

# Virtual Reality facilitator guide

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# Facilitator guide

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- 7 Equipment Tech - Topics for discussion after VR experience**

# Virtual Reality facilitator guide – goal and objectives

## Goal

- The goal of the DRAM Memory virtual reality module is to provide an engaging environment to learn about binary data and how that data gets stored in a DRAM memory array
- The goal of the Equipment Technician virtual reality module is to provide an engaging environment to learn about the cleanroom and specifically about the critical role of Equipment Technicians
- The goal of this guide is to provide educators/facilitators with the necessary tools to confidently facilitate these virtual reality experiences

## Objectives

- Introduce how small the structures in a memory array are
- Present the different component of a memory array in a 3D environment to facilitate the appreciation of the scale and connections between structures
- Experience dressing up for the fab and understand why the order is key to minimize contamination
- Become an Equipment Technician for a day and observe some of the critical tasks this role performs

# Target Audience for the virtual reality experiences

- Middle school, high school, community college, college, and adults.
- Elementary 3<sup>rd</sup> to 6<sup>th</sup> grade: only shrinking room, binary activity and smock room
- Interns, NCGs (New College Grads), and new employees in many technical roles at Micron need to understand these concepts



# How to start the application in VR headset

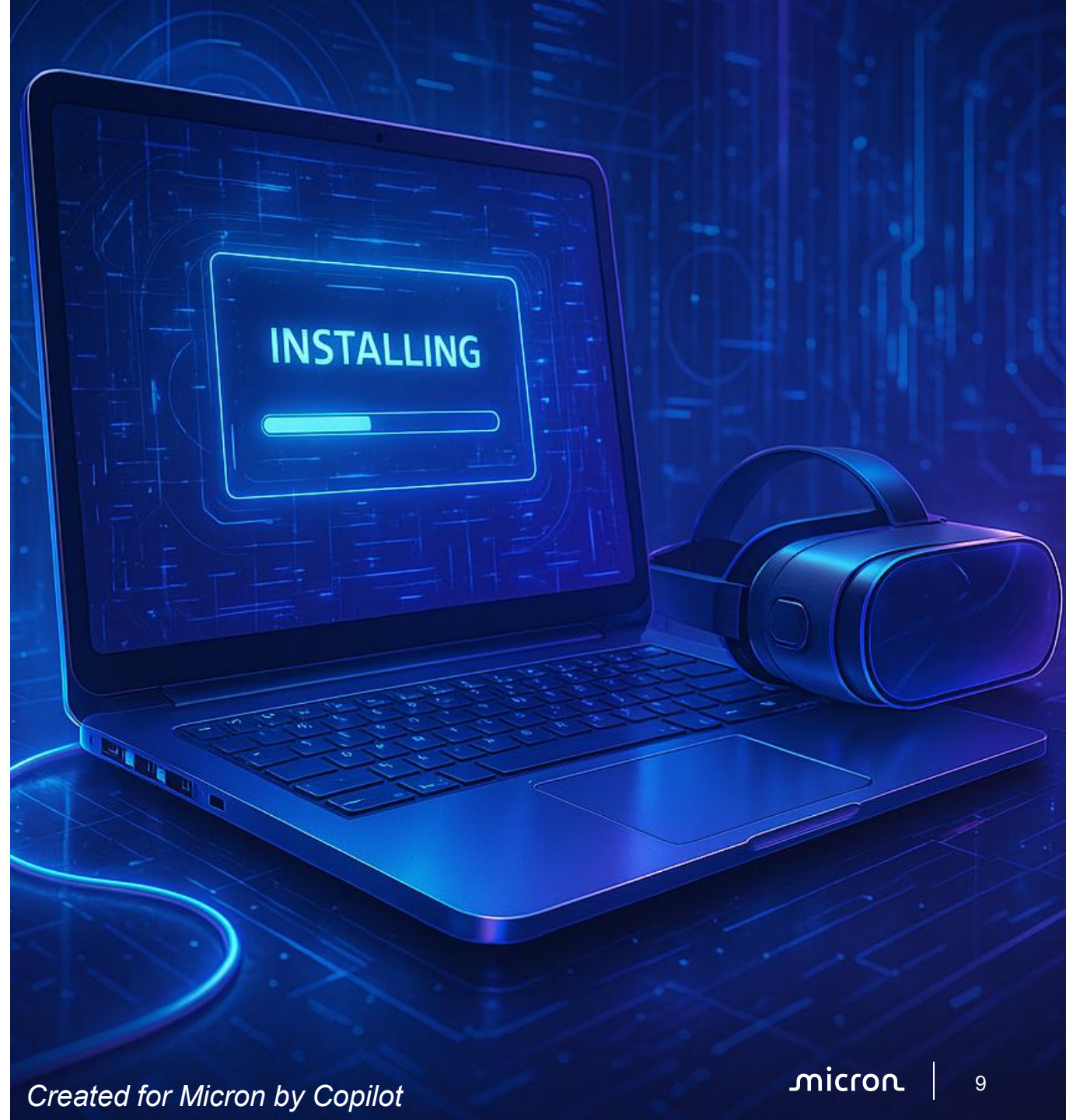
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*Created for Micron by Copilot*

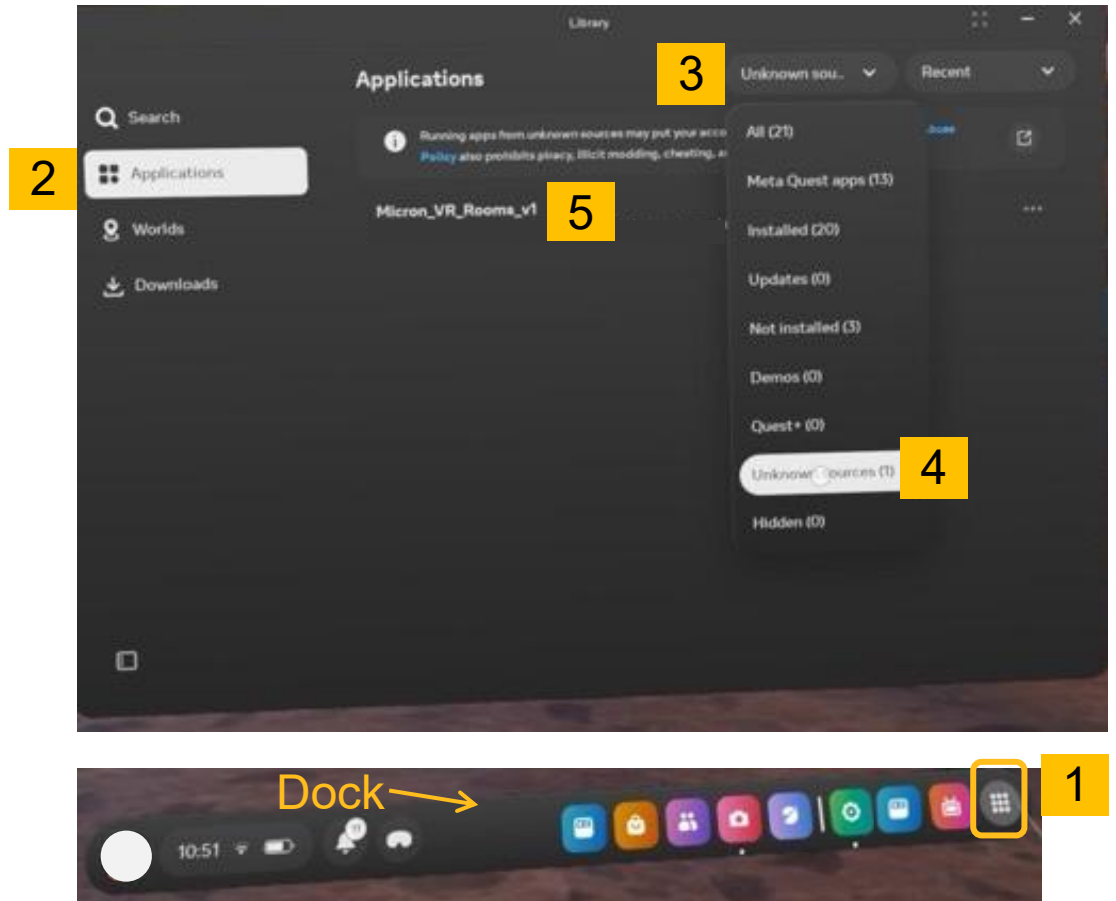
# This document does not cover application installation

- This document assumes the application has already been installed in the VR headset
- Please refer to the *How to install the application* document if the application has not been installed in the VR headset yet



