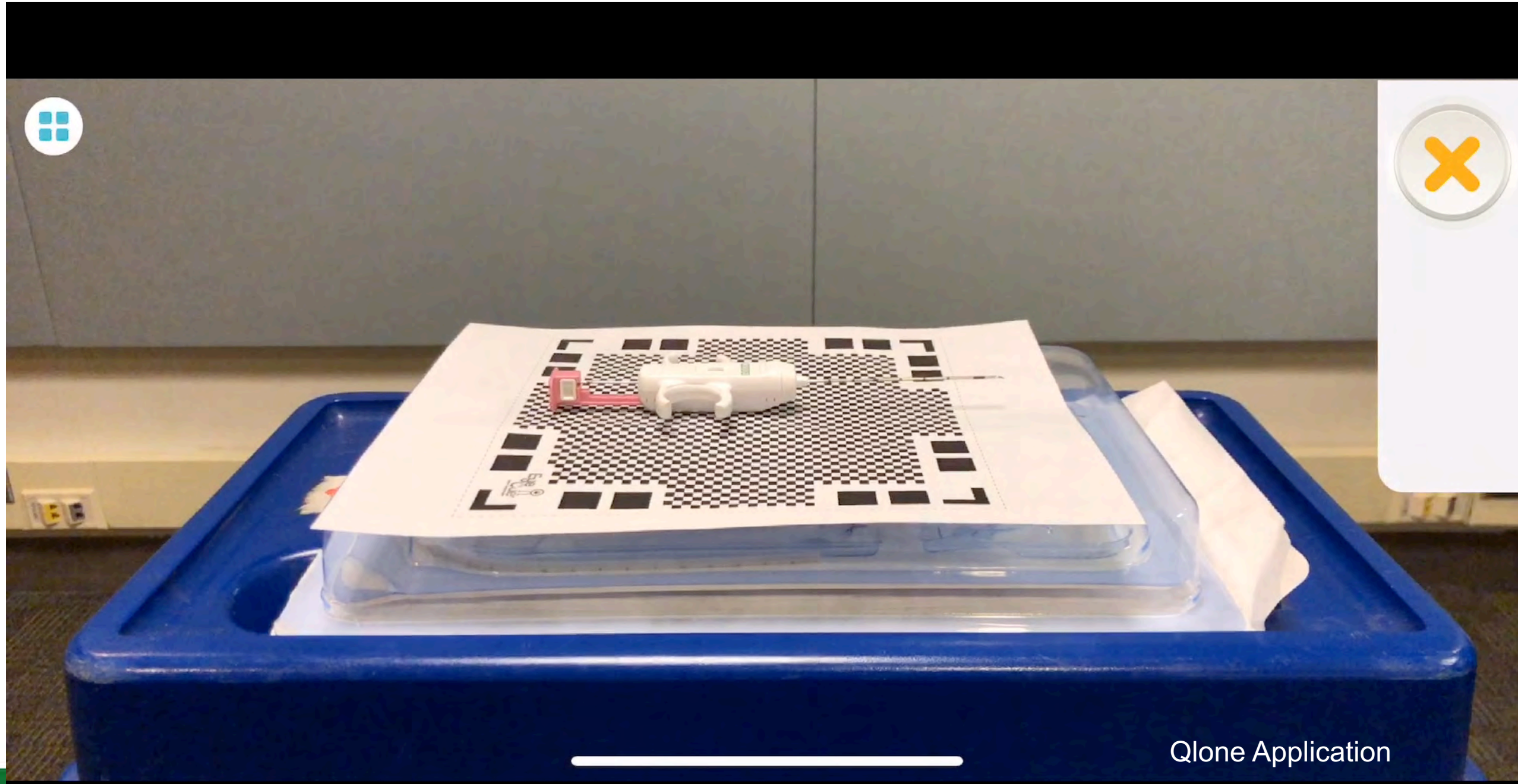
Let's go to the IR suite…

https://vimeo.com/265640313

Case Western Reserve & Augmented Reality HoloLens