VR/AR based approach for the diagnosis of the state of conservation of the architectural heritage. The case of the Convento do Carmo in Lisbon

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Knowledge of the monument for its conservation is the result of a multidisciplinary work based on the integration of different data sources obtainable from historical research, architectural survey, the use of different imaging technologies. The latter are increasingly within the reach of conservators, architects and restoration companies thanks to the reduction of costs and to the effort to produce increasingly user-friendly imaging technologies both in terms of data acquisition and processing. The critical element is the interpretation of the results on which depends the effectiveness of these technologies in answering various questions that the restoration poses. Scientific literature suggests different approaches aimed at making the interpretation of imaging diagnostics easier, particularly by means of : i) the comparison between direct data (carrots, visual inspection) and results from non-invasive tests; ii) the use of specimens or laboratory test beds; iii) Virtual and Augmented reality (VR/AR) to be used as a work environment to facilitate the interpretation of non invasive imaging investigations. In particular, the reading and visualization of multiparametric information using VR/AR contents increases the standard modes for the transmission of knowledge of physical characteristics and state of conservation of the architectural heritage. This approach represents an effective system for storing and analysing heterogeneous data derived from a number of diverse non invasive imaging techniques, including Ground Penetrating radar (GPR) at high frequency, Infrared Thermography (IRT), Seismic tomography and other diagnostics techniques. In the context of Heritage Within Project, a VR/AR platform to interrelate heterogeneous data derived from GPR, IRT, Ultrasonic and sonic measurements along with results finite element computations has been developed and applied to the Convent of Our Lady of Mount Carmel in Lisbon to understand cause-and-effect mechanisms between the constructive characteristics, degradation pathologies and stress/deformation maps.

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Javier Ortega, Margarita González Hernández, Miguel Ángel García Izquierdo, Nicola Masini, et al. (2021). Heritage Within. European Research Project, ISBN: 978-989-54496-6-8, Braga 2021.