

Hardware & Software Components

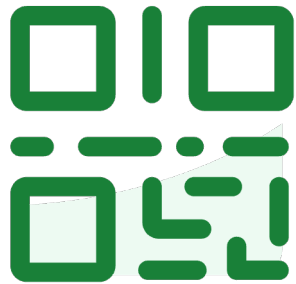
Notes for the SIT-DP module: **Developing Immersive Applications**

Created by: Chek Tien TAN



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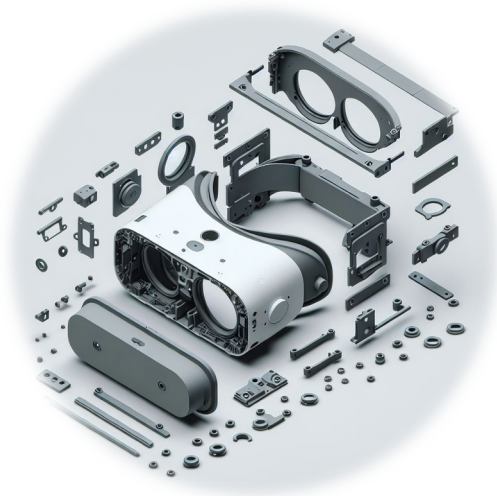


**So... did you watch the pre-class
video this time? (again, no
penalties here)**

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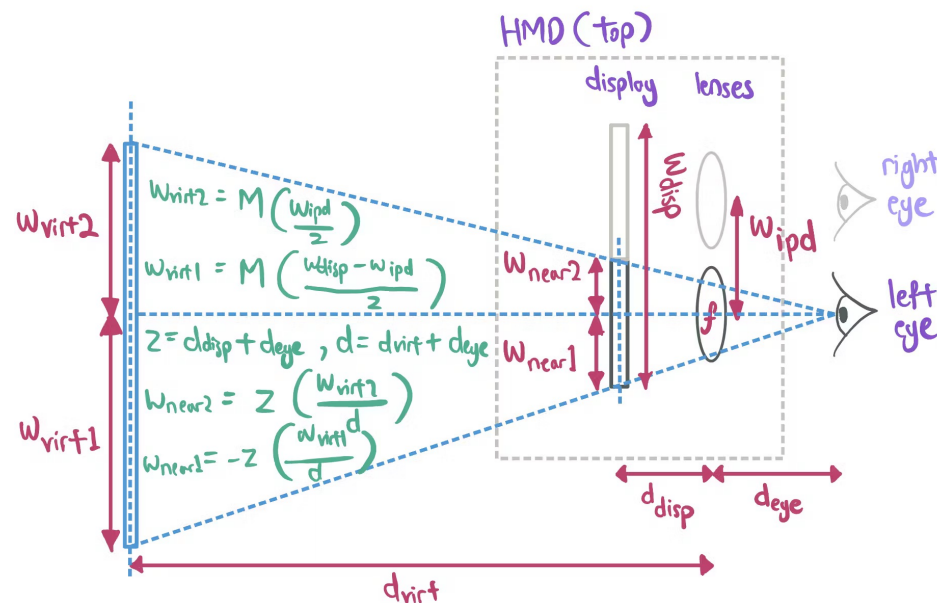
Learning Objectives:

- describe common hardware components in XR devices
- explain the image formation process in typical XR HMDs
- describe common software components in immersive applications
- describe the architecture of a typical WebXR application