Anatomy Lectures

SIMULATION TRAINING

IR EQUIPMENT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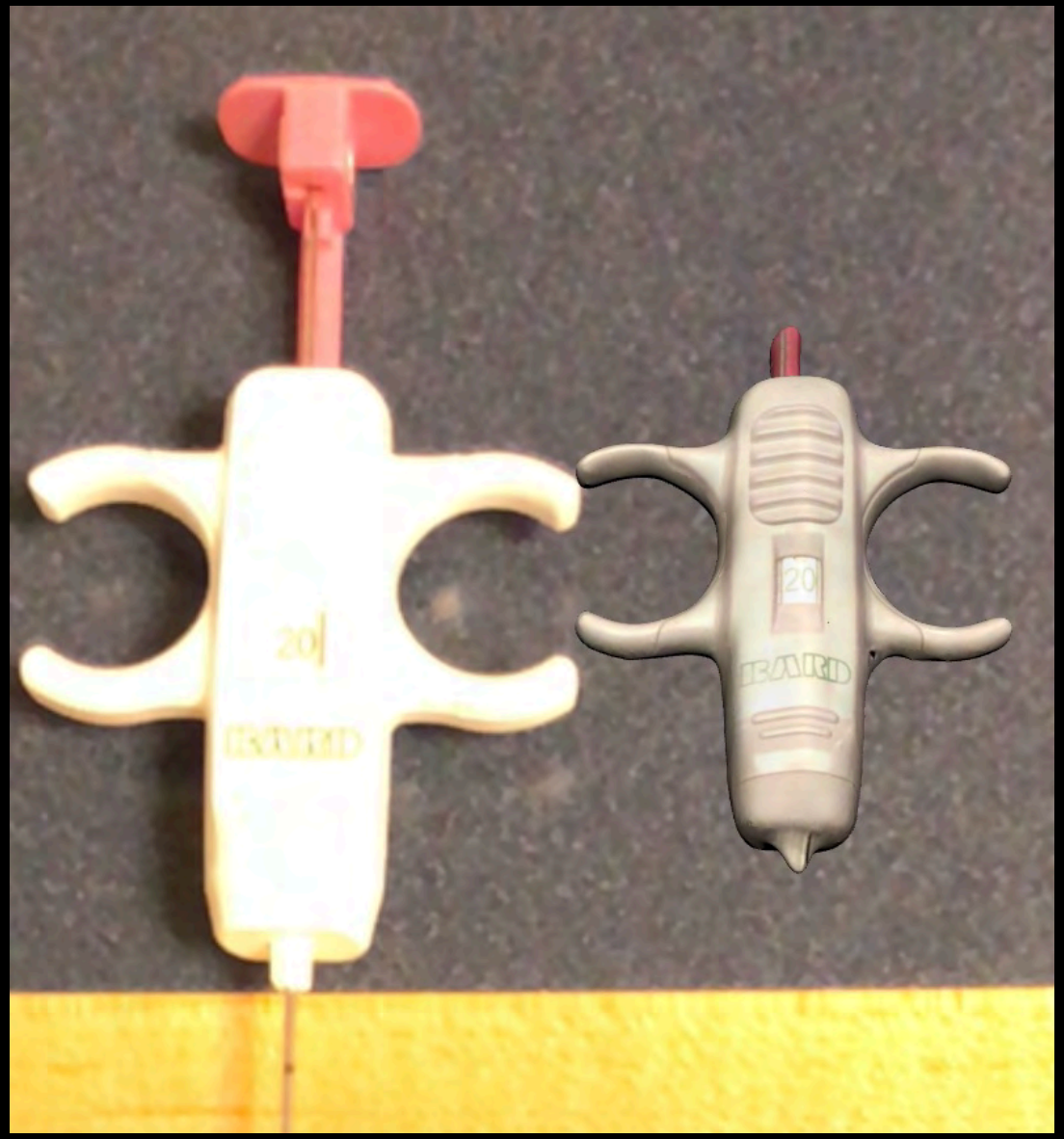
