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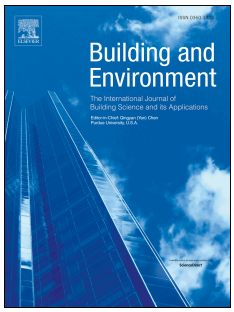

Methodology for detection of occupant actions in residential buildings using indoor environment monitoring systems

Pedro F. Pereira, Nuno M.M. Ramos, Ricardo M.S.F. Almeida, M. Lurdes Simões

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Methodology for detection of occupant actions in residential buildings using indoor environment monitoring systems

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ABSTRACT

Occupant behaviour is the subject of the current study. The number of studies in this area has been increasing over the past decade. Monitoring systems are frequently used to collect occupancy data, behaviour drivers and effects of occupant actions. However, installation of such systems is complex, and their optimal placement to obtain the intended data correctly, without disturbing the normal dwelling use, is not straightforward. The present study is a contribution to the analysis of occupant behaviours in dwellings, proposing a novel methodology for the detection of occupant actions through indoor environmental data.

An occupied dwelling in Porto, Portugal, was investigated in this work. Temperature, relative humidity and CO_2 sensors were set and installed in different rooms. In addition, the occupants completed daily journals to verify some of their actions and their presence in the dwelling. Data gathered from a nearby weather station were used in the assessment of outdoor conditions.

The proposed method was used to detect several actions, namely, windows opening, showering, heating and cooking. The principle of the proposed methodology was based on the fact that the effects of occupant actions produce extremes of a parameter time series. An algorithm generated by the application of the proposed method performed the detection of occupant actions. The method was validated using a set of data from the opposite season to be used to establish an algorithm. The proposed method achieved an accuracy of more than 99.7% of all the intended actions to be detected.