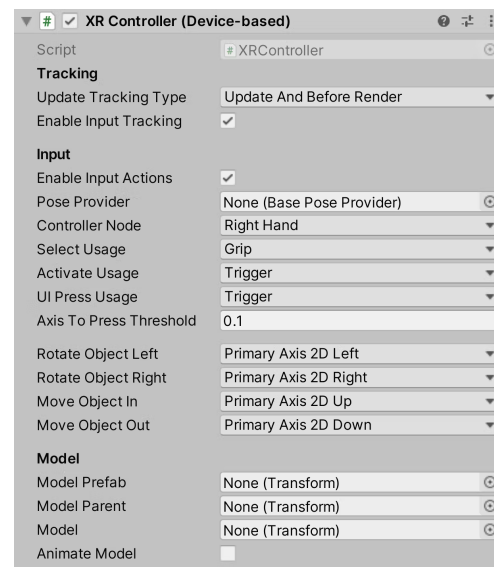
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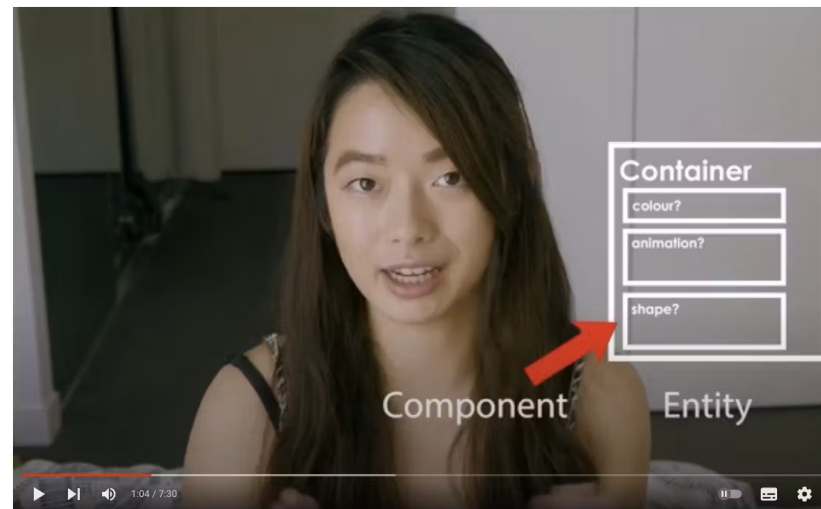
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<https://docs.unity3d.com/Packages/com.unity.xr.interaction.toolkit@2.3/manual/xr-controller-device-based.html>

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Aframe Webvr - VR Development Tutorial Series

Aframe Webvr - VR Development Part 3 - ECS Architecture

https://youtu.be/qB8Ejh_QdpE

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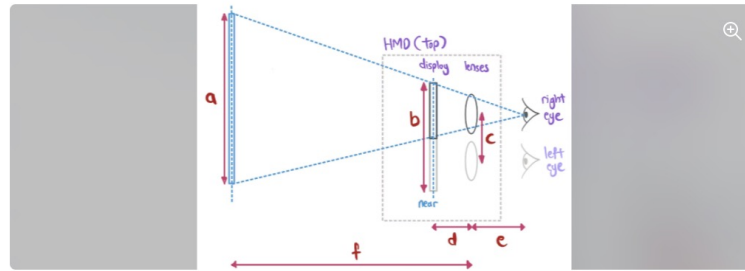
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**What is the main difference between
the hardware in a modern smartphone
and a HMD?**

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What is the main difference between the hardware in a modern smartphone and a HMD?



- ☒ Display
0%
- ☒ Magnifier lens
0%
- ☒ CPU
0%
- ☒ GPU
0%
- ☒ Cameras
0%
- ☒ Motion sensors
0%

Stereo Rendering for HMDs

*All Current-generation VR HMDs are
“Simple Magnifiers”*



Head Mounted Display Optics I



Gordon Wetzstein
Stanford University

EE 267 Virtual Reality

Lecture 7

stanford.edu/class/ee267/

<https://stanford.edu/class/ee267/lectures/lecture7.pdf>

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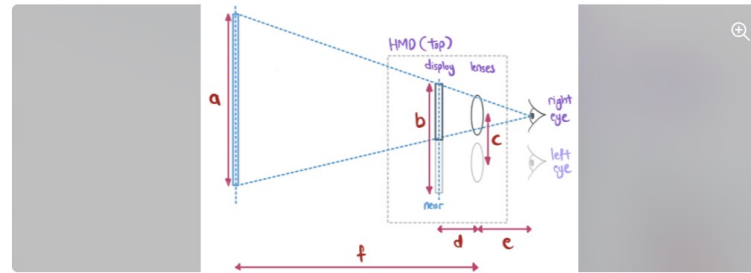
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**In the schematic HMD diagram,
where is the "eye relief"?**

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In the schematic HMD diagram, where is the "eye relief"?



