Augmented and Virtual Reality Course Presentation

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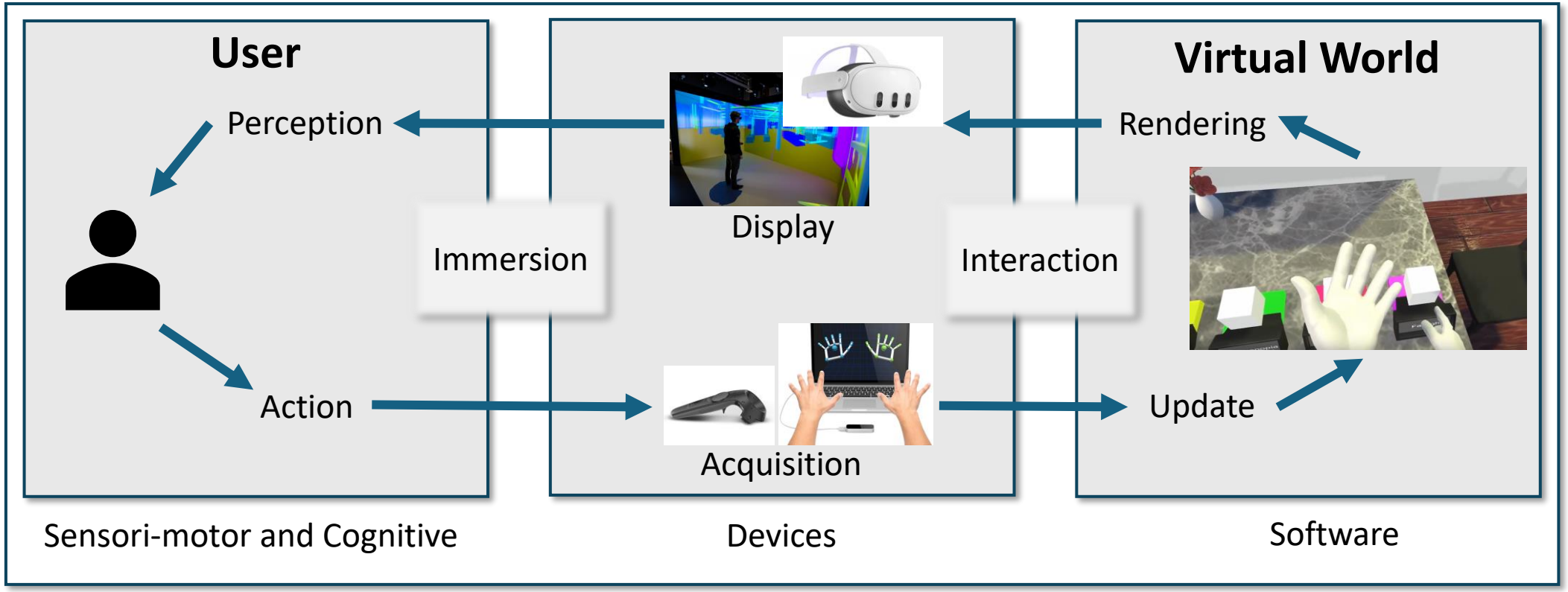
Organization

- Site
  - https://moodle.u-bordeaux.fr/course/view.php?id=18829
- Courses: Tuesdays 8 a.m.
  - Not always in this room, check every week!
- Practical Works
  - I&S Tuesdays 10:15 a.m.
  - IPCV Wednesdays 8 a.m.
- Evaluation
  - Practical Works (groups of 2) 1/3
  - Project (groups of ~4) 2/3
- Disclaimers !

Augmented and Virtual Reality (eXtended Reality, XR)

- Immersion and interaction of users in a partially or entirely virtual environment



eXtended Reality – Scientific Domains

- Computer science obviously
  - Graphics (rendering)
  - Vision (acquisition, tracking)

- But also Cognitive Sciences !
  - Human Computer Interactions
  - Immersion, Presence, Embodiment
  - Perception

