UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Virtual and Augmented Reality

2324-1-F9201P216

Aims

The aim of this course is to introduce the main concepts of VR and AR, both from the conceptual and applied point of view.
At the end of the course, the students will be able to evaluate the need of a VR/AR solution with respect to the domain and goals of the application to be created, and will be able to design and develop a prototype of an apllication using VR/AR, exploiting above all Unity.

Contents

The aim of the course is to introduce the basic concepts of VR and AR from both a theoretical and a practical point of view.
The fundamental principles that characterize VR and AR will be addressed, with basics of design principles and motivations of VR and AR applications.
For both VR and AR, basic enabling technologies will be studied (hints on HW and SW), and examples of simple Unity projects that use smartphones / headsets as enabling tools will be developed.
Finally, we will see basics of the evaluation (user tests, evaluation of adverse effects) of VR / AR applications.

Detailed program

- Introduction to the basic concepts of VR and AR and to the "mixed reality continuum" (a line that starts from the real environment, passes through augmented reality and reaches virtual reality);
- History of AR and VR
- Characterizing features of VR and AR (Virtual Worlds, techniques for locomotion/interaction/manipulation, user tracking);

- Input and Output Devices per VR e AR;
- Notes on design principles and motivations of VR and AR;
- Introduction to Unity
- Intro to VR, basic enabling technologies, development of simple Unity projects that use smartphones / headsets as VR tools;
- Intro to AR, basic enabling technologies, development of simple Unity projects that use smartphones as AR tools;
- Notes on evaluation of VR / AR applications (usability, evaluation of adverse effects).
  The course includes a strong practical and applicative component, mainly focused on VR.

Prerequisites

Basic knowledge of IT and programming

Teaching form

Lectures (28 hours) concerning the theoretical aspects of both VR and AR, and the introduction to the practical ones (including the basic knowledge of Unity).
Exercises in the classroom (or laboratory) (24 hours) for the guided development of practical exercises (in the laboratory or on personal PCs)
If possible, visits to VR/AR laboratories of the University will be organized.

Textbook and teaching resource

Slides from the teacher.
Technical book for Unity.
Books:
Virtual and Augmented Reality (VR/AR), Ralf Doerner, Wolfgang Broll, Paul Grimm, Bernhard Jung Editors. Springer, 2022
Augmented Reality: Principles and Practice (Usability) - Dieter Schmalstieg Tobias Hollerer, 2016

Semester

Second semester

Assessment method

Written test (carried out in the laboratory on online exam) on the topics, technologies and exercises seen in class and exercise, and an optional group project (2-3 people) that allows you to get some additional points on the final grade (one single delivery then held valid for all the exams of the academic year).

Oral discussion on request of the teacher or of the student.

Office hours

By appointment

Sustainable Development Goals

REDUCED INEQUALITIES | SUSTAINABLE CITIES AND COMMUNITIES