Energy Consumption reduction using Smart occupancy sensor in Mosque in hot climates

Abstract

Mosque presents a unique functional and operational building that differ from other building types. In Egypt, energy consumption of building and its cost especially for mosques is a critical issue for government. Integration of smart occupancy sensors in mosque based on sustainable principles and technologies is considered a new concept for eco friendly building. The study aims to investigate the impact of integration smart sensors inside mosque on total energy consumption with prediction of is efficiency for future periods of 2050 and 2080 and climate change. Using a smart control system as a concept does not require a significant change in building structure to reduce energy. Building simulation model using the Design-Builder software was used to investigate the impact of integration smart sensors of occupancy on mosque energy consumption. Results concluded significant reduction of annual energy consumption is achieved with a percentage ranging from 16.2 % to 21.2% due to using smart control operation plan with an energy index of the mosque that reached 69 kWh/(m^2•yr). Also, smart control systems that control energy are applicable in most of the prayer times with a reduction of total energy due to the existence of few numbers of prayers except during Friday prayer and Isha of Ramadan month. This provide information of new smart mosque as a concept for sustainable building.

Keywords

Smart sensors; Energy index; Energy efficient building; Climate change.