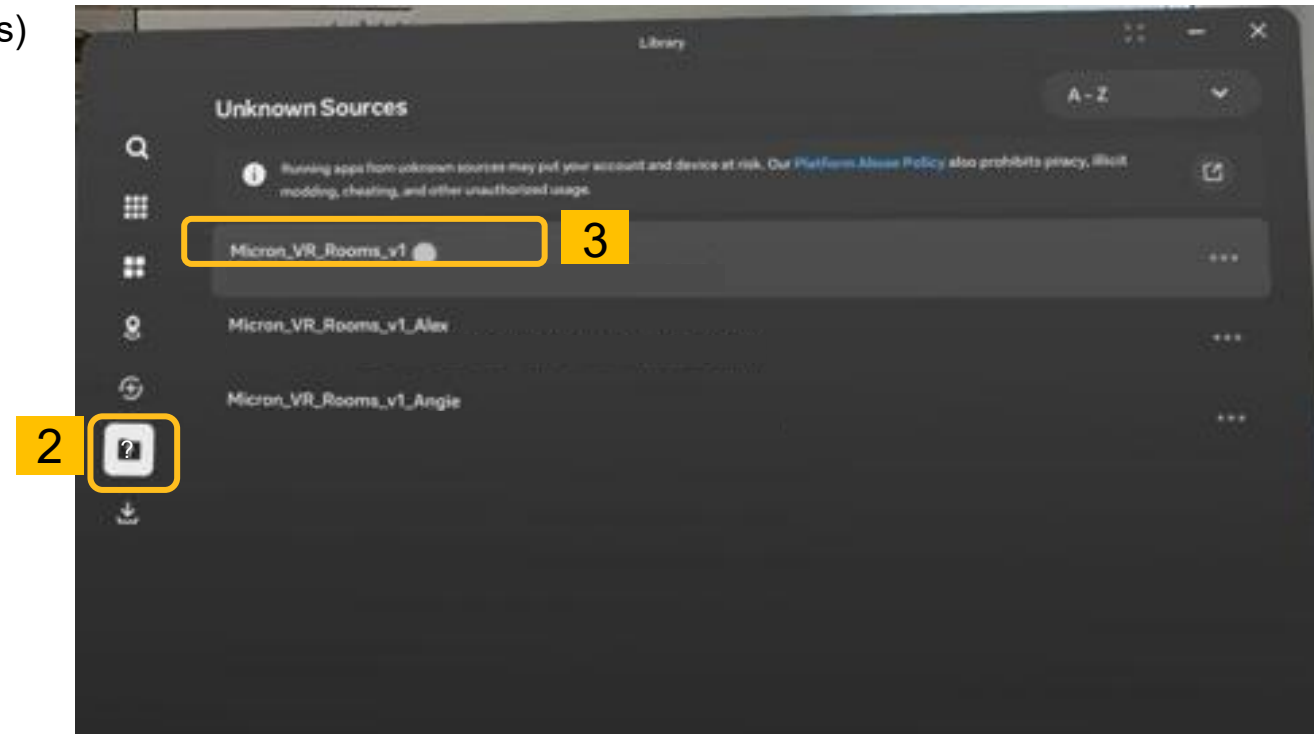
# How to find the experience in Meta Quest™ 2 headsets

- 1 On the Dock, click on the “3x3 dots” symbol
- 2 A window will open. On the left side click on Applications
- 3 Click on the dropdown menu
- 4 Choose Unknown Sources
- 5 Click on application of interest, e.g., Micron\_VR\_Rooms\_v1



# How to find the experience in Meta Quest™ 3 headsets

- 1 On the Dock menu, click on the “3x3 dots” symbol (Applications)
- 2 A window will open. On the left side click on the “?” symbol
- 3 Click on application of interest, e.g., Micron\_VR\_Rooms\_v1



# Three apps to provide flexibility

- Provide facilitators flexibility depending on what story they want to show to their participants

## App name:

**Micron\_VR\_Rooms\_v1**

Details: Both Angie's and Alex's stories. Participant can watch one or all stories. Participant can watch stories in the order they prefer.



## App name:

**Micron\_VR\_Rooms\_v1\_Angie**

Details: Angie's story only (other stories cannot be chosen as they are grayed out)



## App name:

**Micron\_VR\_Rooms\_v1\_Alex**

Details: Alex's story only (other stories cannot be chosen as they are grayed out)



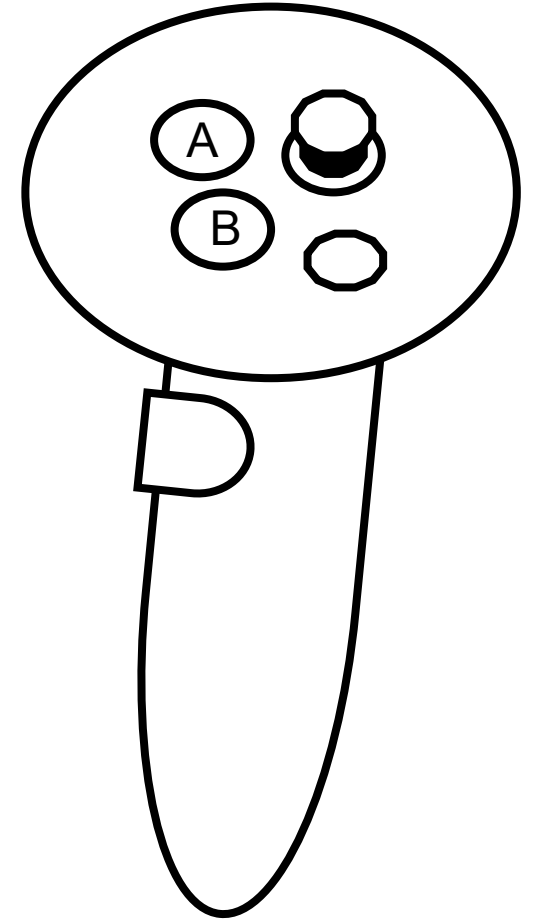
# How to interact with the experience

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# VR controllers

- The **right-hand controller** (the one with the A/B buttons) can be used for these tasks:
  - Interact with the experience (trigger) (shown in a later slide)
  - Exit the application
- The **left-hand controller** (X/Y buttons) can be used for these tasks:
  - Navigate to different rooms during interactive mode
  - Restart level
  - Exit the application
- **Recommendations:**
  - Most facilitators prefer to only give participants the right-hand controller to avoid additional time to train participants on how to use left-hand controller.
  - Giving participants the left-hand controller is recommended when participants prefer more flexibility to explore the environment at their own pace.



Right-hand controller

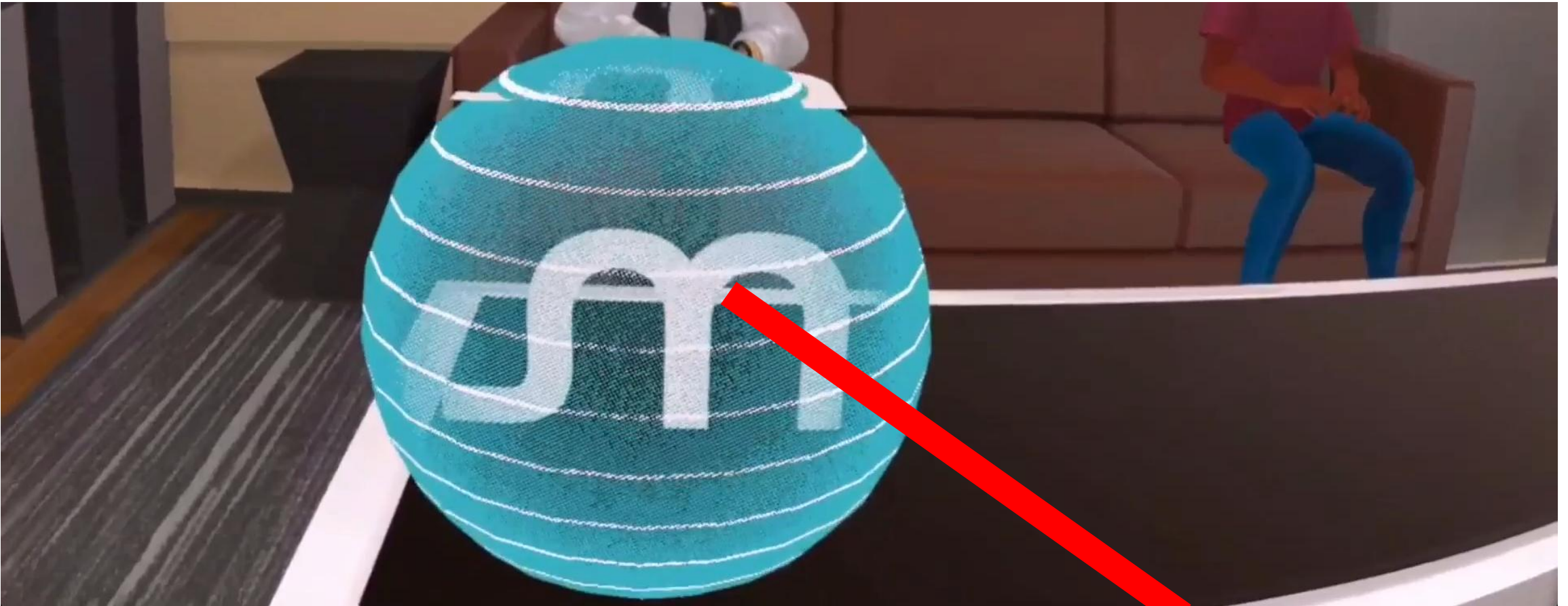
# The Micron Lobby / The Micron Orb

- Once the experience starts there will be a cinematic video of avatars entering into a Micron lobby
- When the blue Micron orb shown below appears, then the participants can start the experience as shown in the next 2 slides



# Trigger – LASER to start experience

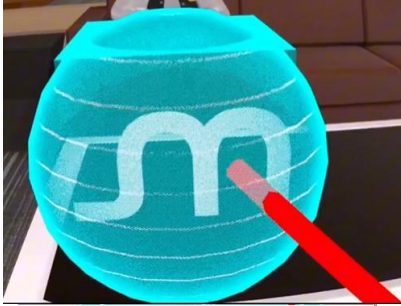
- Participant will use the trigger on the right-hand controller as shown in next slide to activate the blue Micron orb to go onto the next step of the experience