Course goals

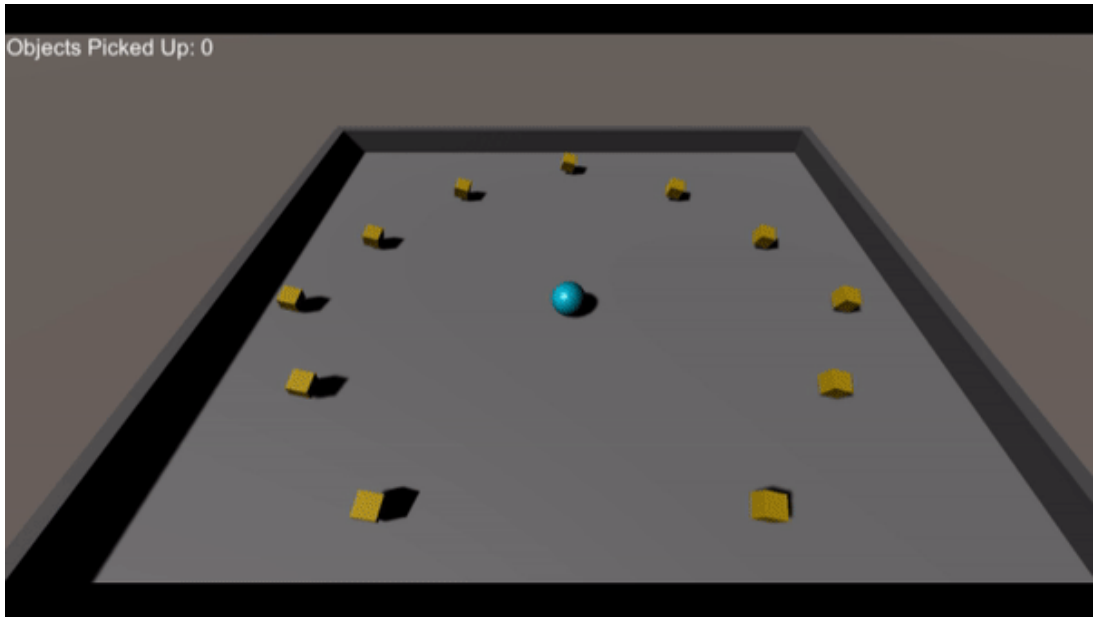
- Knowledge of the history of Augmented and Virtual Reality (XR)
- Understand the main challenges and applications of XR
- Understand challenges of Human Computer Interactions in XR, and communicate with experts
- Design, run and analyze simple user experiments
- Develop XR applications using the Unity game engine

Example – Internship in HCI lab, 2025

- Development of a Virtual Reality application (barber shop)
- Collaboration with a cognitive science student, to study presence in VR

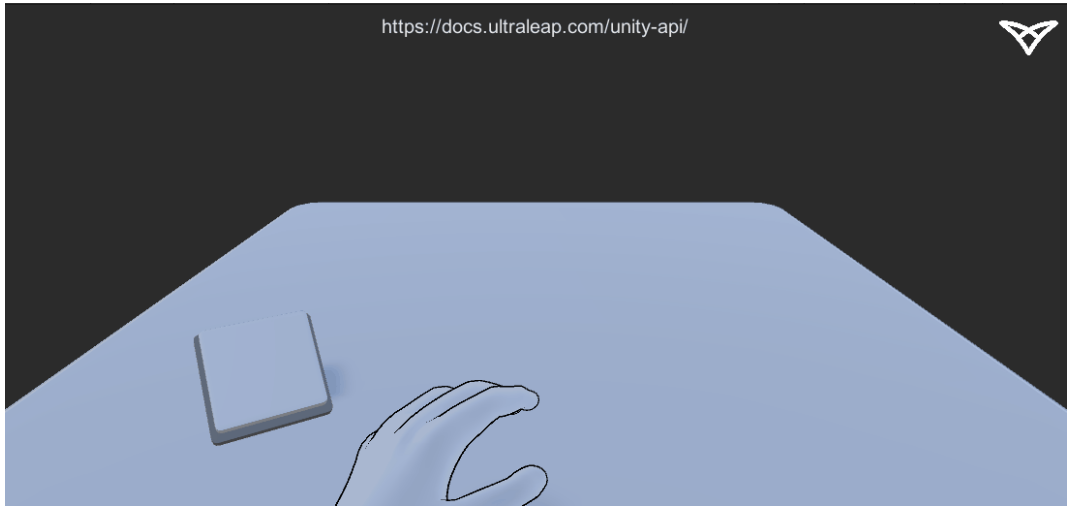
Program – September 9th to 16th

- Courses: Introduction to eXtended Reality
  - Definitions
  - History
  - Applications
  - Challenges
- Practical Work: Introduction to Unity
  - Develop a simple game in Unity
    - Not evaluated



Program – September 23rd to 30th

- Courses: Interacting with XR environments
  - XR specific devices
  - Types of interaction
    - Manipulation
    - Navigation
    - Embodied interaction
    - Collaboration
- Practical Work: Immersive interaction
  - Extension of the game with immersive devices (leap motion, AR)
    - Evaluated (Code and 3D scene)
    - Groups of 2



Program – October 7th to 14th

- Courses: Human Computer Interaction in A&VR
  - Experimental Approach
  - Psychological aspects
    - Human Perception of 3D
    - Presence and Embodiment
- Practical Work: Experimental Approach
  - Compare the performances of users on the games you implemented
    - Evaluated (protocol, pilot study, short report)
    - Groups of 2
  - Introduction on Unity for Meta Quest 3
    - Not evaluated

Program – October 21st to November 14th

- October 21st – Project Conception
  - Choice of groups and subject
  - Start to work on the theorical aspects during the course
- Practical work – Project
- Holidays
- Practical work – Project
- November 14th
  - Reverse class; present your project idea, first prototypes, plans and hypothesis
  - Evaluated

Program – November 18th to December 9th

- Courses
  - Specialized topics, *e.g.*:
    - Tracking algorithms (from IMUs to SLAM)
    - Avatars and embodiment
    - XR for studying human perception
  - Dedicated time to work on projects
  - Analysis of scientific articles
- Practical work: Project
- December 9th: project defenses

Evaluation

- 1/3 Practical, groups of 2
  - Immersive devices, leap motions and smartphone-based Augmented Reality
  - Experimental approach

- 2/3 Project, groups of 4
  - Reverse class – 1/3
  - Defense – 1/3
  - Report – 1/3