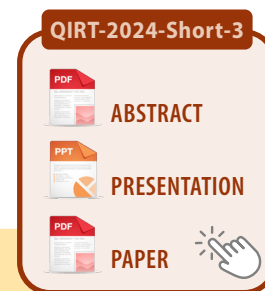




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*Stefano Sfarra attained a Ph.D. title in mechanical, management and energy engineering at the University of L'Aquila (UNIVAQ), Italy, in 2011. Following the achievement of the Ph.D., he was a research fellow at UNIVAQ until 2017, before becoming a researcher in October of the same year. He carried out research and/or teaching periods abroad at prestigious institutions all over the world. He was also an invited-scientific researcher at Tomsk Polytechnic University (Tomsk, Russia), as well as a member of several scientific committees at international congresses. He is also an editor of Mathematical Problems in Engineering (Hindawi), Infrastructures (MDPI), and Sensors (MDPI). Since December 2020, he is the editor-in-chief of the Quantitative InfraRed Thermography (QIRT) Journal (Taylor & Francis). He is deeply involved in the non-destructive evaluation and characterization of materials, especially using optical and infrared vision non-destructive testing techniques, numerical simulations centered on heat transfer phenomena (by Comsol Multiphysics), development of ad hoc scripts in Matlab environment. In these research areas, I authored or co-authored more than 250 articles in Journals and International Conferences. I also have written six chapters in Books. He is currently acting as a reviewer of 50 scientific journals and collaborator and local contact person in international research projects. He is also a member of the Associazione MASTER and the Associazione Italiana Prove Non-distruttive - Monitoraggio Diagnostica (AIPnD). He received many awards, mainly focused on scientific recognition. In October 2020, he became associate professor at UNIVAQ. Since November 2022, he is an adjunct professor at Laval University (Canada).*

## SEEING THE UNSEEN: INFRARED VISION FOR STUDYING CULTURAL HERITAGE - A RESEARCH FIELD EVOLVING ALL THE TIME THANKS TO THE USE OF MOCK-UPS

Cultural heritage is in danger. Historic houses, medieval walls, castles, antique furniture, movable objects such as panel paintings, paintings on canvas, frescoes, marquetrys, are under siege. In fact, severe weather events, invasive plants, no preventive maintenance, earthquakes and pollution are threatening their precious integrity that has stood for centuries.

Without expert conservation our heritage could crumble, their stories lost forever, and our landscape/memories be changed irrevocably. The transmission of the knowledge to future generations is pivotal for our society to keep our past alive and move towards the future. The transmission of the knowledge is in the hands of three important figures, i.e., art historians, restorers and scientists. The latter have a key role in the restoration and conservation of cultural heritage objects because, thanks to a clever use of non-destructive testing (NDT) techniques (initially tested on mock-ups), they are able to provide fundamental information to the remaining figures.

NDTs help to detect incipient defects before damage becomes visible to the naked eye. Applying a conscientious protocol of diagnostics, in which each object is monitored in the course of time, money can be saved and the 'decorative layers' are preserved.

Infrared thermography (IRT) method falls in the 'infrared vision' category. IRT, whether appropriately applied in combination with advanced algorithms, is one of the NDTs providing precious information on the health status of artworks.

In the presentation, a short review on the use of 'infrared vision' (and in particular of IRT) for the inspection of cultural heritage objects is provided. In particular, a series of experiences done by the speaker together with esteemed colleagues will be discussed, the contribution of mock-ups will be stressed, and the main current activities of the bilateral Italy-China research project for "science and technology cooperation" (Italian unit: University of L'Aquila, P.I. Prof. S. Sfarra; Chinese unit: Harbin Institute of Technology, P.I. Prof. H. Zhang), titled "sCHans – Solar loading infrared thermography and deep learning techniques for the noninvasive iNSpection of precious artifacts" (promoted by the Italian Ministry of Foreign Affairs and International Cooperation and co-financed by the Ministry of University and Research, grant number PGR02016) will be illustrated.