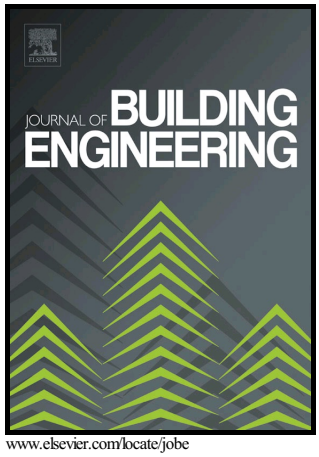

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ABSTRACT

Occupant energy behavior is a major factor affecting the energy performance of buildings, but its impact is difficult to predict during design. Although a significant amount of research has been done based on empirical and lab experiments, the performance gap of buildings, i.e., the design energy performance vs. the actual energy performance of buildings, still exists. Immersive virtual environments (IVEs) offer a unique opportunity and alternative for studying occupant energy behavior because of its potential to provide realistic virtual experiences to participants and elicit their behavioral responses. The objective of this study is to perform a comprehensive literature review to understand the potential and challenges of IVE applications to occupant energy behavior studies. The review covers research in both occupant energy behavior and IVE applications. By matching IVE capabilities with factors of the Drivers-Needs-Actions-Systems (DNAs) framework and the needs of occupant energy behavior studies, the authors found that IVE applications vary depending on IVE's technical maturity to handle DNAs factors, which can be classified into three categories; and that current IVE applications are centered on validating IVEs for occupant behavior studies and understanding behaviors in IVEs. Future research is needed to improve strategies for data generation, behavior and sensation modeling, prediction,