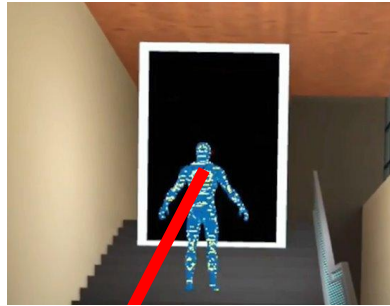
# Right Hand Controls

Meta Quest™

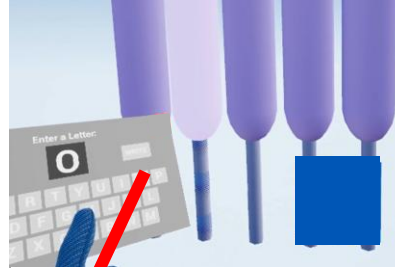
Micron Orb



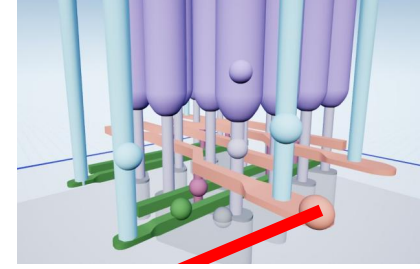
Door to teleport



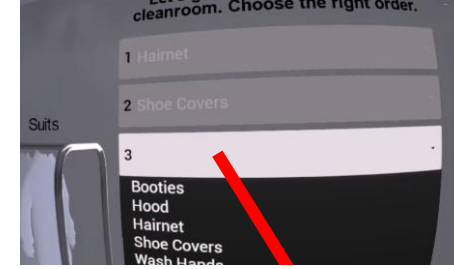
Keyboard



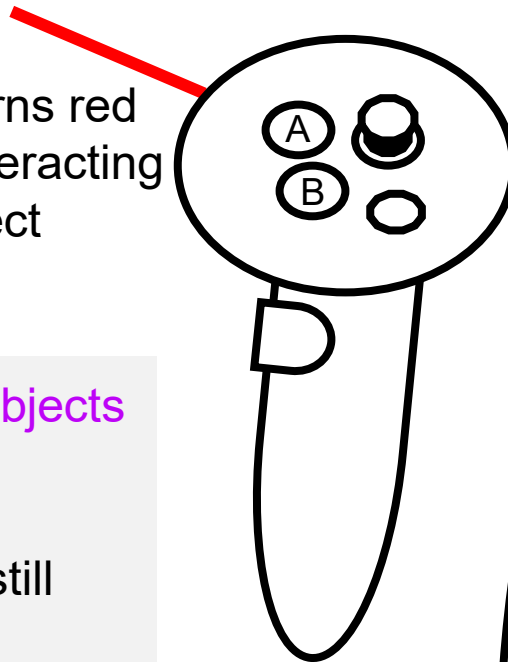
Memory room quiz



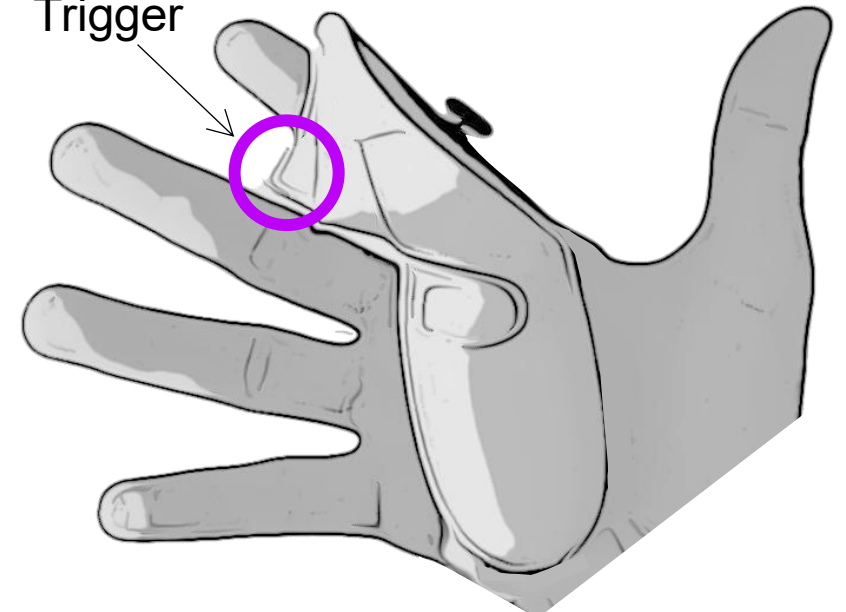
Gown room quiz



Laser turns red when interacting with object



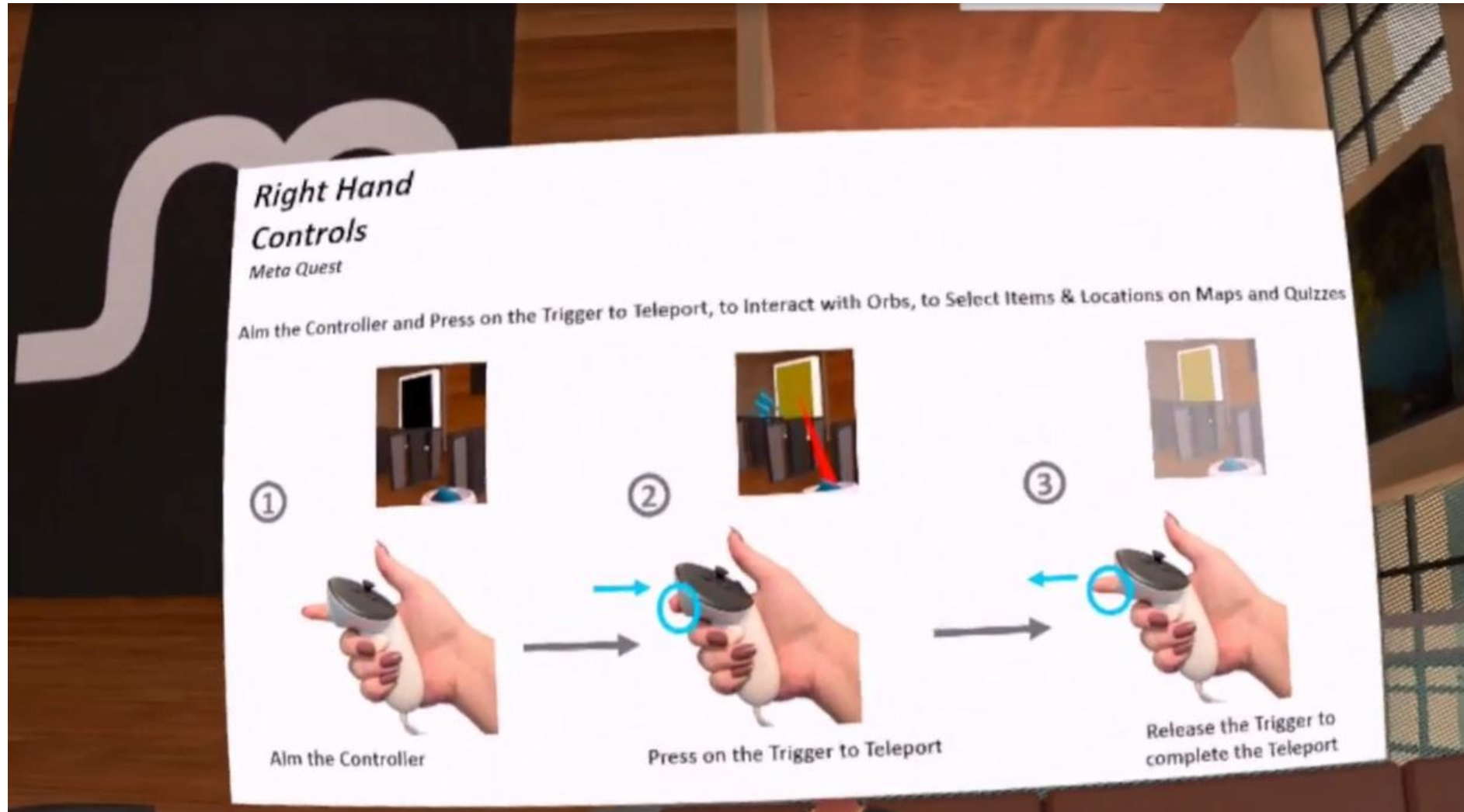
Trigger



Do these three steps to interact with objects

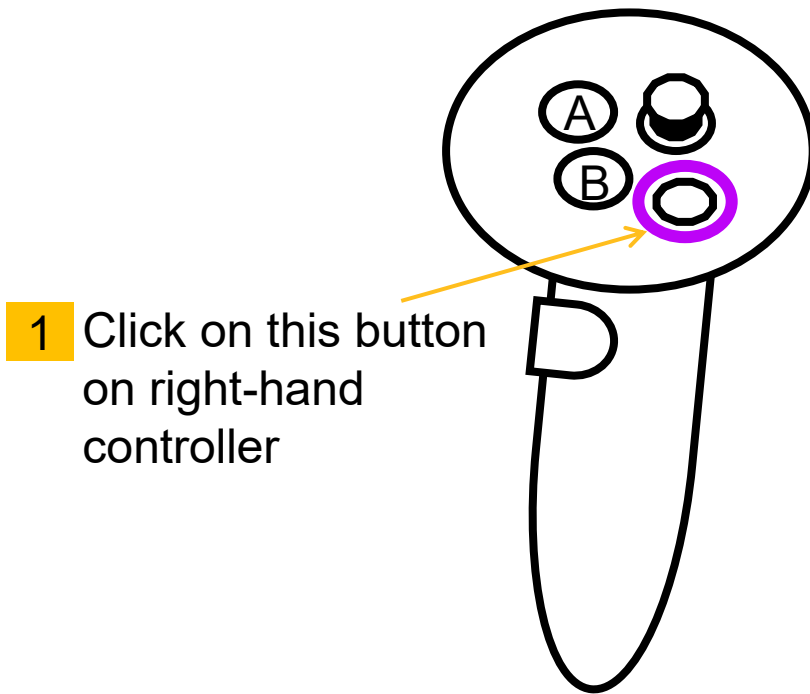
- 1) **Point** at object
- 2) **Press** the trigger button
- 3) **Release** the trigger button (while still pointing at object)

