



**Code:** XR#11

**Title:** Study and Development of advanced HMIs for the interaction with Digital Twin

**Description:** Digital Twins (DT) are becoming more and more a reality. The possibility to use a DT to monitor a critical and complex infrastructure provides an added value for monitoring both the operators' daily work and their awareness of what is happening. The complex explorable 3D, linked to real time data keeping up to date all infrastructure elements, has great advantages but, at the same time, the risk of information overload and loose of focus is critical.

The thesis work will first focus on the study of the available complex Digital Twin and will analyze the requirements coming from the operators using it, identifying the interaction gaps. The second step will be centered on designing a new interaction pattern based on gestures and personalized hardware (e.g.: <https://special-waves.com/>), which will go over the traditional interaction based on mouse/keyboard and screen. The implementation of the gesture-based interaction will complete the software side of the thesis, whose final part will be dedicated to the evaluation (in laboratory environment) of the efficacy of the solution.

**Code:** XR#12

**Title:** Development of adaptive training system based on human cognitive load

**Description:**

TXT is leader in eXtended Reality with its own platform "Pacelab WEAVR". The platform is focused on streamline the creation, deployment, and execution of AR/MR/VR applications. Training is a use-case which is already getting benefits from this technology. Further innovations are focused on the integration of AR/VR systems with external systems like Training Management Systems. The goal of the thesis project is to integrate, test and evaluate the integration of biometric sensors monitoring the user cognitive state to develop adaptive training applications. More specifically, the project will consist of the following activities:

- Analysis of SoA biometric sensor systems
- Integration of sensor systems with existing training applications
- Test and evaluation of performances and results precision
- Development in Pacelab WEAVR platform of an adaptive training module prototype
- Test of the integrated system



**Code:** ARTO#03

**Title:** Study and Development of aircraft cockpit Digital Twin for pilot interaction observation and recordings of executed procedures

**Description:**

Pilot aircraft procedures executed in the cockpit are highly regulated and pilots' training path is long and articulated, involving several levels of simulators and real like flights. Still, different maneuvers can be executed in different ways and mastering the execution is not standardized. This means that also observation and comparison between reference expert pilots and trainees can provide insights in the degree of the students' expertise as well as identify space for improvement.

During their thesis, the student will first develop the Digital Twin of a 737 MAX cockpit, creating a VR environment using both 3D assets provided by the company and the Pacelab WEAVR software, to connect flight simulation. The second step will focus on the monitoring of specific elements - such as interaction time and executed movements - that will result in a report for each referenced pilot. Comparison based on button & switch clicks and timing will be executed among different sessions.