☒ a

0%

☒ b

0%

☒ c

0%

☒ d

0%

☒ e

0%

☒ f

0%

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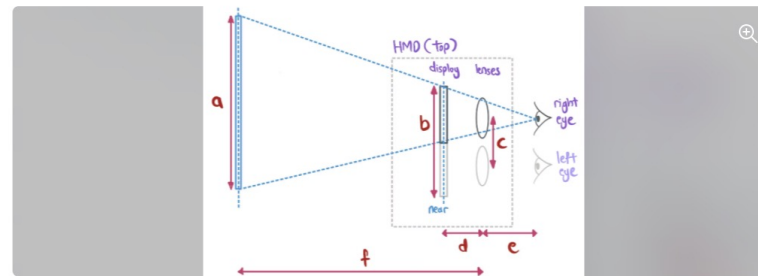
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**In the schematic HMD diagram,
where is the width of the virtual
image?**

① Start presenting to display the poll results on this slide.

In the schematic HMD diagram, where is the width of the virtual image?



☐ a

0%

☐ b

0%

☐ c

0%

☐ d

0%

☐ e

0%

☐ f

0%

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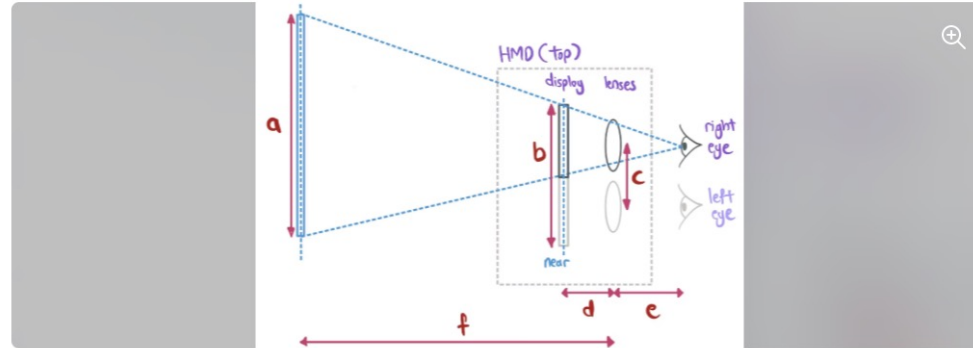
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**In HMDs, what effect will
changing the focal length of the
lens have?**

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In HMDs, what effect will changing the focal length of the lens have?



☒ Height of the HMD display

0%

☒ Depth of the HMD display

0%

☒ Depth of the view frustum's near plane

0%

☒ Depth of the virtual image generated

0%

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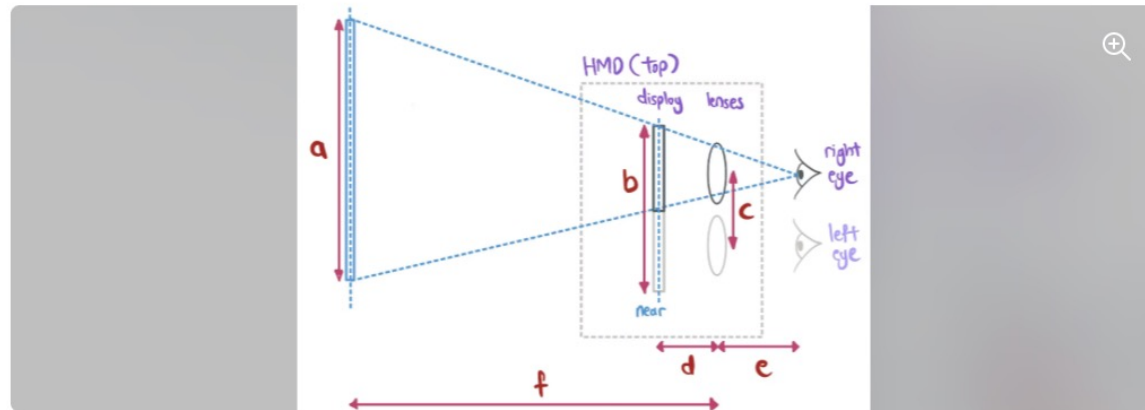
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**The perspective matrix for
rendering in HMDs is the same for
both eyes.**