# Instructions also embedded in the experience



# Exit instructions

- The application can be exited at any time following these steps:
  1. Click on button shown in illustration
  2. A window will pop up
  3. Choose the Quit button to exit application
  4. Alternatively, choose the Resume button to continue the VR experience



# Cinematic versus Interactive sections

|                 | Cinematic scenes   | Interactive scenes  |
|-----------------|--|---|
| Description     | Scenes where there are no elements to interact with. Examples: the start of the experience as avatars enter the lobby; scenes when an avatar is speaking.          | Scenes where there are interactive elements (quizzes, blue Micron orb, doors to teletransport, etc.). |
| Exit experience | Can exit experience (see slide titled <i>Exit instructions</i> ).  | Can exit experience (see slide titled <i>Exit instructions</i> ) or using X button menu.              |
| Navigation      | During Cinematic scenes, cannot pause, rewind, fast forward or go back to the Lobby. Can exit experience at any time (see slide titled <i>Exit instructions</i> ). | Can use Y button to navigate to a different room. See <i>Advanced navigation</i> section.             |

# Description of experiences

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# The Micron Lobby

- Once the initial blue Micron orb is activated, three intro videos will play as below:
  1. Angie's intro video (~20 seconds)
  2. Alex's intro video (~20 seconds)
  3. Leticia's intro video (~20 seconds)
- After videos play, participant can choose the blue Micron orb of their choice (or the one the facilitator indicates)
- Please note that if participant chooses a different experience than the one the instructor indicated, the options are to either allow them to view it, or to exit the experience and start again (see *Exit Instructions* slide)



1

**Follow Angie to learn  
about memory operation**



2

or

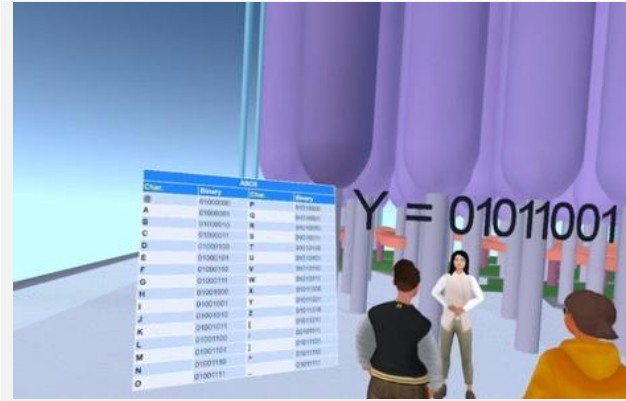
**Follow Alex to visit the  
cleanroom and learn about the  
Equipment Technician role**



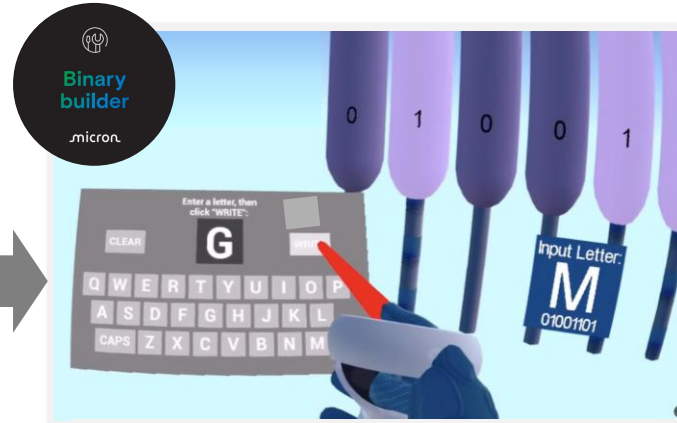
# Angie: memory operation story board



Angie takes us into a “shrinking room” where different objects of known dimensions appear as we shrink to the nanometer scale.



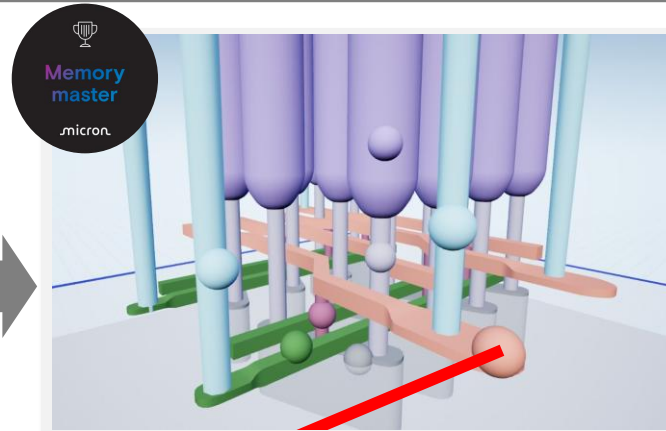
Then we enter into a nanometer scale DRAM memory array where we first learn about binary data.



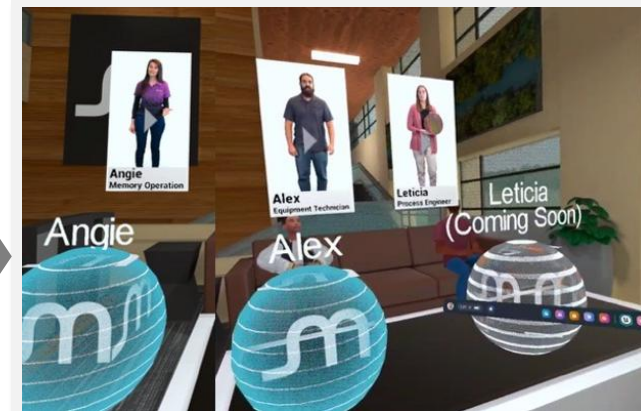
We get to practice how to store a single character (8 bits) into capacitors in a DRAM memory array. We earn the **Binary builder badge** along the way!



Next, we learn about the different components of a DRAM memory array, and we learn about the WRITE operation (how to write a 0 or a 1 in a capacitor).



We next answer several quiz questions to check our understanding and earn the **Memory master badge**!

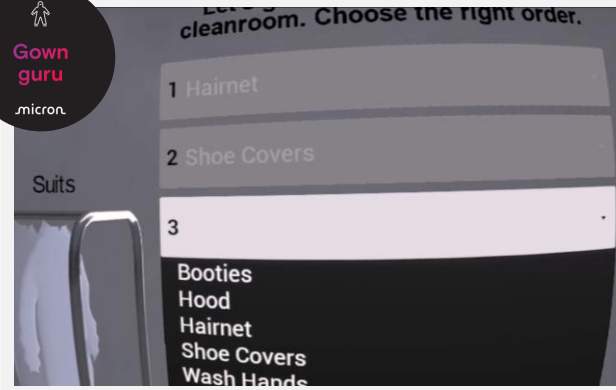


Back to the Micron lobby where we can repeat the adventure or we may be able to choose a new adventure.

# Alex: gown room and cleanroom story board



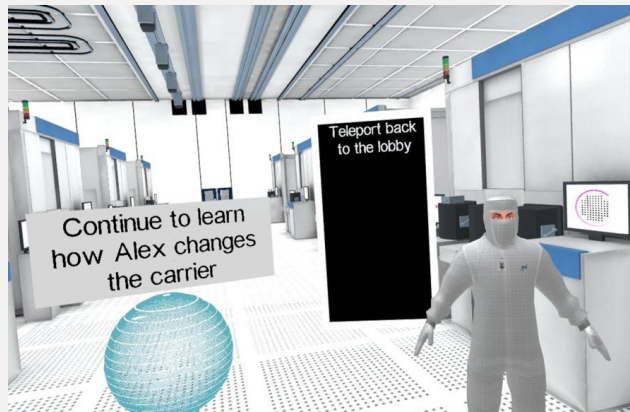
Alex takes us into the Gown Room where we learn the several steps to dress up correctly before entering the cleanroom to prevent introducing contamination.



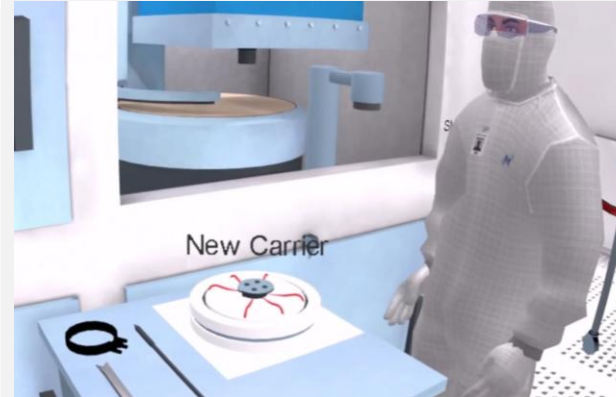
Then we enter the Smock Quiz Room where we interact with numbered drop-down slots to check understanding of the gowning process and earn the **Gown Guru badge**!



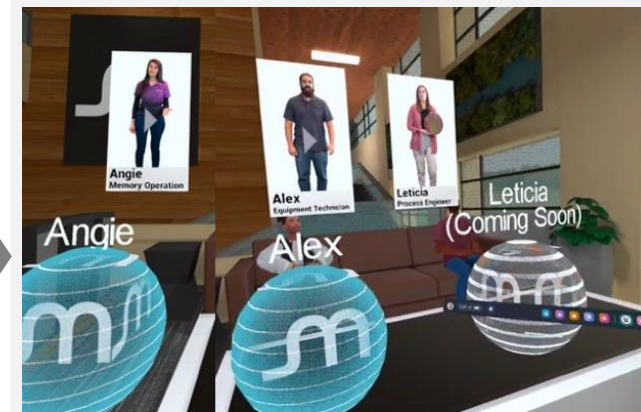
Then we enter the cleanroom where Alex explains the responsibilities of the Equipment Technician and introduces us to the fab area where he works (the Chemical Mechanical Planarization Area).



