



WELCOME TO IEETA

<https://sites.google.com/view/varlab/home>





Virtual and Augmented Reality

RVA - 2024/2025



The Team

- Professors from DETI
 - Researchers at IEETA
 - Enthusiasts of Virtual, Augmented, Mixed & eXtended Reality (VR/AR/MR/XR)
-
- Bernardo Marques - bernardo.marques@ua.pt
 - Beatriz Sousa Santos - bss@ua.pt
 - Paulo Dias - paulo.dias@ua.pt

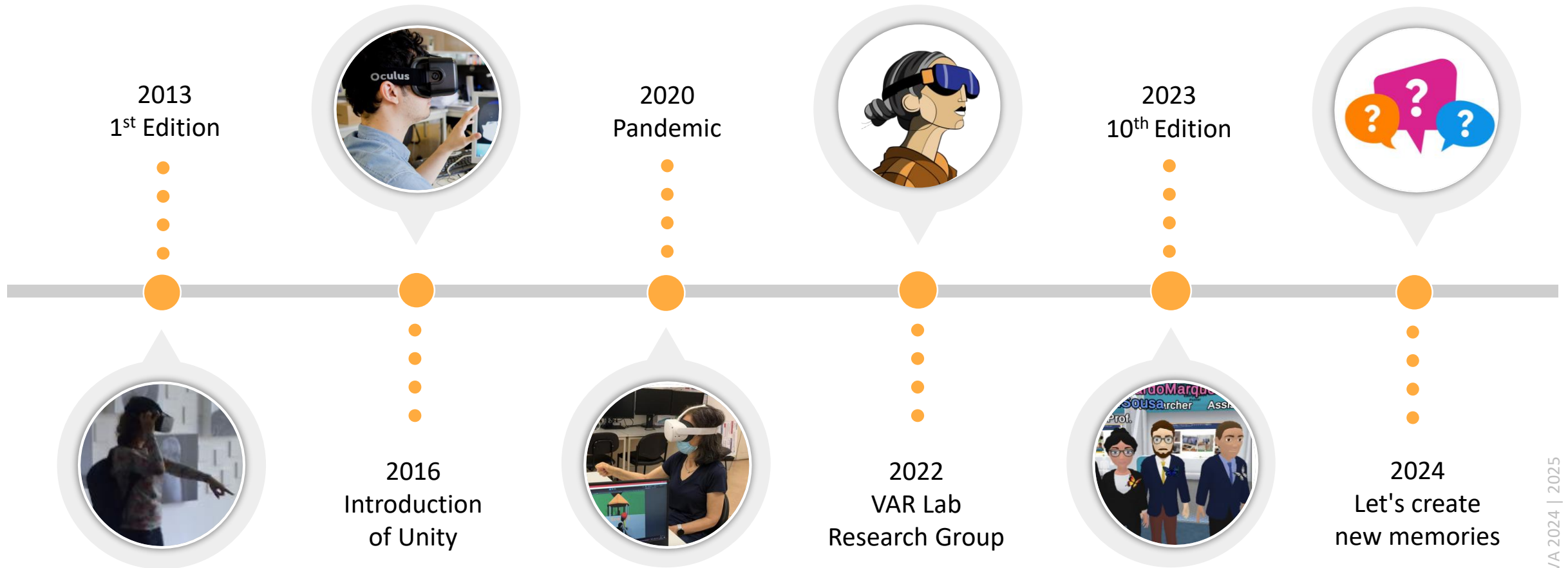


deti

departamento de electrónica,
telecomunicações e informática



Some History



Topics

- Introduction to Extended Reality (XR): Virtual Reality (VR) Augmented (AR) and Mixed Reality (MR)
- Definition, historical perspective, evolution, and applications
- Frameworks for XR
- Input and output devices, tracking
- 3D user interfaces and interaction techniques
- Human-Centered Design for XR
- Human factors in XR
- Evaluation of XR applications
- Traditional and emerging applications



Main Bibliography

- Jerald, J., The VR Book: Human-Centered Design for Virtual Reality, ACM and Morgan & Claypool, 2016
- LaValle, S., Virtual Reality - Virtual Reality. Cambridge University Press, 2023
- LaViola, J., Kruijff, E., McMaha, R., Bowman, D, Poupyrev, I. J., 3D User Interfaces: Theory and Practice, 2nd ed., Addison Wesley, 2017
- Schmalstieg, D., Hollerer, T., Augmented Reality: Principles and Practice (Usability). Addison-Wesley Professional, 2016
- Miguel Melo, Maximino Bessa, José Vasconcelos-Raposo, Introdução à Realidade Virtual - Conceitos e Aplicações. FCA, 2024
- Journal and Conference Papers ...