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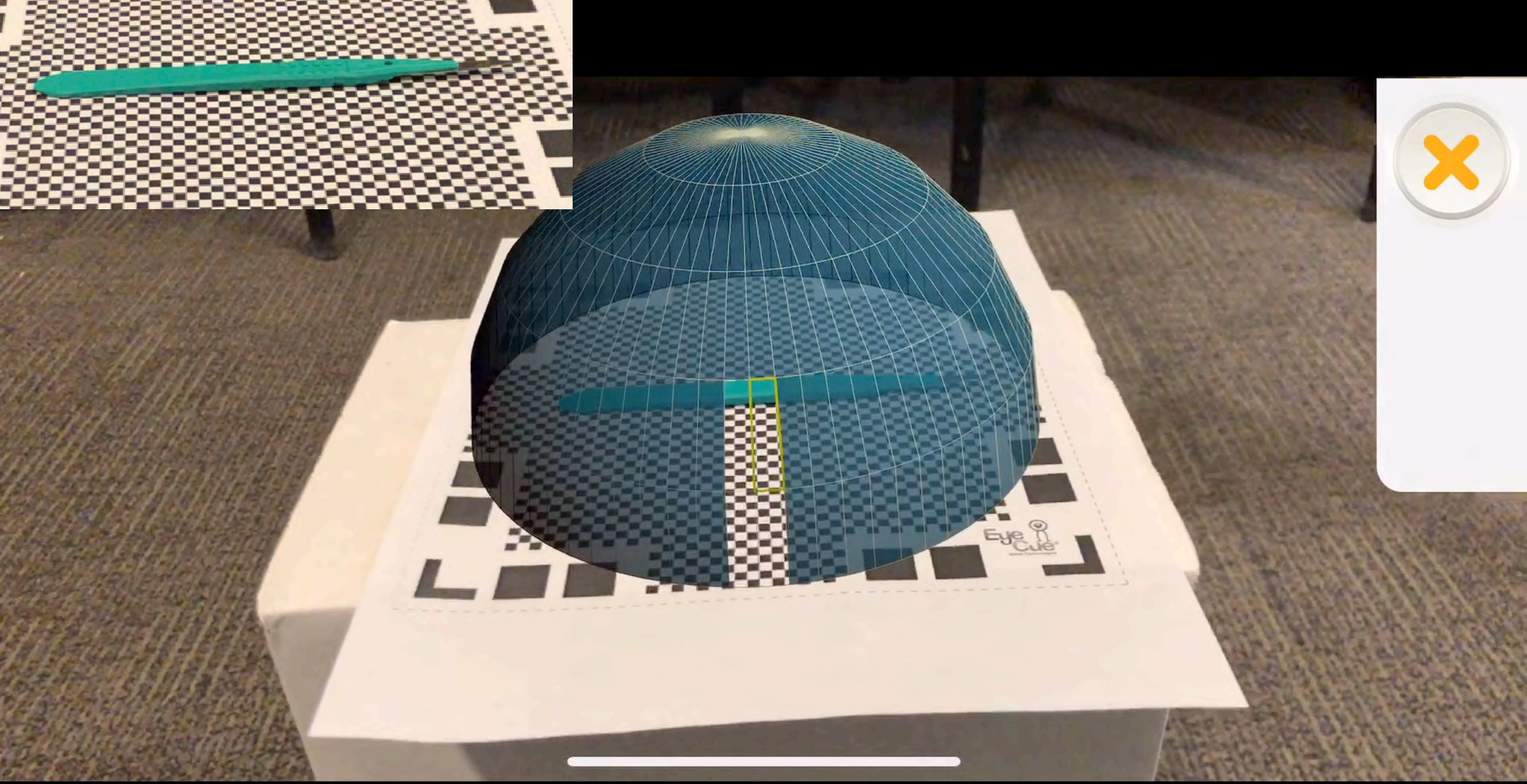
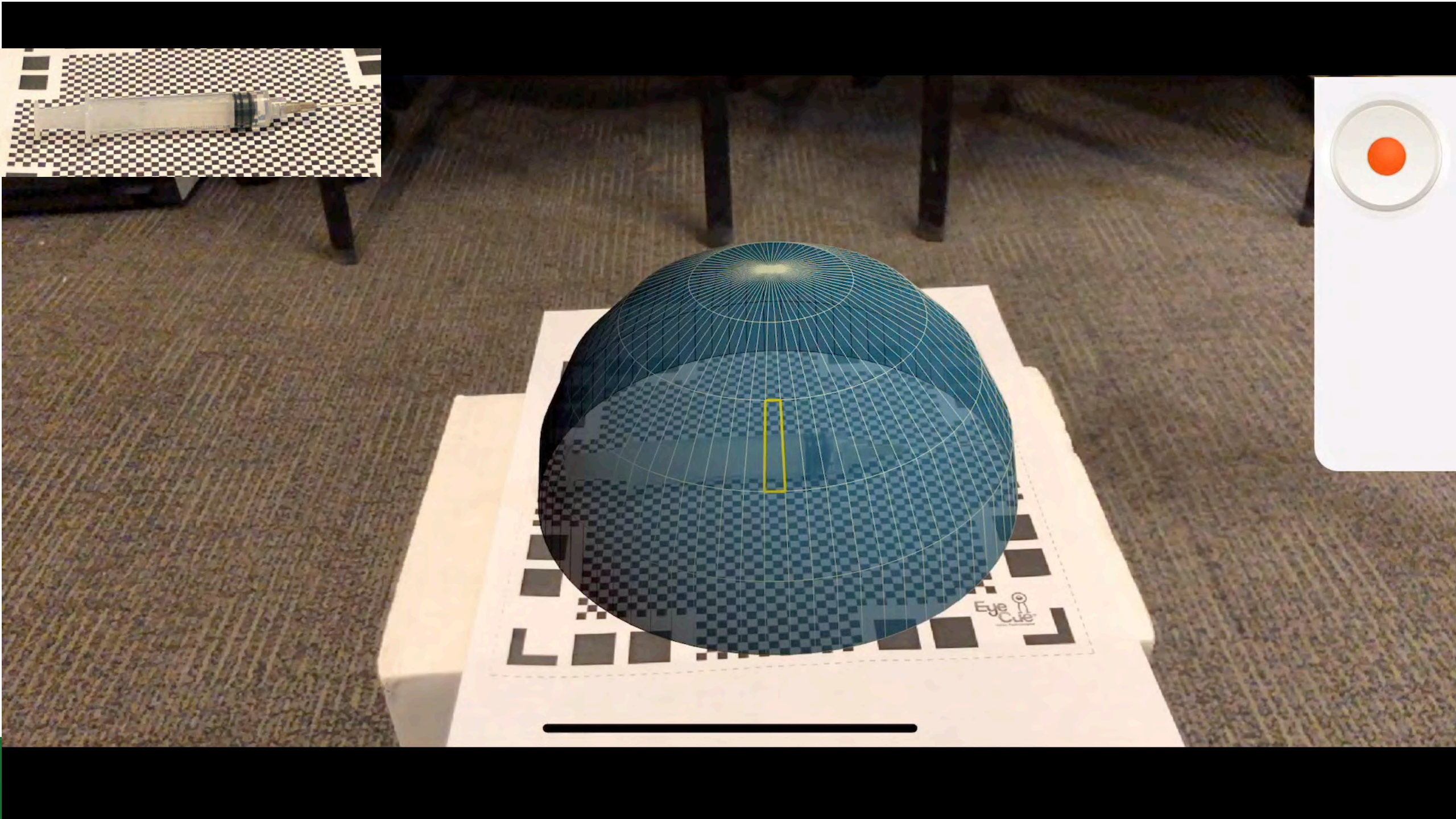