At this point we have the option to exit and go back to the Micron Lobby, or we can continue with Alex to learn more about the Equipment Technician role.



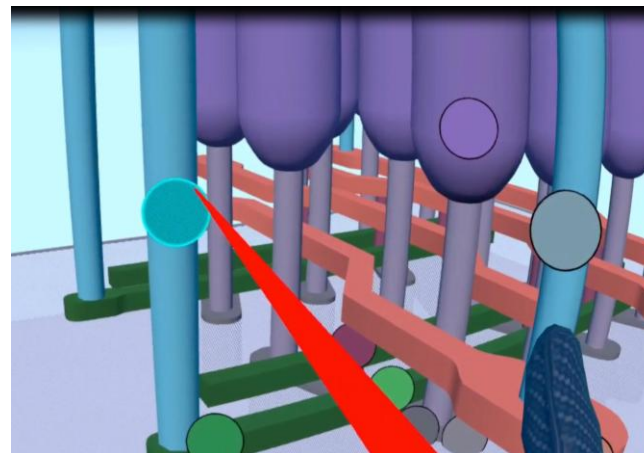
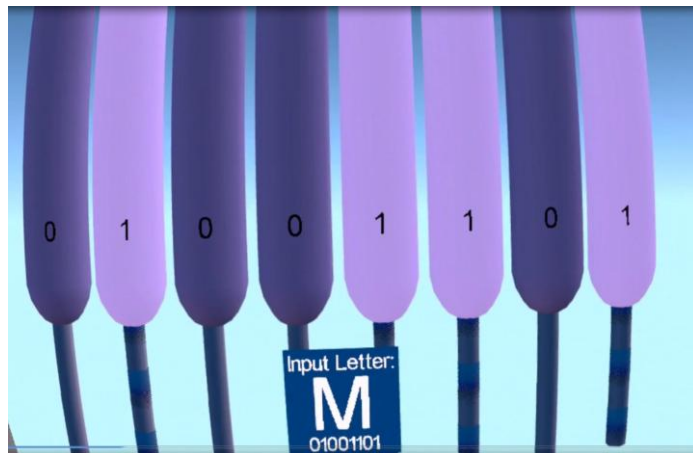
Alex shows step by step how he performs a preventive maintenance task. Today we learn how to change a "carrier" in a Chemical Mechanical Planarization tool he is responsible for.



Back to the Micron lobby where we can repeat the adventure or we may be able to choose a new adventure.

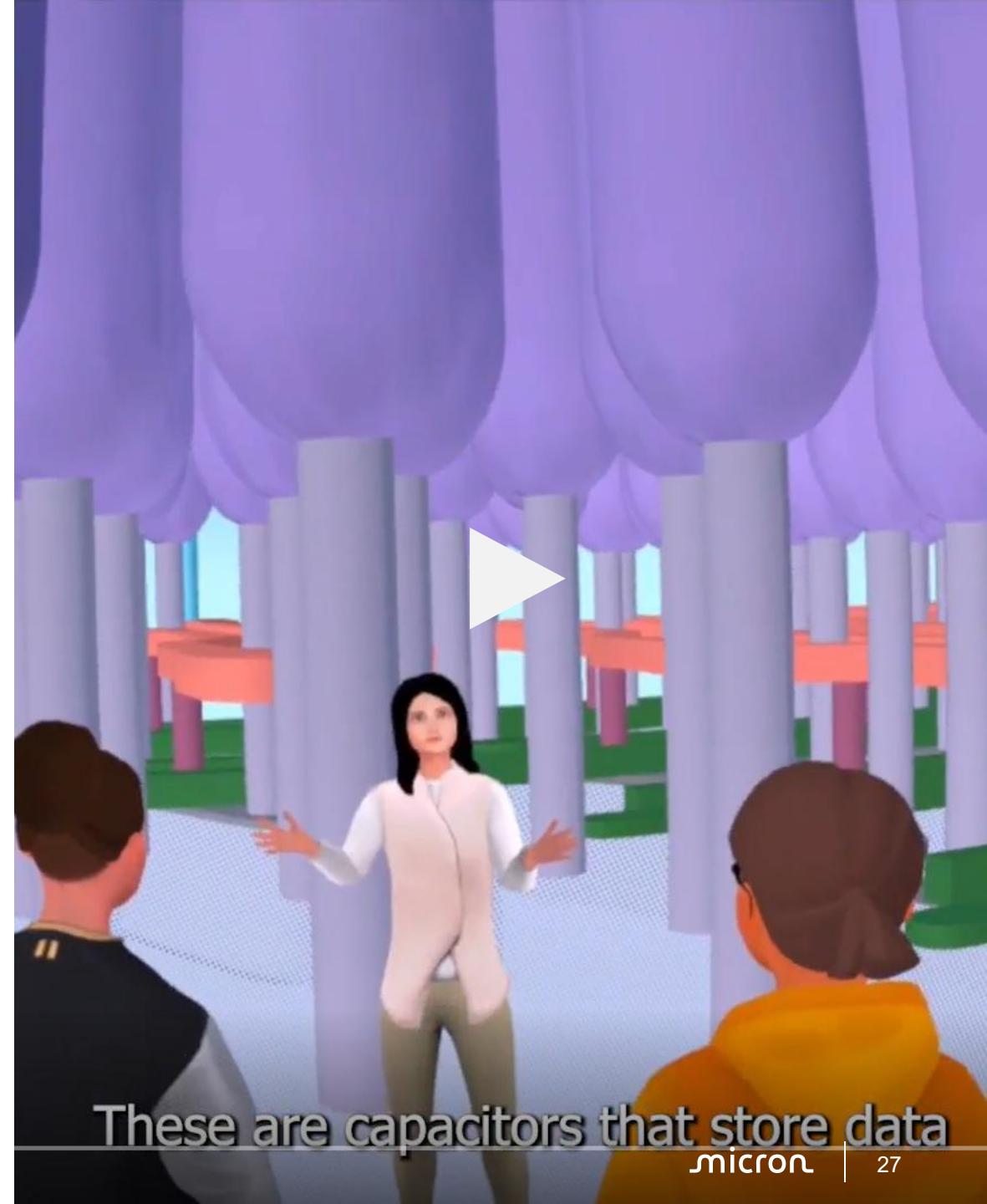
# Stickers for each activity completed!

