

Digital Transformation: Actionable Insights to Optimize the Building Performance

Authors : Jovian Cheung, Thomas Kwok, Victor Wong

Abstract : Buildings are entwined with smart city developments. Building performance relies heavily on electrical and mechanical (E&M) systems and services accounting for about 40 percent of global energy use. By cohering the advancement of technology as well as energy and operation-efficient initiatives into the buildings, people are enabled to raise building performance and enhance the sustainability of the built environment in their daily lives. Digital transformation in the buildings is the profound development of the city to leverage the changes and opportunities of digital technologies To optimize the building performance, intelligent power quality and energy management system is developed for transforming data into actions. The system is formed by interfacing and integrating legacy metering and internet of things technologies in the building and applying big data techniques. It provides operation and energy profile and actionable insights of a building, which enables to optimize the building performance through raising people awareness on E&M services and energy consumption, predicting the operation of E&M systems, benchmarking the building performance, and prioritizing assets and energy management opportunities. The intelligent power quality and energy management system comprises four elements, namely the Integrated Building Performance Map, Building Performance Dashboard, Power Quality Analysis, and Energy Performance Analysis. It provides predictive operation sequence of E&M systems response to the built environment and building activities. The system collects the live operating conditions of E&M systems over time to identify abnormal system performance, predict failure trends and alert users before anticipating system failure. The actionable insights collected can also be used for system design enhancement in future. This paper will illustrate how intelligent power quality and energy management system provides operation and energy profile to optimize the building performance and actionable insights to revitalize an existing building into a smart building. The system is driving building performance optimization and supporting in developing Hong Kong into a suitable smart city to be admired.

Keywords : intelligent buildings, internet of things technologies, big data analytics, predictive operation and maintenance, building performance

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