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**A Warning System for
Energy Consumption and Anomaly
Detection**

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A Warning System for Energy Consumption and Anomaly Detection

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ABSTRACT

Effective feedback is required to reduce building power consumption and carbon emission. Providing information that can draw attention from building manager and tenants is the first step to identify power consumption potential reduction. As anomalous consumption could provide such information, this study proposes an a warning system (WS) that intelligently analyzes anomalous power consumption from large smart meter data sets of a building space and provides real time anomalous consumption visually to different stakeholders. In this study, anomalous consumption is identified through two stages which are consumption prediction and anomaly detection. Daily real time consumption is predicted by developing daily consumption model using hybrid model neural net ARIMA. Then, anomaly consumption is analyzed by calculating the difference between real and predicted consumption through combination of two-sigma rule and time duration. The WS anomalous consumption dashboard was designed so that office occupants with limited technical skills can understand the energy consumption's behavior. The contribution of the study is two-fold. Firstly, the study contributes in formalizing methodology to detect anomalous pattern in large data sets and real time environment of building office space energy consumption. Moreover, the prediction part contributes for electricity planning, while the anomaly detection part contributes to understanding tenant's consumption behavior. Secondly, WS architecture to present anomalous power consumption of an office space from component (smart meter and sensor) data to office occupants visually in real-time. Actual electricity data from the smart meters in an actual research office space are used to demonstrate the applicability of the proposed WS.

Keywords: smart meter, anomalous consumption, feedback visualization, warning system, power consumption prediction, real time detection, dashboard.