Non-Linear Autoregressive with Exogenous Input (Narx) Chiller Plant Prediction Model

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ABSTRACT

A chiller plant is a centralized system used for air cooling systems, commonly, for covering a large area of building with various components such as chillers, cooling towers, pumps, and chilled water storage tanks. Each component has several sensors or indicators with status information. Users can use the information to plan for maintenance and as guidance during troubleshot if an event occurs. It is crucial to ensure the chiller plant is operating efficiently without any faulty especially in critical buildings such as a hospital. The main problem of the chiller plant is to conduct preventive maintenance for avoiding the chiller plant failure and breakdown unexpectedly. Based on the literature, approximately 80 components in the chiller plant has found as the possible reason for the chiller plant faulty. In the current research, modeling chiller plants has been done by several researchers, objectively for preventative maintenance purposes. Study case for this project is for a chiller plant at Hospital Raja Permaisuri Bainun, Ipoh, Perak, Malaysia. A model for the proposed chiller plant system is to be designed using System Identification (SI) technique based on Nonlinear Autoregressive with Exogenous Inputs (NARX). Validation result shows, the proposed chiller plant system can be modelled and to be used as One Step Ahead prediction tool with residual Mean Square Error (MSE) of 1.018E-3 for training set and 1.017E-3 for testing set.

KEYWORDS

Chiller Plant; Non-Linear AutoRegressive Model with Exogenous; Inputs(NARX); Neural Network

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