Eye Cue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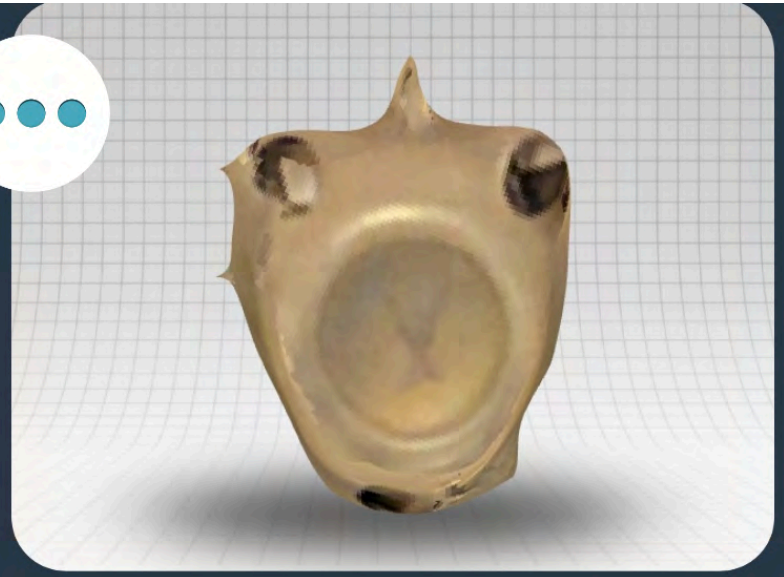