Sticker design available for printing



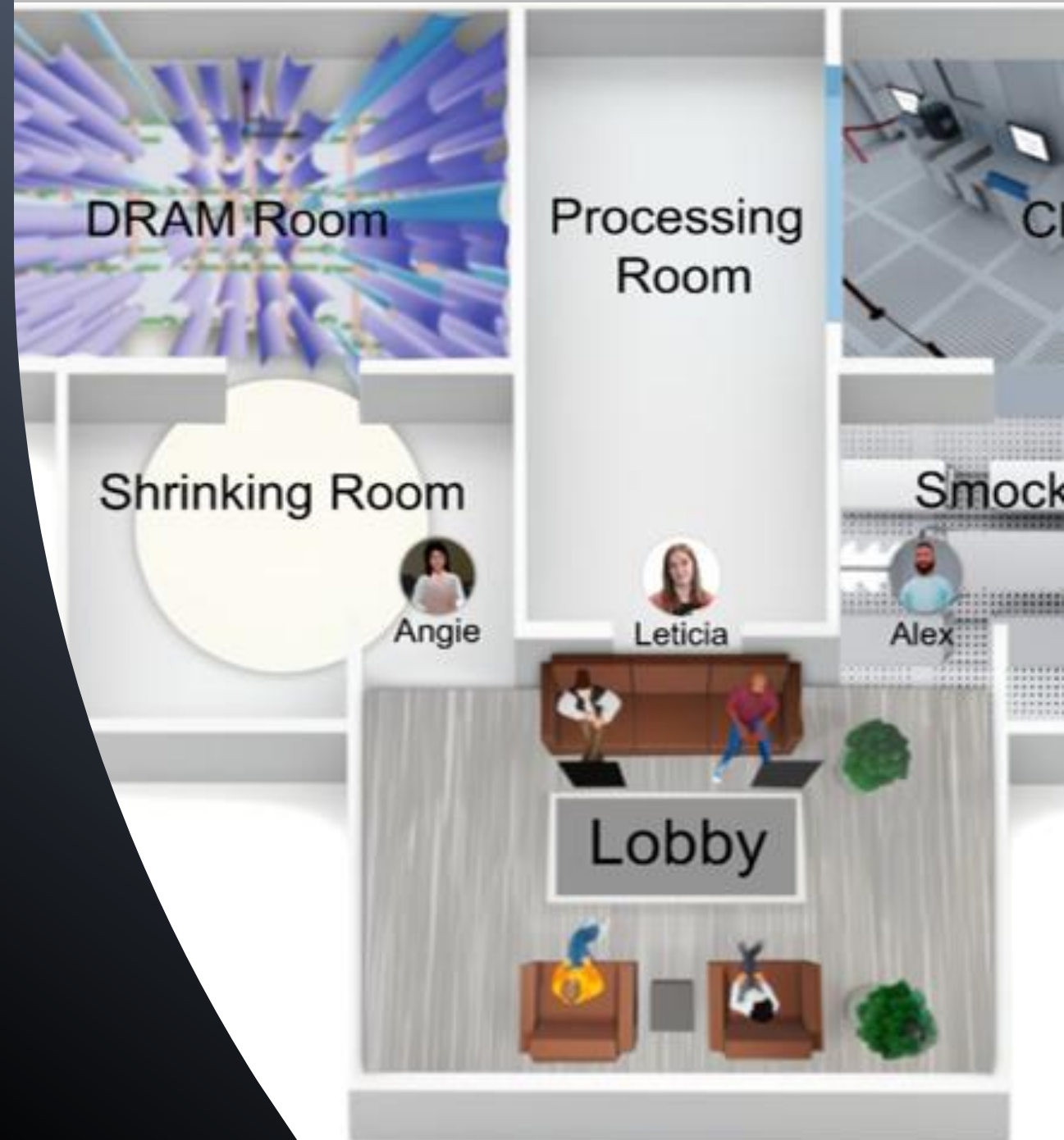
# Videos

- Besides the virtual reality experience, there are two **videos** of the experience that can be watched in a desktop/laptop/etc.:
  - Video without close captions
  - Video with close captions
- These are some scenarios where the videos above have been a good approach
  - Participant has vertigo (VR not recommended)
  - Participant gets dizzy when using VR headsets
  - Participant needs to wear glasses that cannot fit in headset
  - Hearing difficulties – requires close caption
  - English learner who prefers close caption
  - No VR headsets/not enough VR headsets for all participants
- Drawback: the videos do not have interactivity – participant cannot do the activities/quizzes on their own, instead they are watching as someone else does the activities
- Advantage: the videos can be paused, rewind, fast forward, watched at different speeds (the VR version does not have these options)



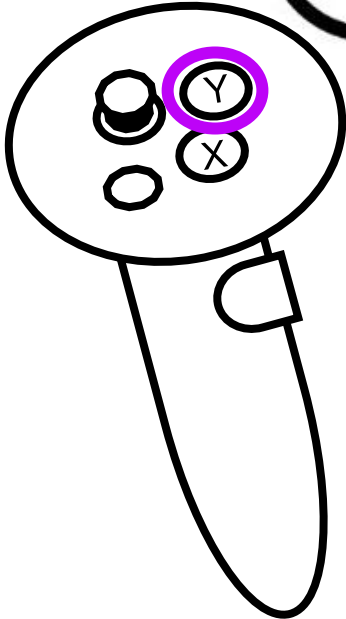
# Advanced navigation

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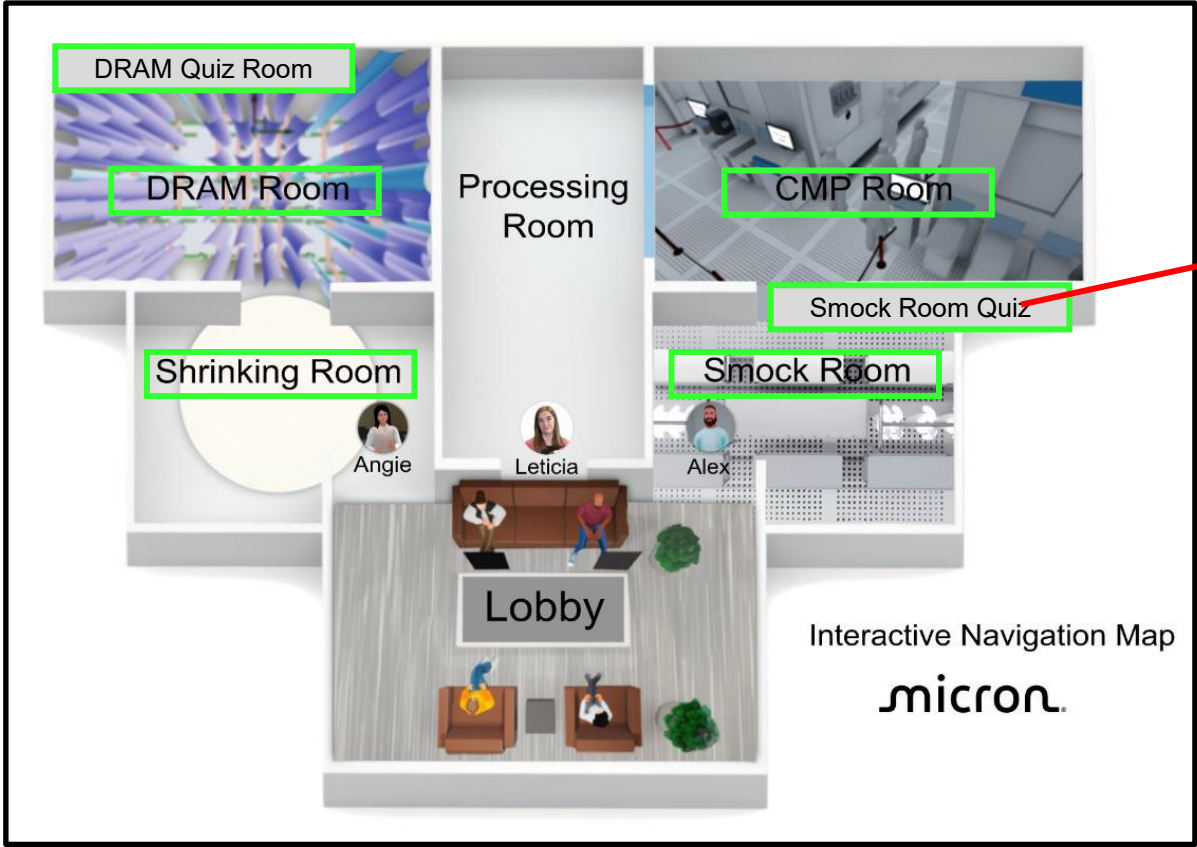


# How to navigate to different rooms during interactive mode (recommended only for facilitators to use)

1) On Left Hand Control click Y button to open Map

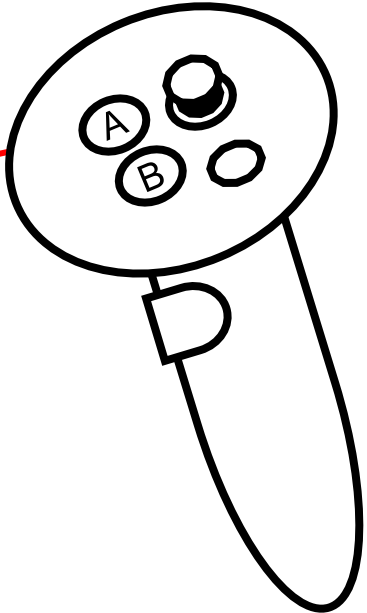


2) Navigation Map opens on your left hand



3) Use Right Hand Control to choose next adventure

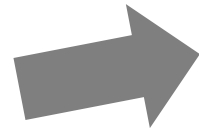
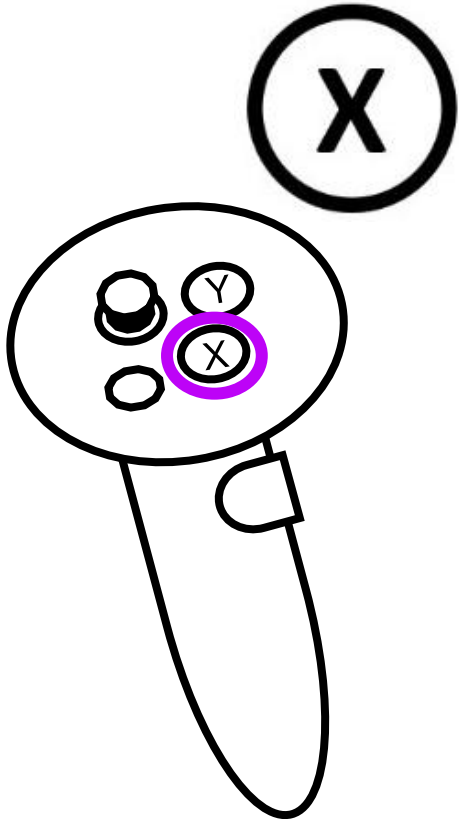
Trigger:  
Point, Press and  
release



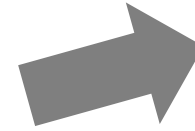
Note: to exit Map click on Y button again

# How to use the Main Menu (recommended only for facilitators to use)

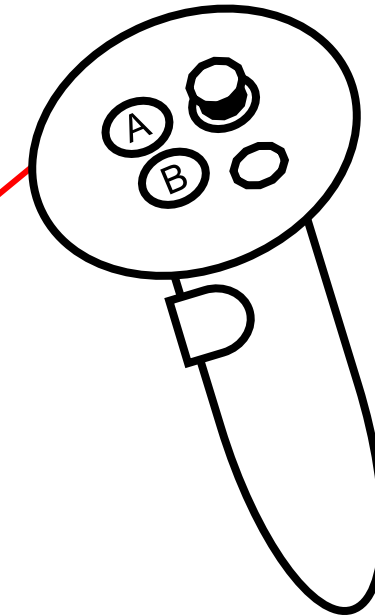
1) On Left Hand Control click X button to open Main Menu



