USEET1 - Integration of Virtual and Augmented Reality Technologies in Connected Industries

Mis à jour le 05-07-2024

Code : USEET1

Unité spécifique de type cours

3 crédits

Responsabilité nationale : EPN05 - Informatique / Eulalie VERHULST

Présentation

Prérequis

- Basic Knowledge of Virtual and Augmented Reality: A basic knowledge of the principles and concepts behind virtual and augmented reality may be required.
- Programming Fundamentals: Since technology integration often involves software development, programming skills in relevant languages such as C# or C++, as well as understanding the concepts behind object-oriented programming, may be required.
- Knowledge of Connectivity Technologies: It may be beneficial to have knowledge of communication technologies like Web Sockets or MQTT, commonly used to connect to IoT devices and digital twins.

Objectifs pédagogiques

The content of the STC is to present novel hardware solutions for virtual, augmented and mixed reality, and showcase different applications of immersive technologies in industrial environments. In particular, the STC will show how digital twins intertwine with immersive technologies, explaining the advantages of immersive Human-Machine-Interfaces (HMIs) over traditional HMIs, and helping to identify situations where to apply immersive technologies to improve use cases in the industrial plant. The STC will also present virtual simulators for education and training.

Programme

Contenu

Introduction to Virtual and Augmented Reality Technologies. Understanding the fundamentals of Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (XR). Hardware alternatives and their advantages and disadvantages.

Applications of VR and AR in Connected Industries. Exploring use cases in manufacturing, logistics, healthcare, and other industries. Case studies of successful VR and AR implementations in connected industries.

Identifying potential challenges and solutions in real-world applications. Technical Foundations of VR and AR. Programming for VR and AR development: Unity, Unreal Engine.

Usability considerations in connected industries. Different types of interactions in VR and AR: Controllers, hand-tracking, and voice commands. Design principles for creating immersive and user-friendly interfaces with the particulars of VR and AR. Hands-on exercises in designing interfaces for specific industrial applications.

Integration of VR and AR applications with IoT devices and sensors in connected industries. Communication protocols between VR and AR applications and simulation servers or IoT devices: API Rest, Web Sockets, MQTT, OPC UA.

Fundamentals of digital twins and their levels. Integration and simulation of digital twins inside VR and AR visualizations. Alternating between digital twin simulation and real data feeds inside the same virtual experience.

Modalités de validation

- Contrôle continu
- Examen final

Description des modalités de validation

Continuous monitoring and exam.