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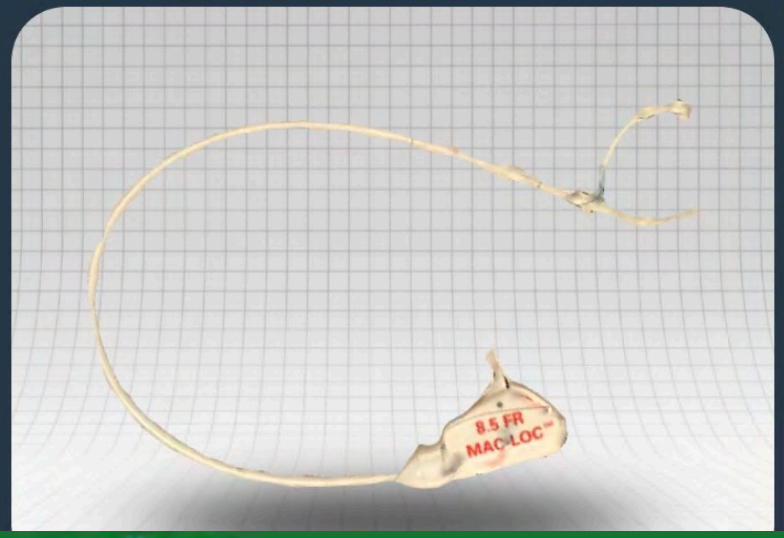
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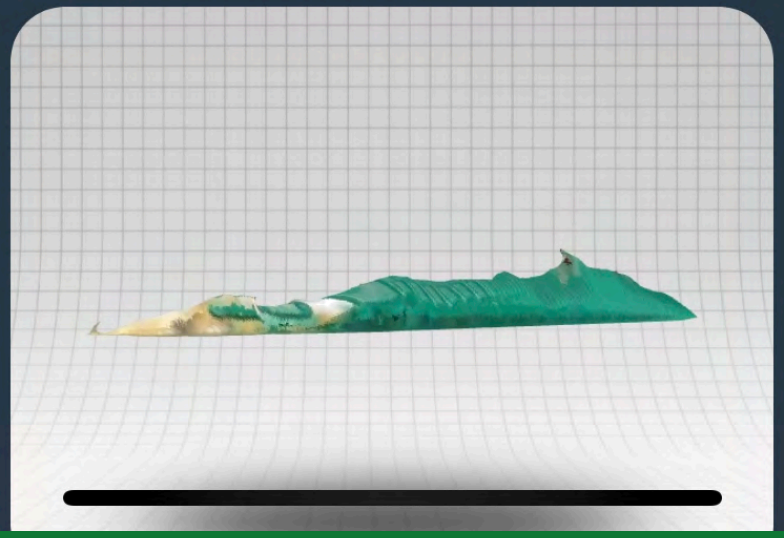
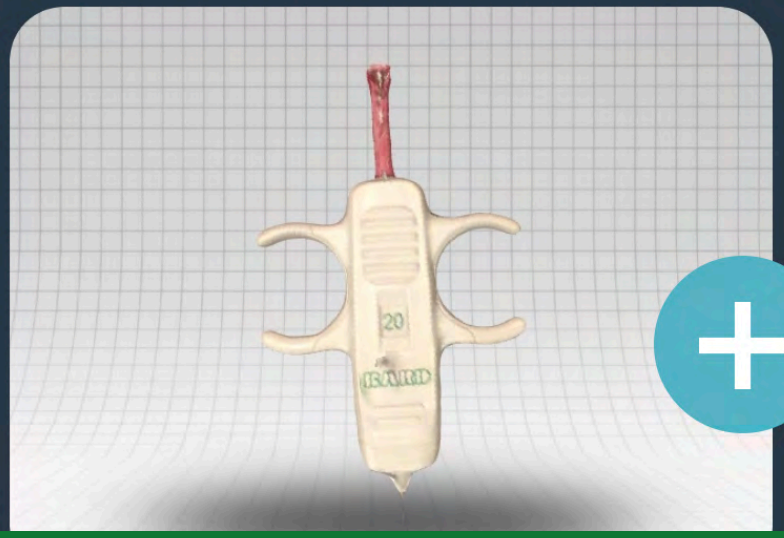
MAC-LOC™

