

Industrial Ph.D. in Technologies for Resilient Living Environments
Projects associated with Financed/Co-financed positions by companies - XXXIX cycle

Company	Immensive s.r.l.s. (https://www.immensive.it/)
PhD position	Position co-financed at 50%
Project title	Risk simulation in the workplace by using innovative virtual immersion technologies
Project summary	<p>The aim of this research activity consists in the improvement of a risk simulation system in the workplace, developed by the company in virtual reality environments. Verification tests will be carried out according to a human centered logic, which sees the user totally involved in the simulation, under different sensory stimuli. The main purpose is to obtain a system truly capable of instilling a safety culture and increasing risk awareness in the workers.</p> <p>The training project focuses on the implementation of innovative technologies applied to living environments represented by workplaces, in order to make workers more resilient to high-risk operating conditions.</p> <p>The research on this subject is part of the company's vision of developing solutions for operational training in high-risk industrial fields by carrying out actions in controlled environments. Moreover, it will help to create a competitive advantage in terms of innovation by means of the experimental approach provided by the doctoral figure who will carry on the research activity.</p>

Company	Immensive s.r.l.s. (https://www.immensive.it/)
PhD position	Position co-financed at 50%
Project title	New systems for creating and visualizing living environment digital content based on the use of real-time interactive 3D graphics
Project summary	<p>The activity concerns the analysis and implementation of new digital content creation and display systems based on the use of real-time interactive 3D graphics. Thanks to virtual production systems, the acquired contents can be transported in interactive experiences in the metaverse with different purposes. To create these experiences, as well as the virtual production contents themselves, a rapid and accurate simulation of movement through the implementation of motion capture technologies is essential. To enhance the user experience and increase the degree of involvement, it will be essential to prepare multi-stimuli simulations.</p> <p>The training project focuses on the implementation of innovative technologies applied to several living environments, from the cultural heritage world to the experiential marketing one.</p> <p>The research on this subject is part of the company's vision of scouting and following the technological trends of the market and creating a competitive advantage in terms of innovation by means of the experimental approach provided by the doctoral figure who will carry on the research activity.</p>

Company	CMD Costruzioni Motori Diesel SpA (https://www.cmdengine.com/)
PhD position	Position co-financed at 50%
Project title	Development of innovative catalysts for the Water Gas Shift reaction and alternative methods for the production of methane starting from the gasification of residual biomasses
Project summary	<p>The research is aimed at analyzing, experimenting, and developing methods, techniques and components aimed at producing hydrogen and biomethane from gasification.</p> <p>Possible search fields are:</p> <ul style="list-style-type: none"> - creation of innovative catalysts active towards the Water Gas Shift reaction ($\text{CO} + \text{H}_2\text{O} = \text{CO}_2 + \text{H}_2$) with the aim of producing a flow of hydrogen at high pressure starting from the synthesis gas; - development of innovative knowledge of catalytic methanation reactors (fixed bed and fluid bed). The innovative catalytic systems must be able to increase the calorific value of the syngas, starting from vegetable biomasses/contaminated biomasses/residual materials also coming from the agri-food sector and the like, even different from virgin wood; - optimization of the gasification process for integration with the methanation reactor. <p>It is expected that the candidate will be able to:</p> <ul style="list-style-type: none"> - interpret the technical documentation and understand the functioning of the energy systems present in the Company; - carry out measurements on the chemical, mechanical and electrical characteristics of energy systems; - build mathematical models of the process using suitable software and validate their accuracy on the basis of experimental measurements; - determine the efficiencies of gasifiers and methanation reactors as indicated by the Company; - prepare technical reports on the activities.

Company	BOVIAR Srl (https://www.boviar.com/it/)
PhD position	Position co-financed at 50%
Project title	Dynamic identification and structural monitoring techniques for monumental buildings
Project summary	<p>The research proposal aims at implementing innovative methodologies for the knowledge and monitoring of historical and monumental heritage. With reference to monumental masonry constructions (e.g. churches, bell towers, etc.), different monitoring and dynamical identification techniques (based on static and/or dynamical and single and/or continuous measurements) will be investigated.</p> <p>The acquired data will be elaborated with the aim to propose:</p> <ul style="list-style-type: none"> - A procedural protocol for effective dynamical identification and structural monitoring of masonry monumental constructions based on different specific objectives. - Elaboration strategies for determining modal frequencies and assessing the possible presence of structural damage based on the result interpretation. - Numerical modelling techniques for faithfully reproducing the actual behaviour of investigated structures. <p>In order to achieve such results a strong collaboration with the co-proponent industry will be established. The PhD candidate, moreover, will spend a period (3-6 months) in an abroad university to extend the adoption of the proposed methods to different structural typologies.</p> <p>The results that will be achieved set the stage for the wider scope related to the conservation and preservation of cultural heritage.</p> <p>Therefore, the research proposal is strongly consistent with the PNRR mission no. 1 “Digitalization, innovation, competitiveness, culture and tourism”.</p>