Allegato A Breve descrizione del Progetto formativo

❖ **Titolo del Progetto Formativo:**

Artificial intelligence and Augmented reality as tools to foster digital transformation in Italian SMEs.

❖ **Descrizione dell'obiettivo scientifico e formativo:** *(min 1.000 caratteri - MAX 5.000 caratteri)*

Human-computer interaction has held a crucial role in recent history, where computers, mobile devices, wearables, IoT devices and smart devices in general have a growing pervasiveness in every aspect in our everyday life. The spread of smart devices has also been accompanied by a continuous enhancement of artificial intelligence-based applications, where the complexity of such systems is often hidden to the user, giving access to very sophisticated technologies by exploiting means that humans use to interact with each other, such as natural language, gestures or even emotions.

Moreover, the growth of *metaverses* poses new questions about the ethical, economic and social implications of these new spaces in which portions of our lives are lived.

Even if technology-augmented environments are full of opportunities, the rampant presence of machinery raises several issues both at personal and social level, such as accessibility, social organization, security and privacy, just to mention a few.

The Ph.D. project aims at joining research in Human-computer interaction field with Artificial intelligence techniques, more specifically with machine learning and deep learning approaches, within the context of virtual and augmented reality.

The educational program provides specific training on VR, AR and machine learning and deep learning with dedicated frameworks (e.g. PyTorch and TensorFlow), together with the conventional Ph.D. training program, characterized by a very multidisciplinary approach.

The training program requires, as a prerequisite, a coding, software designing and developing background, together with basis on deep learning techniques.

The resulting scientific and technological skills will enrich the productive fabric in several contexts, for instance in enhancing, modernizing, and promoting digital transformation in tourism and culture.

These sectors pose challenges the SMEs have to tackle, even referring to Tourism 4.0, and require a strong multidisciplinary approach, for instance in the context of accessibility in fruition of cultural and environmental heritage.

❖ **Supervisore Aziendale:**
Ing. Paolo Carilli – Sole Administrator
Ingegnere con oltre 10 anni di esperienza nello sviluppo e nella progettazione di sistemi e piattaforme informatiche complesse, è Project Manager dei progetti AEROMAT (co-finanziato dal M.I.U.R.), RehaStart e VESPA 2.0 (co-finanziati dalla Regione Siciliana) è stato Project Manager dei progetti co-finanziati dal M.I.U.R. – DIGITEMA e The Viral Cluster Project coordinando le attività di sette soggetti attuatori.
Engineer with over 10 years of experience in the development and design of complex IT systems and platforms, he is Project Manager of the AEROMAT projects (co-funded by M.I.U.R.), RehaStart and VESPA 2.0 (co-funded by the Sicilian Region), he was Project Manager of projects co-funded by the M.I.U.R. - DIGITEMA and The Viral Cluster Project, coordinating the activities of seven implementing bodies.

❖ **Modalità di svolgimento delle attività formative e di ricerca:**
The student will have to attend the training program of the PhD in Cognitive Sciences; in addition, specific training activities are provided for the project, which will be provided both during the period spent at the partner company and during the period abroad. These training activities will be oriented towards the in-depth study of development tools in the context of virtual and augmented reality, and in the field of machine learning, with specific focus on deep learning techniques. The research activities will be carried out in collaboration with the Human-Machine Hybrid Intelligence (HuM-HI) laboratory based at the COSPECS Department, whose highly multidisciplinary research group has a consolidated experience in the topics covered by the research project. The laboratory will also make available the equipment useful for the project (such as workstations, devices for VR and AR, software).

❖ **Ricadute e risultati attesi con particolare rilievo alla promozione dello sviluppo economico e del sistema produttivo:**
The research project was designed based on objectives related to the identification of technological needs in the context of the "digital transformation", as one of the strategic assets of the PNRR and given the entrepreneurial fabric and the potential of local context on Tourism 4.0. In this context, the in-depth study of issues related to human-machine interaction with reference to augmented and virtual systems, artificial intelligence and machine learning represent the first objective of the training project. Thanks to the training of specialized personnel, this PhD Project will have direct repercussions and results in terms of promoting economic development and the production system. Especially with reference to the development of the southern Italy, the training project is based on a clear need for specific technological experiences and skills.

The growth and spread of devices dedicated to AR and VR and the development of software connected to these new devices offer several opportunities to increase competitiveness of the companies, specifically in the local and national business fabric. There is a growing need for new technologies that lead users into immersive activities and that lead local and national companies to fully exploit the potential of these new technologies to promote their products and services, or to make their products in line with customer expectations.

L'impresa Ieeng Solution s.r.l. ospiterà il dottorando beneficiario della borsa finanziata sulle risorse del DM 352/2022 per n. 18 mesi nel corso del dottorato.

Periodo all'estero per n. 6 mesi presso la seguente istituzione:
Instituto Politcnico de Coimbradisabled, Coimbra, Portugal