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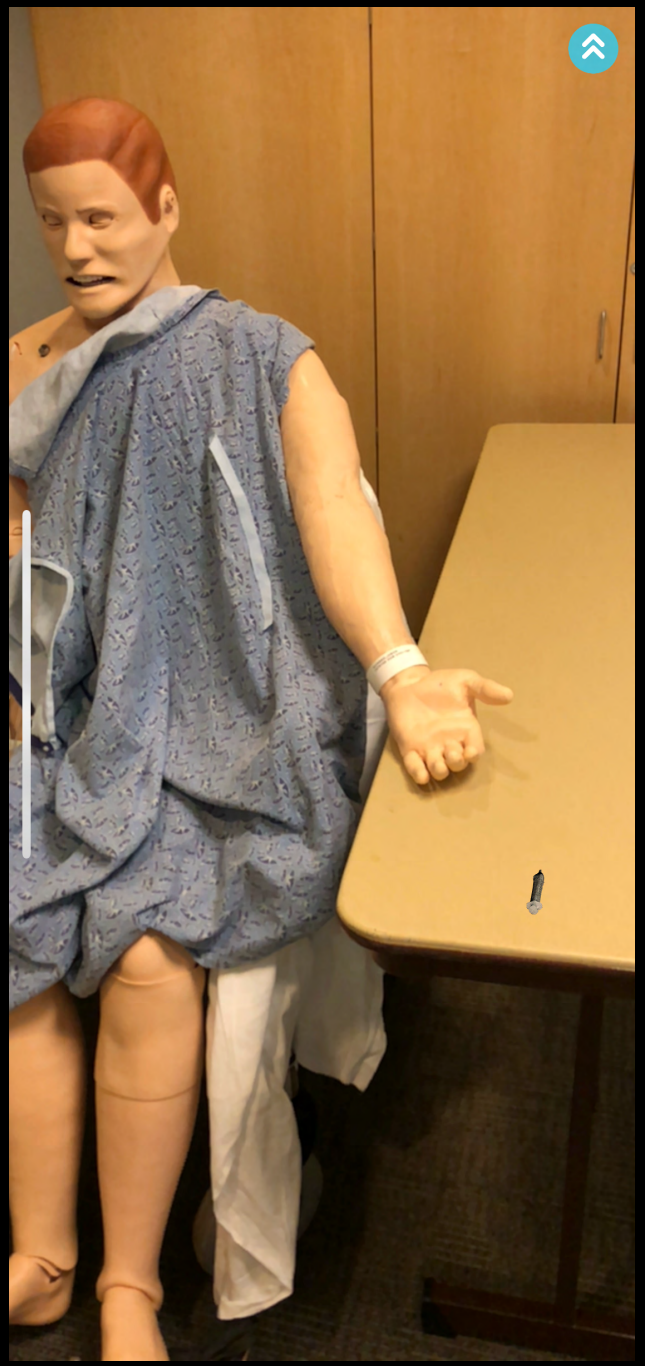
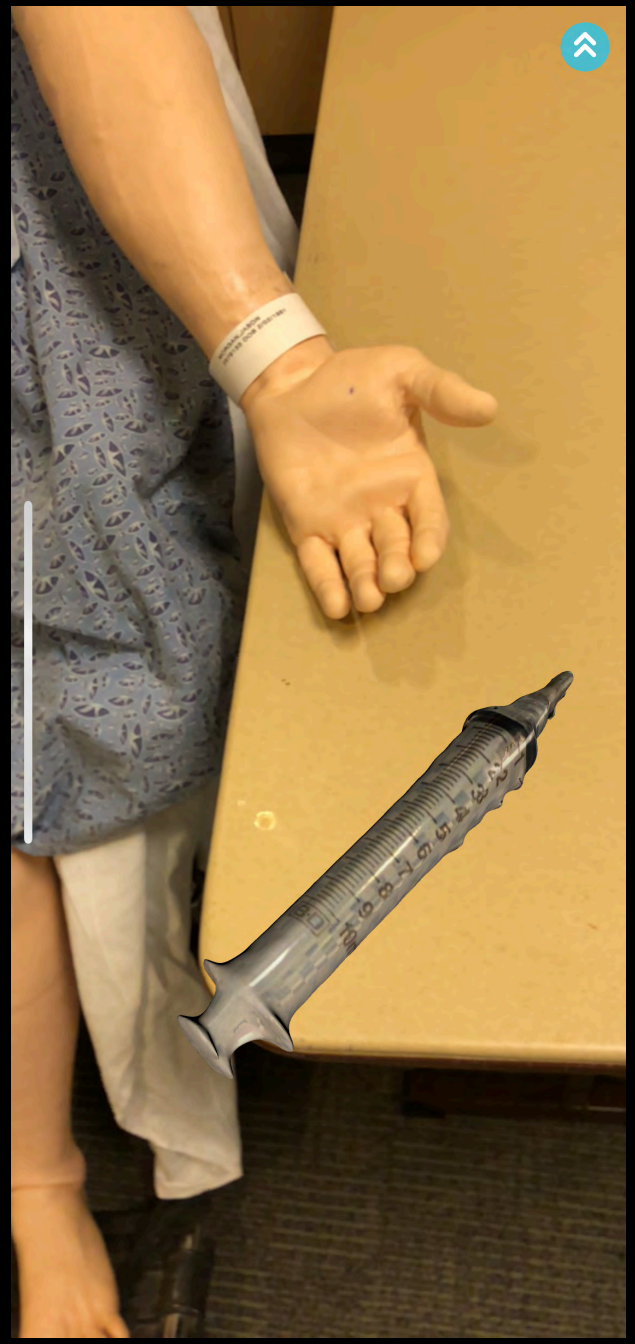
BARD