2) Main Menu opens on your left hand



3) Use Right Hand Control to select

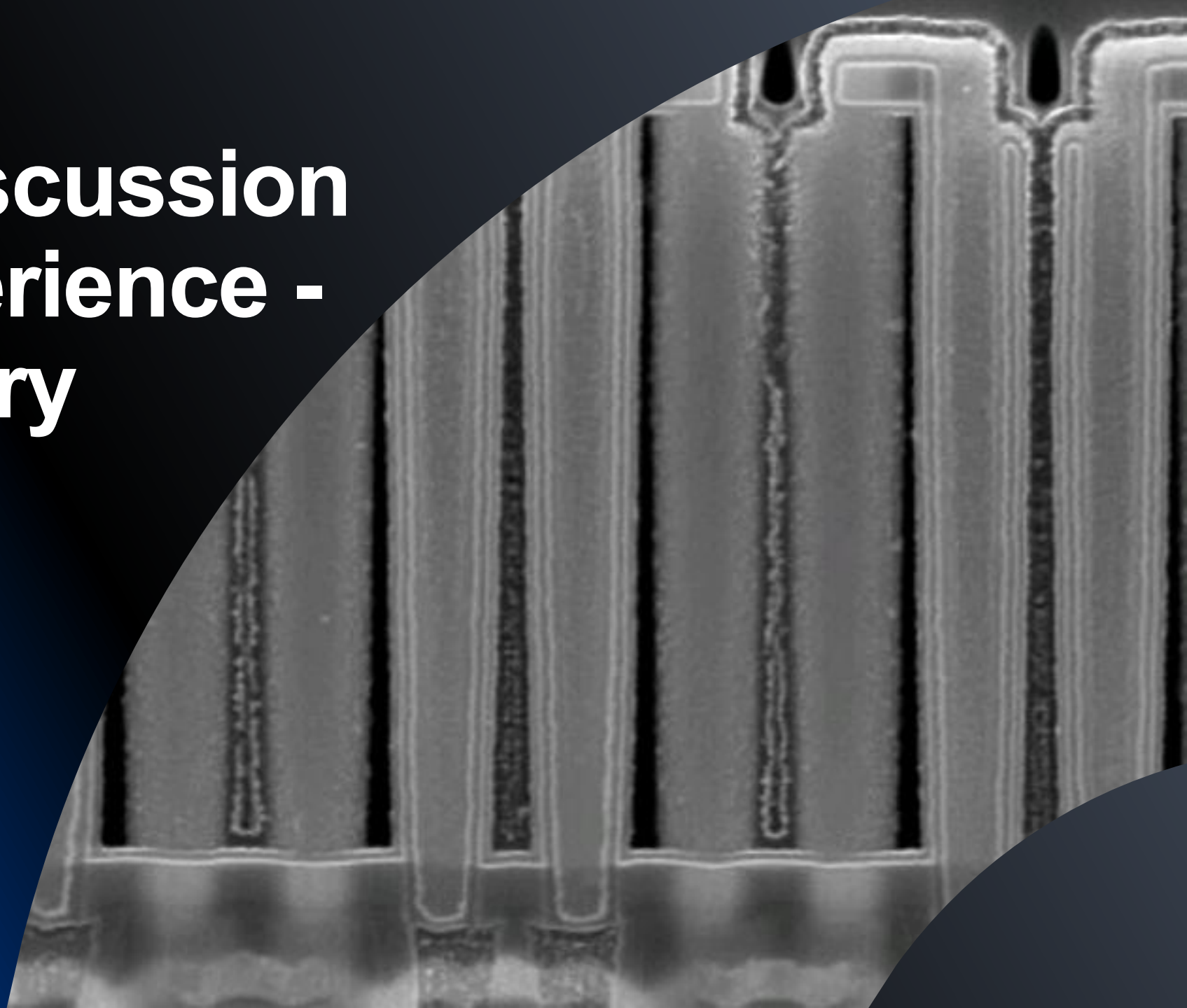


Trigger:  
Point, Press and  
release

Note: to exit Menu  
click on X button again

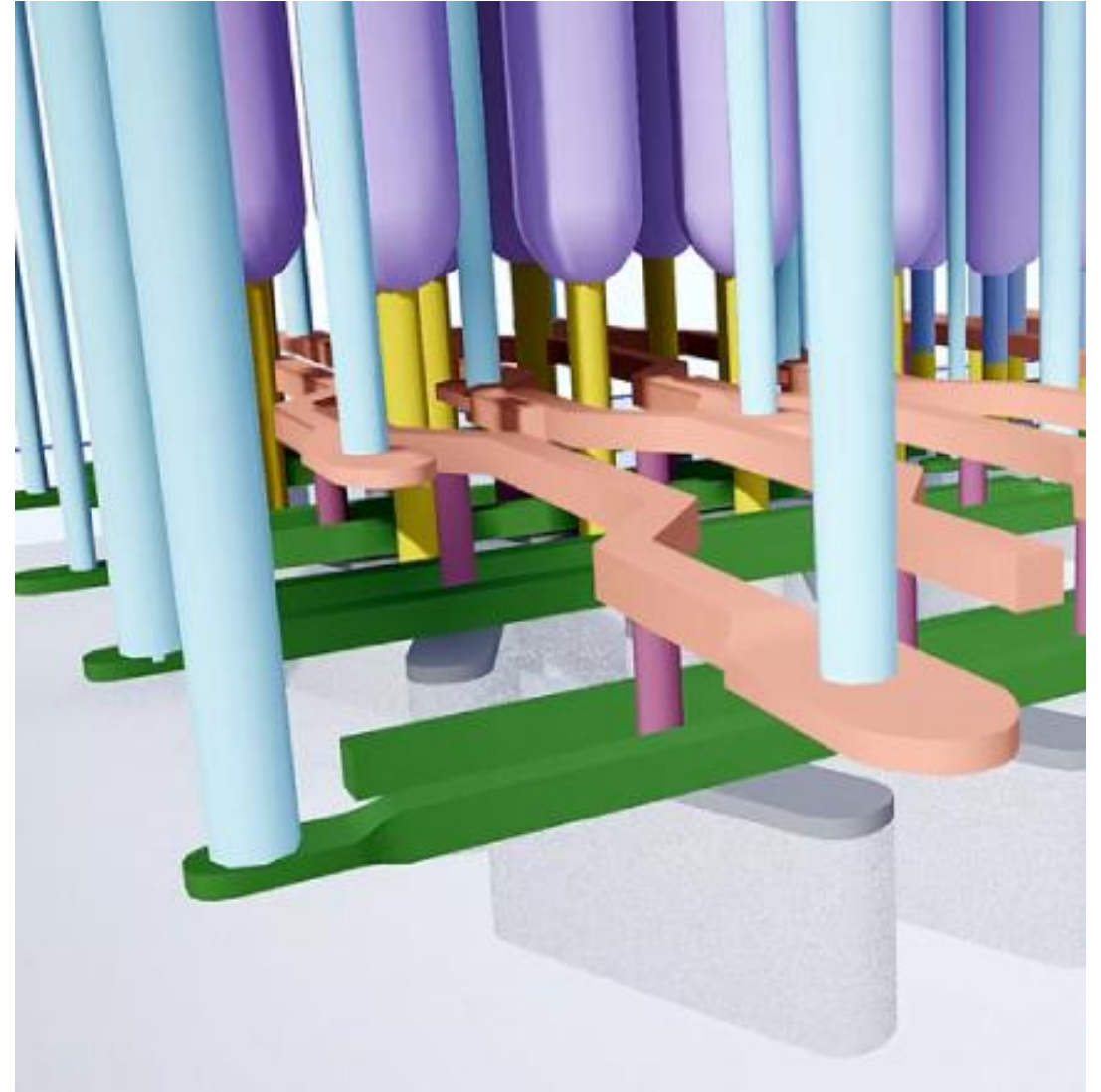
# Topics for discussion after VR experience - DRAM Memory

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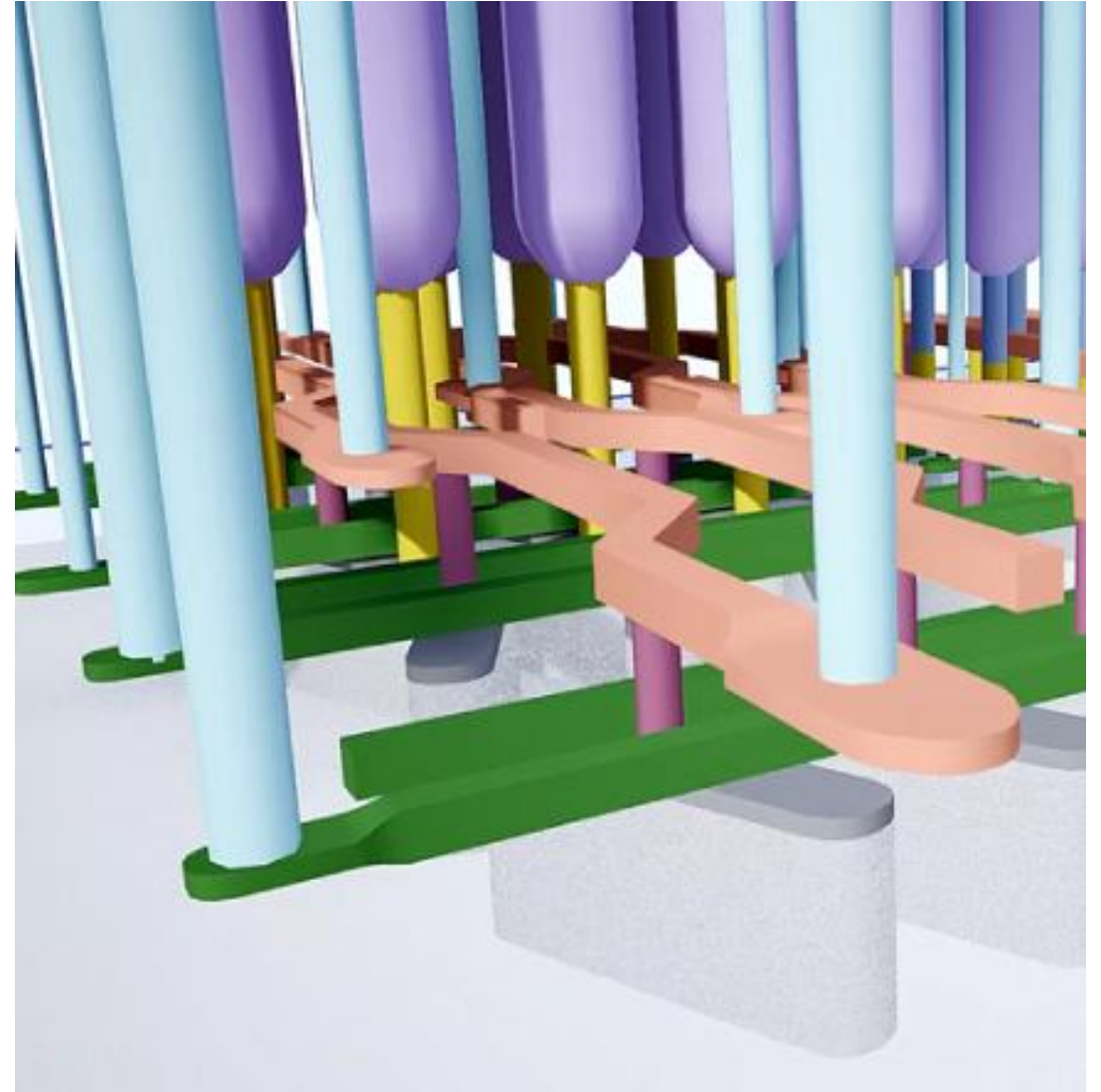
# DRAM memory discussion/disclaimers