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The perspective matrix for rendering in HMDs is the same for both eyes.



☒ True

0%

☒ False

0%

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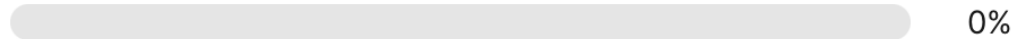


**The view matrix for rendering in
HMDs is the same for both eyes.**

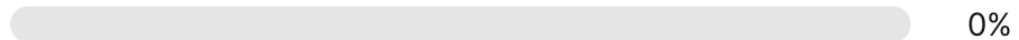
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The view matrix for rendering in HMDs is the same for both eyes.

☐ True



☐ False



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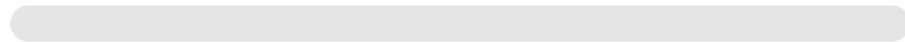


**What is a valid property of the
view frustum generated by typical
HMDs?**

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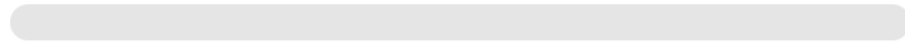
What is a valid property of the view frustum generated by typical HMDs?

☐ Volume is vertically symmetric only



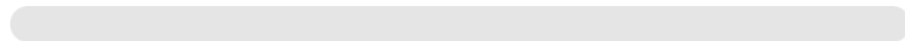
0%

☐ Volume is horizontally symmetric only



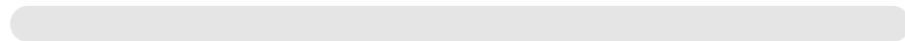
0%

☐ Volume is both vertically and horizontally symmetric



0%

☐ There is no symmetry in the volume



0%

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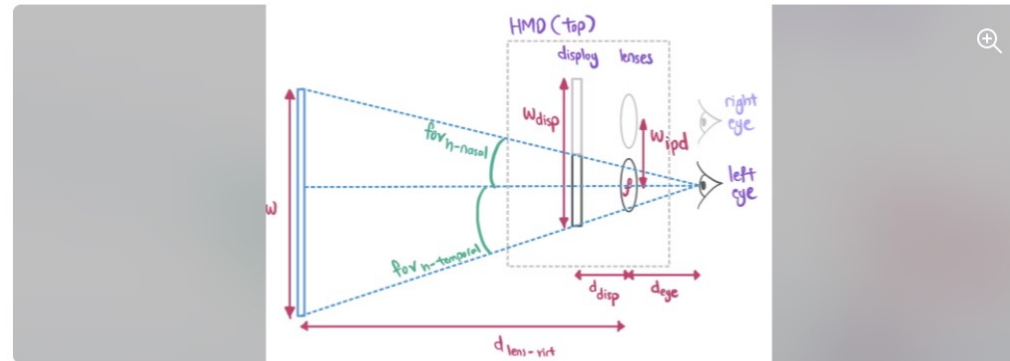
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**What is a result of reducing the
eye relief?**

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What is a result of reducing the eye relief?