IMMERSION IN THE ENVIRONMENT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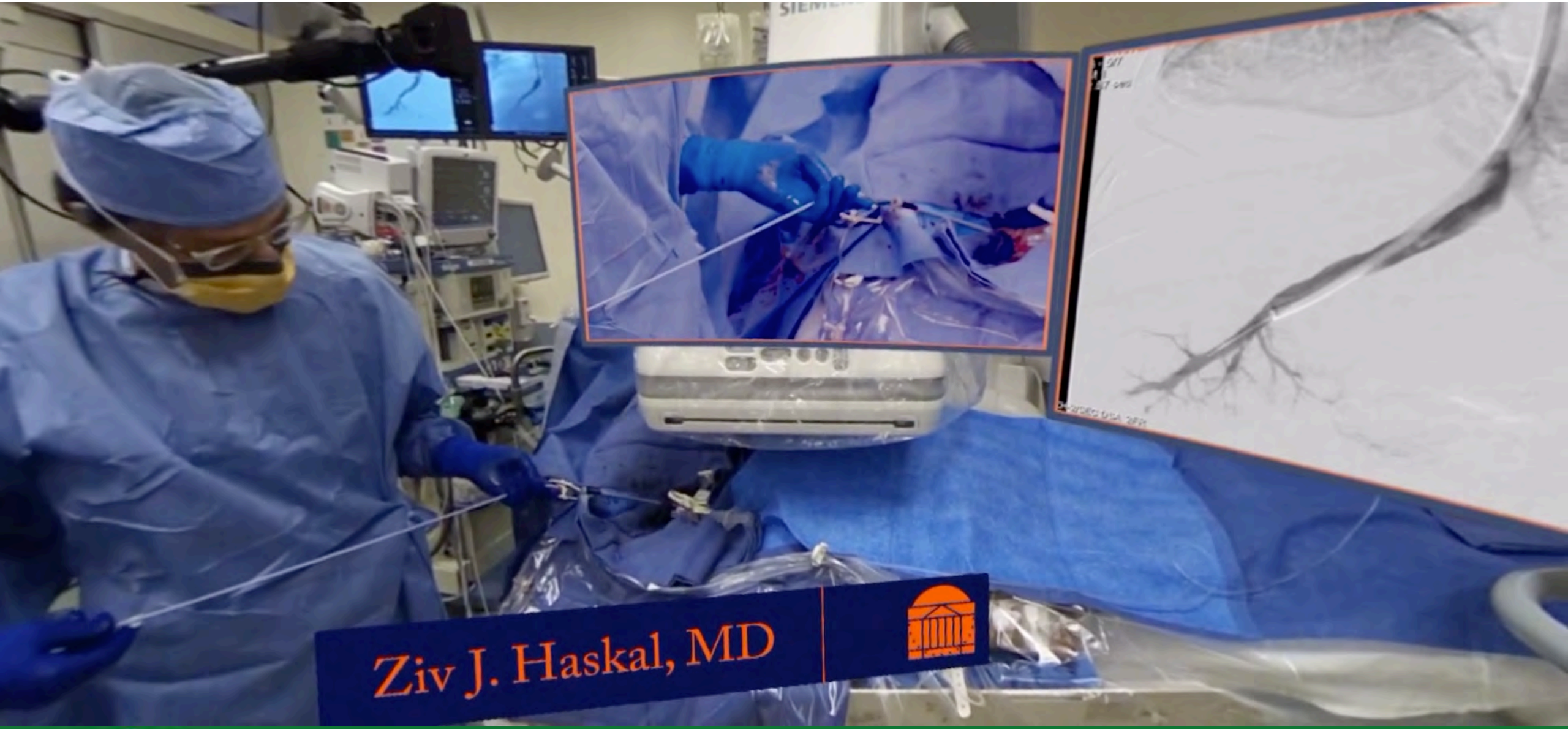
SIR 2018

March 17–22 \ Los Angeles, Calif.
Los Angeles Convention Center


Ziv J. Haskal, MD

VENDOR APPLICATIONS


for your vascular pro
EXPERIENCE


OsteoCool VR
Training
Demo
Ready
OsteoCool.exe
1:33 PM

IS IMMERSION APPROPRIATE?