Lectures and Practical Classes

- Theoretical Lecture:
 - Invited talk
 - Paper presentation and discussion
- Practical sessions
- 3 sessions devoted to presentation and demo of the mini-projects (follow up and final presentations)



Lectures and Practical Classes - Tentative Schedule

- | | |
|-------------|---|
| 1 (Sep/17) | Introduction to the course, syllabus, assessment, bibliography, paper presentation guideline
<i>Home work: Install and star learning Unity</i> |
| 2 (Sep/24) | Research work at VAR Lab and visit to the laboratory; Creation of student groups
<i>Home work: Decide on a paper to present</i> |
| 3 (Oct/ 1) | T - Introduction to XR (VR, AR and MR)
P - Works from previous years; Presentation of mini-projects list; Familiarization with Unity
<i>Home work: Decide on a mini-project</i> |
| 4 (Oct/. 8) | T - Input devices and trackers
P - Mini-project selection; Familiarization with Unity
<i>Home work: Start designing mini-project</i> |
| 5 (Oct/15) | T - Human Centered Design for XR
P - Designing and conceptualization of mini-project |
| 6 (Oct/22) | T - Input devices and trackers/ Paper presentation
<i>P - Mid-term presentation (Submit sides)</i> |
| 7 (Oct/29) | T - Interaction in XR / Paper presentation
P - VR Practical Class |

Lectures and Practical Classes - Tentative Schedule

8 (Nov/ 5)	T - Invited Talk (Sérgio Eliseu) / Paper presentation P - AR Practical Class
9 (Nov/12)	T - Human Factors for XR / Paper presentations P - Mini-project Development
10 (Nov/19)	T - Human Factors for XR / Paper presentation P - Mini-project follow-up
11 (Nov/26)	T - Output devices / Paper presentation P - Mini-project Development
12 (Dec/ 3)	T - Evaluation in XR / Paper presentation P - Mini-project Development
13 (Dec/10)	T - Invited Talk (Inês Cruz) / Paper presentation P - Mini-project Development
14 (Dec/17)	T - Paper presentation P - Mini-project follow-up

Assessment

- Exam – 35%
- Mini-project – 55% (15%+40%)
 - (Final presentation on the day of the Exam)
- Paper presentation and discussion – 10%
- Working students must contact us until October 4 about the assessment!



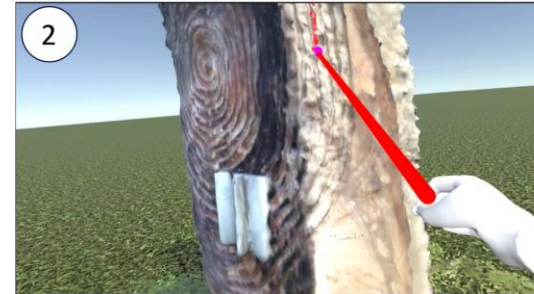
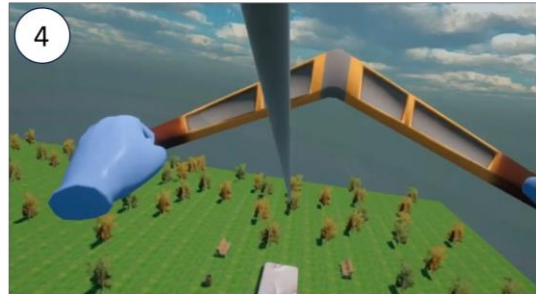
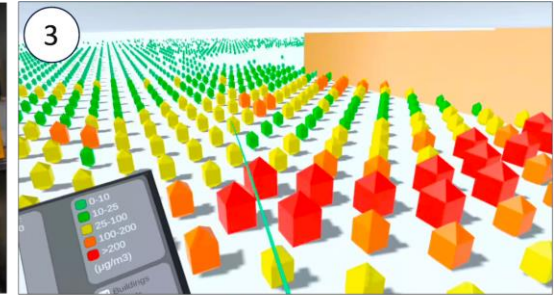
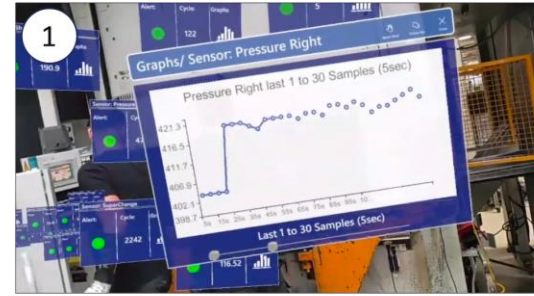
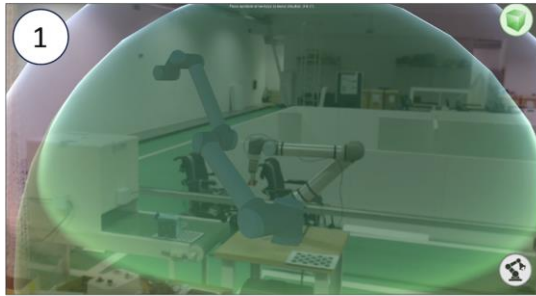
Assessment – Practical component