✓ increased distance between lens to virtual image

0%

✓ decreased distance between lens to virtual image

0%

✓ increased FOV

0%

✓ decreased FOV

0%

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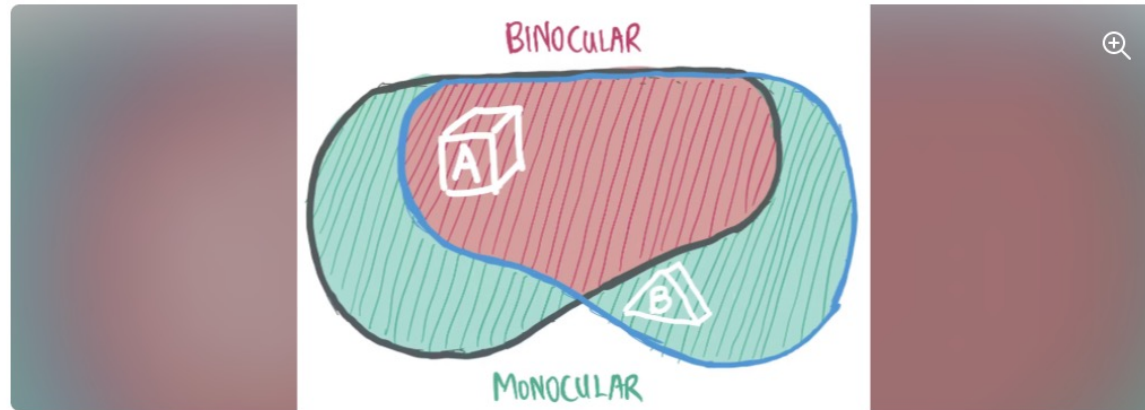
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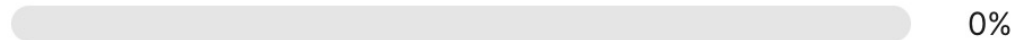
**Which object is easier for the user
to reach out and grab with his/her
hands?**

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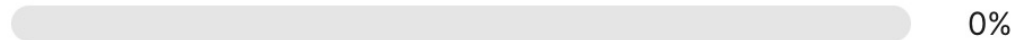
Which object is easier for the user to reach out and grab with his/her hands?



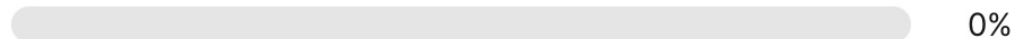
☒ A



☒ B



☒ Both are the same





<https://dementia.org.sg/2022/03/30/experience-dementia-in-singapore/>

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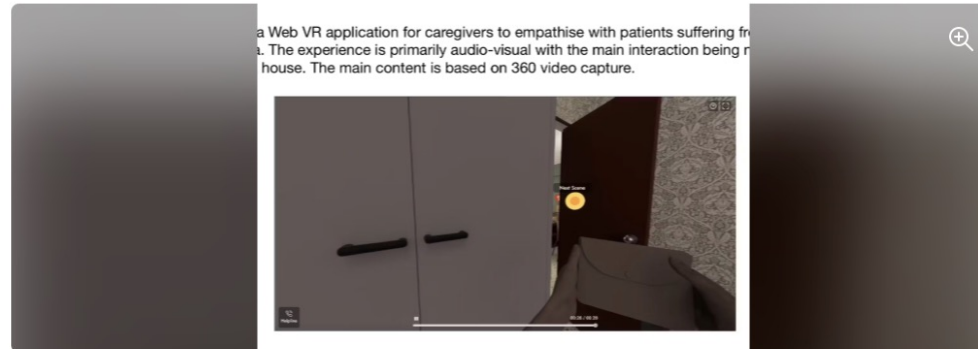
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**Which software component is the
least important in the XR application
described?**

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Which software component is the least important in the XR application described?

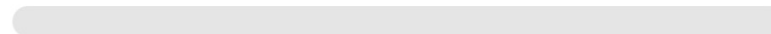


✓ Rendering



0%

✓ Physics



0%

✓ Input Handler



0%

✓ Audio



0%

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What is your top reason for using ECS over straightforward OOP in your game app architecture.

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Audience Q&A

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