Touch Surgery Application

AUGMENTED REALITY OVERLAP – THE HOLY GRAIL


https://vimeo.com/user66447337

ELSEVIER

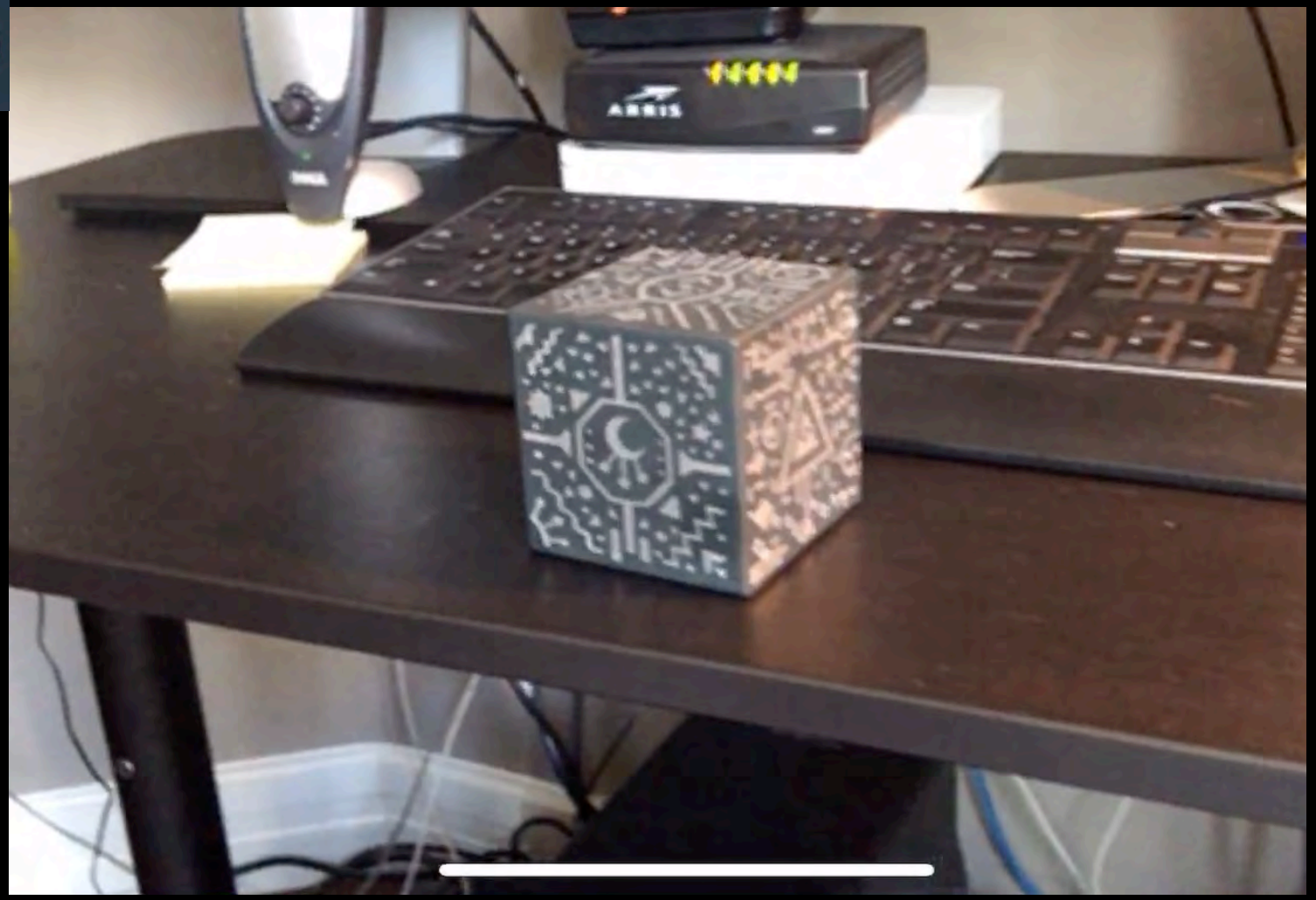
Medical Image Analysis

Volume 13, Issue 3, June 2009, Pages 494-506

An augmented reality system for liver thermal ablation: Design and evaluation on clinical cases

S.A. Nicolau [a], X. Pennec [b], L. Soler [a], X. Buy [c], A. Gangi [c], N. Ayache [b], J. Marescaux [a]

WHERE DO WE GO FROM HERE?


ARRIS

CAE (Canadian Aviation Electronics) Healthcare


THIS IS ONLY THE BEGINNING…

Varjo's XR-1 Developer Edition - https://www.youtube.com/watch?v=TiVa-o8uh6Q

Conclusion

- VR/AR offers the possibility of immersion and simulation training
- Explosion in the application of gaming and entertainment technology in medicine
- Image-guided procedures well poised to use these technologies to help with training and clinical use


THANK YOU