- Memory arrays **do not** have open gaps between components/structures. All devices/structures are protected by insulation and are all **compacted** (crunched) together.
- Cylindrical connections such as **cell contacts** and **digitline contacts** are **much shorter** than shown and not actually cylinders (cylinder shape was convenient to illustrate contact but it is not the actual shape of some contacts).

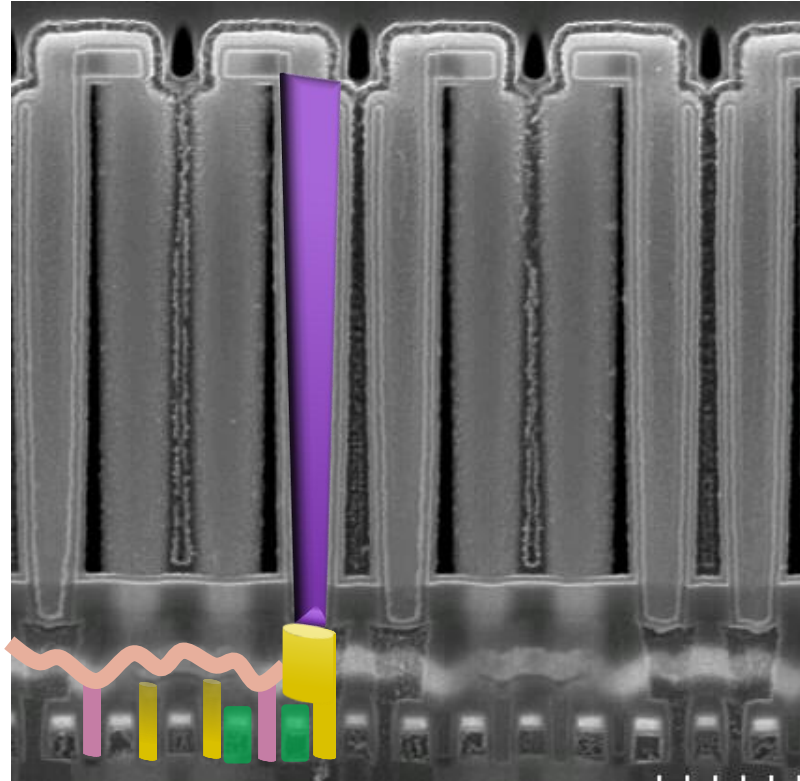


# DRAM memory discussion/disclaimers

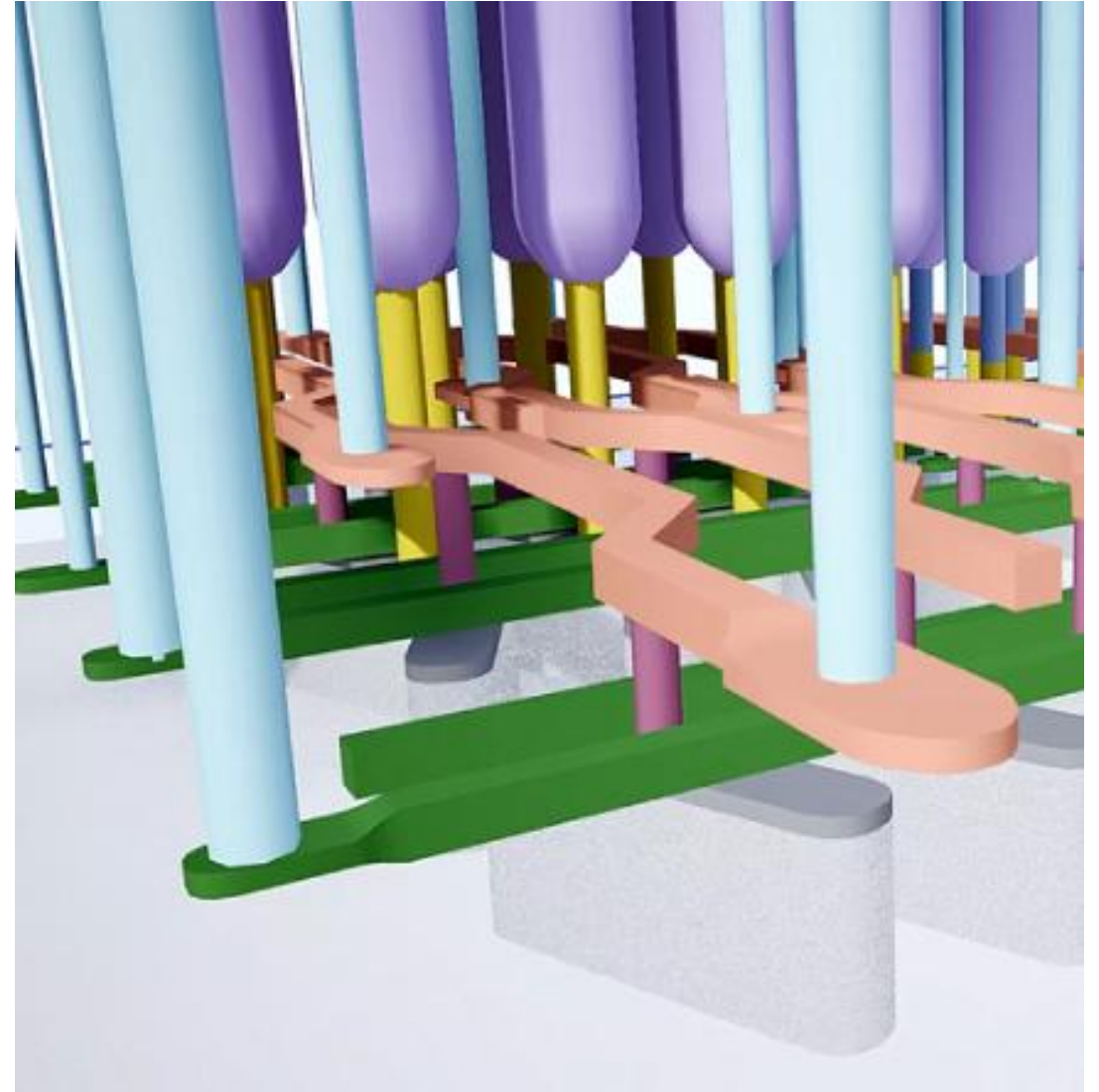
- The **wordlines** today are buried *below* the silicon surface. The wordlines shown here are built on top of the silicon which is an older technology to facilitate the explanation.
- Current **capacitors** are taller and skinnier than shown. They have a high ‘aspect ratio’. What is aspect ratio?
- Today, **digitlines** are straight (no weaving). Best for tiny features, tight control, and repeatability.



# DRAM memory discussion



This Scanning Electron image of an older DRAM memory array (similar to the technology shown in the VR experience) may have some recognizable features. What can you identify?



# Topics for discussion after VR experience - Equipment Tech

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# Fab Equipment Tech Role

 **CMP (Chemical Mechanical Planarization) is one of 10 fab areas**

 **Equipment Technician roles in all 10 fab areas**

- See list of areas on the right

 **What Do Equipment Technicians Do?**

- Maintain, troubleshoot, and calibrate advanced fab equipment

 **Education or Experience**

- Ideal candidates familiar with one or more: electrical & mechanical systems, mechatronics, robotics, microelectronics, reading and interpreting schematics

 **No Fab Experience? No Problem!**

- Most roles do not require prior fab experience
- On-the-job training is provided

 **What Makes a Great Equipment Technician?**

- Strong troubleshooting and problem-solving aptitude
- Good communication and teamwork skills

 **Ready to Join?**

- Check out current openings: [careers.micron.com](https://careers.micron.com)

## Fab Areas

- CMP (Chemical Mechanical Planarization)
- CVD (Chemical Vapor Deposition)
- Diffusion
- Dry Etch
- Implant
- Metrology
- Photolithography
- PVD (Physical Vapor Deposition)
- RDA (Real-Time Defect Analysis)
- Wet Process

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