VIRTUAL REALITY AND MULTI-SENSORY INTERACTION

Semestre	Semestre 2
Nature	UE

RESPONSABLES

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OBJECTIFS

In recent years, Virtual Reality (VR) has witnessed an important technological revolution in the consumer market, in particular, with the growth and large spreading of VR head-mounted-devices (HMD). This economical breakthrough has led to a wider availability of VR systems, but have also stressed a number of research challenges that the VR research field has been studying from the early nineties. Virtual reality immerses the user in a virtual experience, but in order to create such experience, the user has to believe that the experience is plausible in terms of both perception and "presence" (the feeling of "being there" in the virtual world) and interaction (with realistic interaction capabilities). Thus, this course, in addition to provide a broad overview of virtual reality field, focuses in particular on presenting: (1) the modeling and simulation of virtual worlds (physical and behavior simulation), (2) the user's representation and mental models of such virtual worlds (visuo-haptic perception), and (3) the means to interact with them (human-computer interaction).

KEYWORDS

Virtual Reality, 3D Interaction, Haptics, Physical Simulation, User Perception

PREREQUISITES

None

CONTENTS

Introduction to Virtual Reality

What is Virtual Reality? Concepts and Definitions
Human Factors: Adding the user into the 3D loop
Virtual reality technology: Are Head-Mounted-Displays a revolution?
Creating virtual worlds: 3D graphics is not enough!
Applications: From virtual creation to virtual experiences

Human-Computer Interaction in Virtual Reality

> The 3D interaction loop: From perception to action
> 3D interaction techniques: Beyond mouse and keyboard
> User Experience: Evaluation of VR systems
> A focus on emerging technologies: Brain-Computer Interfaces

Physicalizing Virtual Worlds

> Haptic Perception: Tactile and Kinesthetic perception and integration
> Haptic Interfaces and Interaction: Feeling virtual worlds
> Physical Simulation and Haptic Rendering: Creating plausible virtual worlds
> Visuo-Haptic illusions: Pseudo-Haptic Feedback and Cross-Modal Effects

LEARNING OUTCOMES

The main goal of this course is to dive the student in the key research challenges of virtual reality by providing a complete view of the state of the simulation and interaction with virtual worlds. In particular, enable the student to analyze and design 3D interaction methods exploiting the user capabilities (motor and perceptual).

APPARTIENT À

Master 2 informatique parcours Science Informatique

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