Supervisor Project Idea

Supervisor

Insert a brief CV and/or external link, the total number of publications, the ORCID link, 5 of the most significant/recent publications, and a list of funded projects and awards. max 300 words

Prof. Marco D'Orazio:

- Engineer and Architect**, Full Professor in Architectural Engineering**, DICEA UNIVPM Coordinator of the DICEA section of Construction - Architectural Engineering – Ancona, Italy.
- **Vice-Rector UNIVPM** from 2019 till today. Previously Dean of the Engineering Faculty and member of the board of directors. President from 2013 to 2017, Board Member from 2018 to 2021 and responsible for PhD activities of the Architectural Engineering Scientific Society. Coordinator of UNI GL 33 and member Technical Group (national standardization body), member of UNI GL2 Italian delegate at TC 128 SC3 (European standardization body). Editor of international editorial series and journals.
- More than **350 publications**, focusing on the improvement of building construction and management and on the development of building components, considering people behaviour.

Research Group Description

Provide the name the reference department and a brief description of the research group, including external links, and available instrumentations and infrastructures. max 300 words

The research group consists of: **Marco D'Orazio** (Full Professor), **Enrico Quagliarini** (Full Professor), **Elisa Di Giuseppe** (Associate Professor), **Gabriele Bernardini** (Researcher), Francesco Monni (Researcher). Actually, the research group is involved in **3 EU projects** (Horizon, Life) and **6 national research projects** financed by public bodies (MUR, MES, etc…), producers associations and producers. The reference Department is the "**Department of Construction, Civil Engineering and Architecture**" (**DICEA**). It is among the mostly active departments of construction and civil engineering, as well as, architecture, in Italy, generating (research) and transferring (training) knowledge and value of the highest quality on such topics. DICEA is arranged in 4 main sections: Architecture, Constructions, Infrastructures and Structures. DICEA was ranked first in 2017 among the best University departments of Italy (Department of Excellence) and awarded with a grant of 6,6 M€ in the period 2018-2022. In 2022 the DICEA was again ranked first and then awarded with a new Department of Excellence grant (about 6,5 M€) for the period 2023-2027. DICEA brings together a wide range of disciplines, being leading contributor to the undergraduate programmes in civil and environmental engineering, building engineering, architectural engineering. DICEA also offers postgraduate programmes in civil, environmental, building engineering and architecture.

The **4 labs** where their research takes place are:

1) **VR/AR LAB** (VR, AR, Eye-Tracking, ECG, Physiological sensing),
2) **Immersive environment LAB** (CAVE Automatic Virtual Environment),
3) **Real scale LAB** (2 real scale building mock-ups),
4) **High calculation cluster** (7 node calculation cluster to perform high calculations (ML training, etc.).

Title and goals

Provide the title of the topic and a short summary of the project idea. max 200 words

The project idea **title** is "**Sustainable and Safe Built Environments through User-Centered approaches supported by Immersive Virtual Environments**".

The **project highlights** are:

- People spend about 90% of time indoors, thus buildings shape our comfort, behaviour, work efficiency, perception and physiology (dependent variables),
- Complexity of human-building relationship due to the presence of several indoor environmental factors (independent variables) at a time,
- A user-centered approach to building design is needed to establish a sustainable and conducive indoor environment for individuals,
- Oversimplified comprehension of human responses in the scientific sector due to the difficulty in testing different stimuli in lab studies,
- Virtual reality is a useful research tool in terms of speed of execution and possibility of tests replication by easily varying the environments design.

The **research methods** are:

- Physiological measurements,
- Questionnaires,
- Cognitive tasks,
- Actions.

The **objectives** are:

- Supporting the definition of standardized and consolidated protocols for design, testing and training in immersive virtual environments,
- Designing building (interactive) components and systems according to users' needs, perceptions and experiences, thus improving human-building interactions,
- Developing decision-support and control frameworks for built environments based on users' experience and interactive elements,
- Developing training tools to improve users' awareness and interaction with the built environment.

Contact details (*including email address of the supervisor*)

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