- Groups of two students
- Development of a simple XR application using a **Human-Centered Design** approach
- Mini-project Selection:
 - Chosen from a list of project we will provide
 - Proposed by the group based on MSc Diss topic or personal interests
- Hardware will be provided accordingly

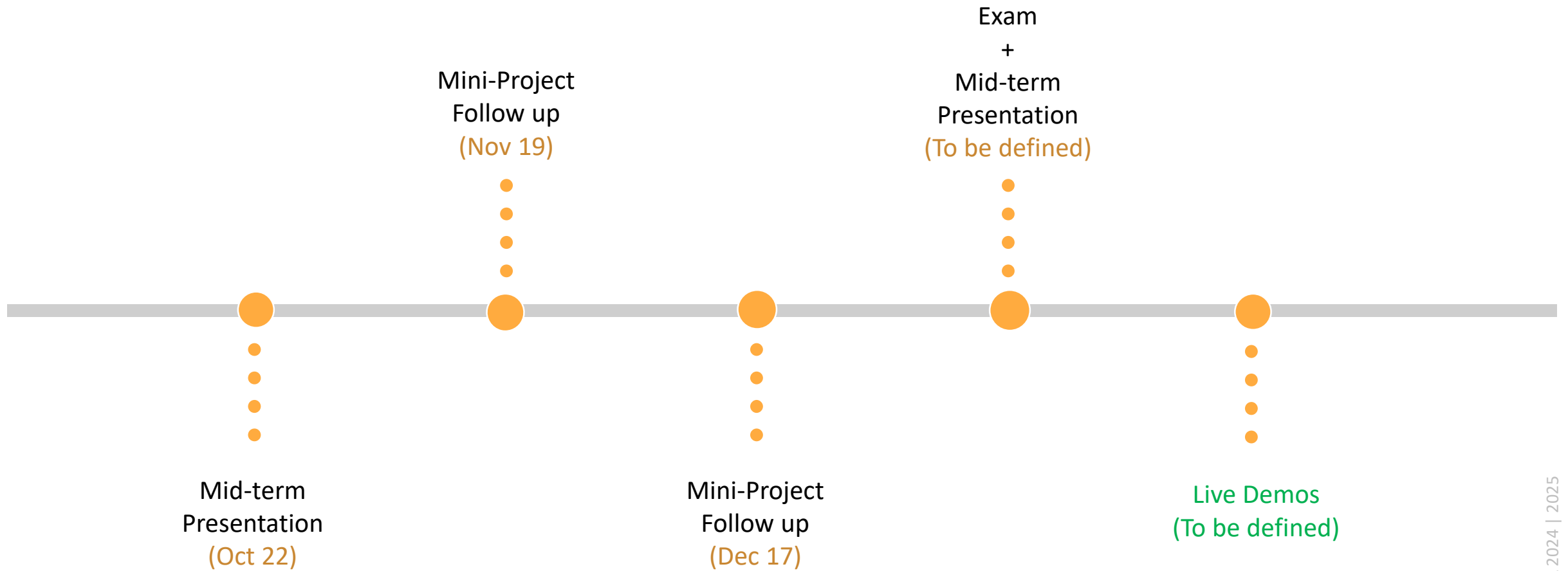


Assessment – Practical component

- We will show you some examples of past works in the next classes...



