

Virtual Reality and Other Real-Time Visualization Technologies for Architecture Energy Certifications

Authors : Román Rodríguez Echegoyen, Fernando Carlos López Hernández, José Manuel López Ujaque

Abstract : Interactive management of energy certification ratings has remained on the sidelines of the evolution of virtual reality (VR) despite related advances in architecture in other areas such as BIM and real-time working programs. This research studies to what extent VR software can help the stakeholders to better understand energy efficiency parameters in order to obtain reliable ratings assigned to the parts of the building. To evaluate this hypothesis, the methodology has included the construction of a software prototype. Current energy certification systems do not follow an intuitive data entry system; neither do they provide a simple or visual verification of the technical values included in the certification by manufacturers or other users. This software, by means of real-time visualization and a graphical user interface, proposes different improvements to the current energy certification systems that ease the understanding of how the certification parameters work in a building. Furthermore, the difficulty of using current interfaces, which are not friendly or intuitive for the user, means that untrained users usually get a poor idea of the grounds for certification and how the program works. In addition, the proposed software allows users to add further information, such as financial and CO₂ savings, energy efficiency, and an explanatory analysis of results for the least efficient areas of the building through a new visual mode. The software also helps the user to evaluate whether or not an investment to improve the materials of an installation is worth the cost of the different energy certification parameters. The evaluated prototype (named VEE-IS) shows promising results when it comes to representing in a more intuitive and simple manner the energy rating of the different elements of the building. Users can also personalize all the inputs necessary to create a correct certification, such as floor materials, walls, installations, or other important parameters. Working in real-time through VR allows for efficiently comparing, analyzing, and improving the rated elements, as well as the parameters that we must enter to calculate the final certification. The prototype also allows for visualizing the building in efficiency mode, which lets us move over the building to analyze thermal bridges or other energy efficiency data. This research also finds that the visual representation of energy efficiency certifications makes it easy for the stakeholders to examine improvements progressively, which adds value to the different phases of design and sale.

Keywords : energetic certification, virtual reality, augmented reality, sustainability

Conference Title : ICESBCD 2021 : International Conference on Energy-Saving Building and Construction Design

Conference Location : Baku, Azerbaijan

Conference Dates : October 04-05, 2021