Assessment – Practical component – Overview



Hardware Available

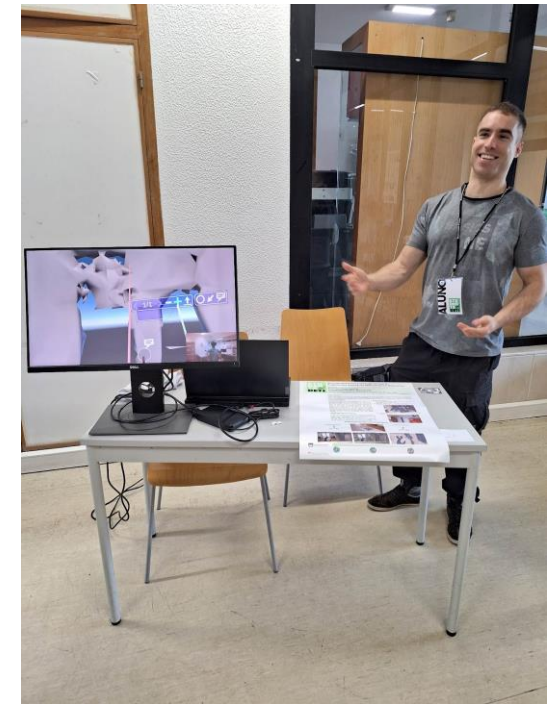


Development Tool



During classes, you may also be invited to...

- Participate in testing of XR applications currently being developed by other students/researchers ...



Paper/Framework Presentation

Analyze and present a conference/journal paper or an XR framework

- Group of 2 students - Make a 20min presentation
- **Paper Selection:**
 - A list of interesting papers will be made available at Moodle
 - Groups may choose their own paper according to their personal interests
- **Alternative:** You may select an XR framework to present!
- Guidelines for the presentation will be available at Moodle
- Send slides to bernardo.marques@ua.pt and bss@ua.pt

Bring your preferences to
propose until September
24

Paper Presentation

- Conferences:

- IEEE VR; ISMAR; UIST; SUI; MUM; VRST; Eurographics; ISS; IMX; ICAT-EGVE; CSCW; CHI; Mobile HCI; among others.

- Journals:

- IEEE Transactions on Visualization and Computer Graphics; Virtual Reality; Computer and Graphics; Multimedia Tools and Applications; IEEE Computer Graphics and Applications; International Journal of Human Computer Interaction; International Journal of Advanced Manufacturing Technology; Computers in Industry; among others (**Avoid articles from MDPI**).

- **Tools you may use to search:** Google Scholar; Scopus, Scimago (journals only), etc.

- Contact us if you have questions regarding the suitability of a paper



Alternative presentations

- Auditory perception in XR
- Haptics or smell interfaces in XR
- Human-Robot Collaboration
- Applications of AI in XR use-cases
- Ethics, privacy and security in XR
- Advanced features of Unity
- An emerging XR equipment
- Or other relevant topics...



Presentation discussion

- After each talk:
 - You must be prepared to discuss the topic with the class
 - Engagement/questions by students are encouraged
 - All students will vote on each other presentations – link will be at Moodle



Next Class

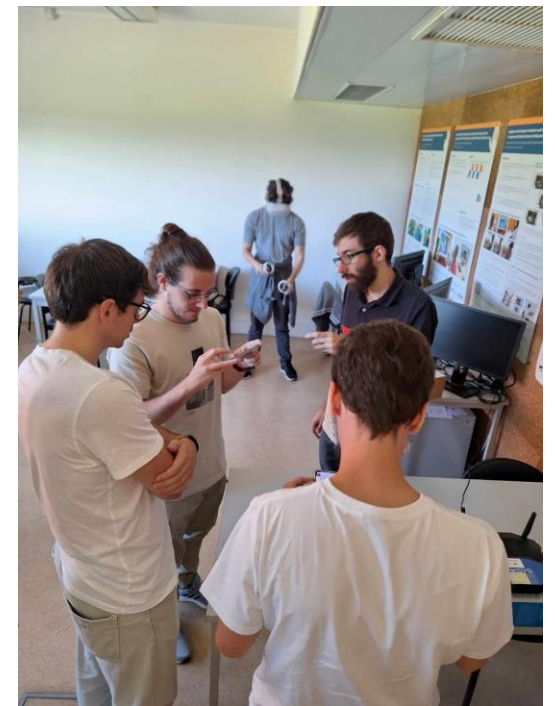
- Visit the VAR Lab installations – Who are we and what we do? + Demonstrations of XR applications



- You should appear at the beginning of next class in Building 24 – IEETA

Next Class

- Visit the VAR Lab installations – Who are we and what we do? + Demonstrations of XR applications.



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Before we finish

- Questions?
- Let's talk about You – Why this class?
- Date for the exam
- Who what's to present and discuss a paper on **October 22nd?**



A woman with long dark hair, wearing a white VR headset and a white patterned shirt, is sitting cross-legged on a brick ledge. She is waving her right hand towards the camera. Behind her is a large, calm pond that reflects the surrounding environment. In the background, there are modern university buildings with brick and concrete facades, palm trees, and a clear blue sky. The overall scene is bright and sunny.

THE END

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